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Savannah River Site Approved Site Treatment Plan, 2001 Annual Update (U)

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Savannah River Site
Aiken, SC 29808

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Chapter 1. Purpose and Scope of the Compliance Plan Volume

For each facility at which the United States (U.S.) Department of Energy (DOE) generates or stores mixed wastes, Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6721, as added by Section 105(a) of the Federal Facility Compliance Act (P. L. 102-386, the FFCAct), requires DOE to devise a plan for developing treatment capacities and technologies to treat mixed waste. Upon submission of a plan to the South Carolina Department of Health and Environmental Control (SCDHEC), the FFCAct requires SCDHEC to solicit and consider public comments, and approve, approve with modification, or disapprove the plan, within six months. The agency is to consult with U.S. Environmental Protection Agency (EPA) and any state in which a facility affected by the plan is located. Upon approval of a plan, SCDHEC shall issue an order requiring compliance with the approved plan (Order).

The U. S. Department of Energy, Savannah River Operations Office (DOE-SR), has prepared the Site Treatment Plan (STP) for Savannah River Site (SRS) mixed wastes in accordance with RCRA Section 3021(b), and SCDHEC has approved the STP (except for certain offsite wastes) and issued an order enforcing the STP commitments in Volume I. DOE-SR and SCDHEC agree that this STP fulfills the requirements contained in the FFCAct, RCRA Section 3021, and, therefore, pursuant to Section 105(a) of the FFCAct (RCRA Section 3021(b)(5)), DOE's requirements are to implement the plan for the development of treatment capacities and technologies pursuant to RCRA Section 3021.

Emerging and new technologies not yet considered may be identified to manage waste more safely, effectively, and at lower cost than technologies currently identified in the plan. DOE will continue to evaluate and develop technologies that offer potential advantages in public acceptance, privatization, consolidation, risk abatement, performance, and life-cycle cost. Should technologies that offer such advantages be identified, DOE may request a revision/modification of the STP in accordance with the provisions of Consent Order 95-22-HW.

The *Compliance Plan Volume* (Volume I) identifies project activity schedule milestones for achieving compliance with Land Disposal Restrictions (LDR). Information regarding the technical evaluation of treatment options for SRS mixed wastes is contained in the *Background Volume* (Volume II) and is provided for information.

Changes to the STP will be made in accordance with the provisions of Consent Order 95-22-HW.

Table 1.1 identifies each mixed waste stream, the preferred treatment option (PO), and the location where the waste stream is described in Volumes I and II of the STP. Waste streams that have been eliminated, combined, are in compliance, or will be in compliance by April 30, 2001, do not appear in Volume I other than this table.

In 1995, DOE Headquarters expanded the scope of the master complex-wide database used to maintain mixed waste inventory data and to generate the 1995 Mixed Waste Inventory Report (MWIR). Non-mixed TRU data was incorporated into the database, which was re-named as the Material Inventory and Tracking Information (MITI) database. With the expansion of the database, the numbering of new mixed waste streams may no longer be sequential. For example, the non-mixed TRU waste streams were assigned waste stream numbers SR-W074 through SR-W076.

Table 1.1 User's Guide to Chapters 3, 4, and 5

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W001	Rad-Contaminated Solvents	Combustion in CIF or at commercial facility	3.1.1.1	3.1.1.1.A
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A	1.4, Table 1.1
SR-W003	Solvent Contaminated Debris (LLW)	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.B
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	Consolidated with SR-W037	N/A	1.4, Table 1.1
SR-W005	Mark 15 Filtercake	Stabilization by Vitrification– M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1
SR-W006	CH Mixed TRU/Liquids	Characterization at SRS– WIPP Disposal	4.1	4.2.2
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	N/A	Chapter 3 Appendix
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	N/A	Chapter 3 Appendix
SR-W009	Silver Coated Packing Material	Macroencapsulation in a Steel Container– Onsite	3.1.1.4	3.1.1.4.B
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	1.4, Table 1.1
SR-W011	Cadmium Coated HEPA Filters	Scrap Metal Exclusion	N/A	Chapter 3 Appendix
SR-W012	Toxic Characteristic Solids For Treatment in CIF	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.C
SR-W013	Low-Level Waste (LLW) Lead–to be Decontaminated Onsite	Decontamination in an Onsite Facility	3.1.1.7.C	3.1.1.7.C
SR-W014	Tritium Contaminated Mercury	Amalgamation-Offsite, DOE Complex-wide Broad Spectrum Vendor	3.1.2.3.1	3.1.2.4
SR-W015	Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	N/A	Chapter 3 Appendix
SR-W016	221-F Canyon High-Level Liquid Waste	Stabilization by Vitrification–DWPF	5	5
SR-W017	221-H Canyon High-Level Liquid Waste	Stabilization by Vitrification–DWPF	5	5
SR-W018	Listed Incinerable Solids	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.B

SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	N/A	1.4, Table 1.1
SR-W020	Salt Processing Filters	Acid Washing followed by Placement in an Engineered S. S. Container	N/A	3.1.1.4.A
SR-W021	Poisoned Catalyst Material	Waste Stream Eliminated	N/A	1.4, Table 1.1
SR-W022	DWPF Benzene	Combustion in CIF or at commercial facility	3.1.1.1	3.1.1.1.A
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a Cask as a 90-Day Generator	N/A	Chapter 3 Appendix

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	N/A	Chapter 3 Appendix
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization at SRS	4.1	4.2.1.2
SR-W026	CH Mixed TRU/Thirds	Characterization at SRS–WIPP Disposal	4.1	4.2.1.1
SR-W027	CH Mixed TRU/ F-Listed Solvents	Characterization at SRS–WIPP Disposal	4.1	4.2.1.1
SR-W028	Mark 15 Filter Paper	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	1.4, Table 1.1
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	1.4, Table 1.1
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification-M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1
SR-W032	Mercury-Contaminated Heavy Water	Waste Stream Treated	3.1.1.5	1.4, Table 1.1
SR-W032B	Mercury-Contaminated Heavy Water Residues	Solidification in Container as a 90-Day Generator	N/A	Chapter 3 Appendix
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization at SRS	4.1	4.2.1.2
SR-W034	Calcium Metal	Future Generation-Treatment to be Determined	N/A	6.6
SR-W035	Mixed Waste Oil-Sitewide	Combustion in CIF or at commercial facility	3.1.1.1	3.1.1.1.A
SR-W036	Tritiated Oil with Mercury	Treatment by Aging followed by Combustion	3.4	3.4
SR-W037	M-Area Plating Line Sludges	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1
SR-W038	Plating Line Sump Material	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1

SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1
SR-W040	Listed Stabilized Sludge/Listed LDR-Compliant Debris	Waste Stream Treated in Compliance with LDR	N/A	Chapter 3 Appendix
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	N/A	Chapter 3 Appendix

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W042	Paints and Thinners	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.B
SR-W043	Lab Waste with Tetraphenyl Borate	Consolidated with SR-W012	N/A	1.4, Table 1.1
SR-W044	Tri-Butyl-Phosphate & n-Paraffin-TRU	Consolidated with SR-W045	N/ A	1.4, Table 1.1
SR-W045	Tri-Butyl-Phosphate & n-Paraffin (PUREX)	Combustion in CIF	3.1.1.1	3.1.1.1.A
SR-W046	Consolidated Incineration Facility Ash	Stabilization CIF Ashcrete Unit	N/A	3.1.1.1.D
SR-W047	Consolidated Incineration Facility Blowdown	Stabilization CIF Ashcrete Unit or Wastewater Treatment at F/H ETF	N/A	3.1.1.1.D
SR-W048	Soils from Spill Remediation	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.2.4.2	1.4, Table 1.1
SR-W049	Tank E-3-1 Clean Out Material	Stabilization-Onsite CIF Vendor	3.1.1.7.D	3.1.1.7.D
SR-W050	Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	N/A	Chapter 3 Appendix
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.C
SR-W052	Cadmium Contaminated Glovebox Section	Waste Stream Eliminated	N/A	1.4, Table 1.1
SR-W053	Rocky Flats Ash	Characterization at SRS–Ship to WIPP	4.2	4.2.2
SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	1.4, Table 1.1
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.B
SR-W056	Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes	Waste Stream Re-characterized	N/A	1.4, Table 1.1

SR-W057	D-Tested Neutron Generators	Waste Stream Eliminated	N/A	1.4, Table 1.1
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	N/A	Chapter 3 Appendix
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	1.4, Table 1.1
SR-W060	Tritiated Water with Mercury	Macroencapsulation in a Steel Container via a Treatability Variance	3.1.1.4	3.1.1.4.B
SR-W061	DWPF Mercury	Consolidated with SR-W068	N/A	1.4, Table 1.1

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W062A	Normal Low-Level Contaminated Debris	Macroencapsulation by a Vendor at an Offsite Facility	3.1.2.2	3.1.2.2
SR-W062B	Difficult-to-treat Low-Level Contaminated Debris	Macroencapsulation by a Vendor in an Existing SRS Facility	3.1.1.7.B	3.1.1.7.B
SR-W063	Macroencapsulated Low-Level Waste	Meets Treatment Standard	N/A	Chapter 3 Appendix
SR-W064	IDW Soils/Sludges/ Slurries	Awaiting ROD, etc.	N/A	6.1
SR-W065	IDW Monitoring Well Purge/Development Water	Awaiting ROD, etc.	N/A	6.1
SR-W066	IDW Debris	Awaiting ROD, etc.	N/A	6.1
SR-W067	IDW Personal Protective Equipment (PPE) Waste	Awaiting ROD, etc.	N/A	6.1
SR-W068	Elemental (Liquid) Mercury–Sitewide	Amalgamation– Offsite DOE Complex-wide Broad Spectrum Vendor	3.1.2.3.1	3.1.2.3.1.A
SR-W069A	Low-Level Waste (LLW) Lead – to be Macroencapsulated Offsite	Macroencapsulation by a Vendor at an Offsite Facility	3.1.2.2	3.1.2.2
SR-W069B	Low-Level Waste (LLW) Lead- to be Macroencapsulated Onsite	Macroencapsulation by a Vendor in an Existing SRS Facility	3.1.1.7.B	3.1.1.7.B
SR-W070	Mixed Waste from Laboratory Samples	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1	3.1.1.1.E
SR-W071	Wastewater Suitable for Treatment in CIF	Combustion in CIF or at commercial facility	3.1.1.1	3.1.1.1.E
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Extraction or Immobilization Alternative Debris Technologies as a 90-Day Generator	N/A	Chapter 3 Appendix
SR-W073	Cadmium-Containing Raschig Rings	Macroencapsulation Onsite	3.1.2.2	3.1.2.2
SR-W077	Aqueous Characteristic Wastewater	Ion Exchange, Filtration, and/or Stabilization at F/H ETF, Saltstone, or D Area or combustion at commercial facility	N/A	Chapter 3 Appendix
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	Awaiting Characterization	3.3.2	3.3.2

SR-W079	Polychlorinated Biphenyl (PCB) Mixed Waste	Combustion in the TSCA Incinerator at ETTP	3.1.2.3.3	3.1.2.3.3
SR-W080 (CN-W001, CN-W004)	Charleston Naval Shipyard Waste– Solids and Organic Debris with Chromium and Lead	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1*	3.1.1.1.C*
SR-W081	Reactive/Ignitable Waste	Deactivation followed by combustion in CIF or at commercial facility	3.1.1.1	3.1.1.1.F
SR-W082	Radioactive Chemicals, Metals, and Pesticides (CMP) Soil	Stabilization by Vitrification in M-Area Vendor Treatment Facility	3.1.2.4.2	1.4, Table 1.1

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W083	Mercury- and Chromium-Contaminated Residues	Waste Stream Re-Characterized	N/A	1.4, Table 1.1
SR-W084	Remediation Waste Soils that Meet LDR	Meets Treatment Standard	N/A	1.4, Table 1.1
SR-W085	Rocky Flats Plutonium Fluoride Residues	Future Generation-Treatment to be Determined	N/A	6.3
SR-W086	Characteristically Hazardous Non-Incinerable Solids	Roasting/retorting followed by Amalgamation – offsite DOE Complex-wide Broad Spectrum Vendor	N/A	6.3
SR-W087 (BT-W035, part of BT-W003)	Bettis Atomic Power Laboratory Contaminated Oil	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	3.1.1.1*	3.1.1.1.B*
SR-W088	Aqueous Halogenated Solids	Treatment to be determined	3.1.3	1.4, Table 1.1
SR-W089	TRU Mixed Waste from Mound Site	Future Generation – Characterization at SRS – WIPP disposal	4.2.2	4.2.2

* Information on Charleston Naval Shipyard waste and Bettis waste is also found in Volume II, Chapter 10.

Chapter 2. Key Order Provisions

Implementation of the STP will be by SCDHEC Consent Order 95-22-HW (Order). The purpose of this chapter is to reiterate key provisions of the Order.

2.1 Definitions

a. **Project Activity Schedule(s)** shall mean the plan in the STP for performing key activities in support of mixed waste treatment(s). Project activity schedules will be provided in Chapters 3 through 5 of this Volume in accordance with the Section 3021(b)(1)(B)(ii) of the FFCAct.
b. **Milestone(s)** shall mean those specific date(s) or time frame(s) within the STP project activity schedule(s) that constitute the steps DOE-SR is committing to take to provide for treatment of its mixed waste.
c. **Day(s)** are defined as calendar days; activities defined as occurring within a given quarter shall be completed by the last day of the quarter.
d. **Revision(s)** shall mean a change to the STP, which includes but is not limited to the addition of a treatment facility, treatment capacity, or technology development not previously included in this Compliance Plan Volume.
e. **Modification(s)** shall mean a change to the STP that does not constitute a revision.
f. **Mixed Waste(s)** shall mean waste that contains both hazardous wastes and source, special nuclear, or byproduct materials, subject to the Atomic Energy Act of 1954 (42 2011 U.S.C. et seq.).
g. **Fiscal Year (FY)** shall mean the federal fiscal year, which begins October 1 and ends September 30.

2.2 Project Activity Schedules

The schedules identified in Chapters 3, 4, and 5 represent DOE's plan for treating the Site's mixed waste. Changes to these schedules require SCDHEC approval. Appendix A represents those schedule activities that occur in the upcoming federal fiscal year and that DOE agrees are enforceable commitments unless otherwise proposed by DOE and approved by SCDHEC. Appendix B represents those schedule activities planned to occur in the subsequent two federal fiscal years. During the STP annual update process, Chapters 3, 4, and 5 schedule activities will be moved into Appendix B, and Appendix B activities will be moved to Appendix A as scheduled unless otherwise proposed by DOE and approved by SCDHEC.

During the annual budget planning process, DOE-SR will seek funding by submitting a target budget request and identifying any additional funding required to accomplish activities identified in Appendix B as occurring in the upcoming federal fiscal year plus one. Additionally, DOE-SR will evaluate the funding status of the activities identified in Appendix B as occurring in the upcoming federal fiscal year plus two and those activities identified in Appendix A.

If a funding shortfall is identified for Appendix A or B activities, DOE-SR shall notify SCDHEC and attempt to resolve the shortfall through obtaining additional funds, reprioritization, and/or implementing improved operating efficiencies. If the funding shortfall for Appendix A is not resolved, DOE-SR will request a schedule modification or revision, as appropriate.

During the budgeting process, DOE-SR will also evaluate schedule activities beyond the upcoming federal fiscal year plus the next two federal fiscal years to identify required funding. If shortfalls are identified, DOE-SR shall notify SCDHEC and attempt to resolve the shortfall through reprioritization and/or implementing improved operating efficiencies. If the funding shortfall is not resolved, DOE-SR may request a schedule modification or revision, as appropriate.

2.3 Covered Matters

Applicability

Except as specifically set forth elsewhere in this plan, this plan shall apply to the RCRA LDR requirements pertaining to past, ongoing, and future generation, storage, and treatment of mixed waste at SRS, the hazardous component of which is subject to the LDR. LDR requirements can be found in the South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.268 and the Code of Federal Regulations, Chapter 40, Part 268.

Mixed Waste Treatment

This plan addresses the development of treatment capacities and technologies for treating or otherwise managing SRS mixed wastes in accordance with RCRA LDR, regardless of the time when the mixed waste was generated. For the purpose of this plan, covered mixed waste shall mean that mixed waste not excluded by the Covered Matters herein.

Exclusions–General

Inasmuch as the intent of the FFCAct is to develop an STP to address compliance with RCRA Section 3004(j), this Compliance Plan Volume shall not address mixed waste being stored or generated at SRS which (1) meets LDR requirements, regardless of when generated; or (2) mixed wastes that are being stored, or will be stored, when generated, solely for the purpose of accumulating sufficient quantities of mixed wastes as are necessary to facilitate proper recovery, treatment, or disposal in accordance with SCHWMR 61.-79.268.50. Information pertaining to the status of the mixed waste described above is provided in the Background Volume of this STP. By previous agreement with SCDHEC, small (less than 55 gallons) quantities of mixed waste(s) stored in RCRA Satellite Accumulation Areas [R.61-79.262.34(c)] are not subject to R.61-79.268 and are not included in this plan, unless requested otherwise by SCDHEC.

RCRA/Comprehensive Environmental Response Compensation and Liability Act (CERCLA)

Corrective actions and response actions shall be addressed by the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Section 120 Federal Facility Agreement (FFA) that was negotiated by EPA, DOE-SR, and SCDHEC (effective date August 16, 1993), any RCRA hazardous waste permits issued or to be issued by the State of South Carolina and EPA, orders issued pursuant to Section 3008(h) of RCRA, and/or by an agreement, order, or legal action under CERCLA. SCDHEC and DOE-SR acknowledge that this plan does not address mixed waste subject to corrective actions pursuant to RCRA and response actions pursuant to CERCLA, unless waste is removed from the area of contamination and not otherwise subject to the provisions of the RCRA/CERCLA orders or agreements.

Environmental Restoration

This plan excludes (1) environmental restoration mixed wastes derived from RCRA corrective actions and CERCLA response actions that do not involve the land disposal of hazardous wastes (e.g., the placement of remediation wastes into or within a corrective action management unit or area of contamination) and/or (2) mixed waste for which a specific treatment path is included in another existing regulatory agreement (e.g., FFA, mixed aqueous Investigation Derived Waste (IDW) in the SRS IDW Management Plan, or mixed waste with a designated treatment listed in Records of Decision (RODs)/orders), permit or order or modifications thereof. Other environmental restoration mixed waste streams not specifically excluded will be dispositioned in accordance with the strategy provided in Volume II, Section 6.1. Information on any mixed waste for which SRS proposes to be excluded from the STP shall be submitted to SCDHEC for approval.

Compliance Issues

This plan does not address RCRA compliance issues other than those issues specifically addressed herein. Therefore, SCDHEC and DOE-SR acknowledge that this plan does not affect the rights of SCDHEC to address any RCRA violations that exist or may exist at SRS not specifically covered by this plan.

2.4 Funding

Process

DOE-SR shall use its best efforts, in accordance with the DOE federal appropriations process, to request timely funding to meet its obligations under this plan.

Anti-Deficiency Act

No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

2.5 Changes to STP

Annual Update

SRS shall submit to the SCDHEC an Annual Update to the STP. This Annual Update shall be in compliance with Section 3021(b) of the FFCAct and shall include, but is not limited to, an updated inventory of all mixed waste, the status of all treatment residuals, and an updated implementation schedule. Projections of new mixed waste streams generated, or to be generated, onsite and proposed to be received from offsite shall be included in the Annual Update. A list of all proposed changes to the approved STP with a justification for requesting such changes shall be provided with the Annual Update. Unless otherwise notified by the SCDHEC, SRS shall not propose, in the Annual Update, modifications or revisions to the approved STP that have been previously denied by the SCDHEC.

Modifications and Revisions

SRS shall submit, for SCDHEC approval, a request for a modification or revision to Volume I of the approved STP for any change, unless the change requires notification only. (See Section 2.1 of Volume I for definitions of modification and revision.) All requests for modifications or revisions must meet the requirements of Section 3021(b) of the FFCAct. SRS may begin implementation of any modification or revision only upon receipt of written approval by the SCDHEC after appropriate public notice, if required. SCDHEC shall ensure that the public notice requirements of the FFCAct are addressed.

Additional RCRA Permit Identification

If SRS determines that treatment preparation steps, such as characterization, may require RCRA permits or a RCRA Interim Status Expansion, SRS will submit a revision or modification, as appropriate, to identify proposed permit application submittal dates to be included in Volume I project activity schedules.

Alternate Treatment Strategy

If SRS determines that a proposed treatment strategy is inappropriate, SRS will submit a revision or modification and identify the new proposed strategy.

Chapter 3. Mixed Low-Level Waste Treatment

The sections of this chapter discuss project activity schedules proposed for the treatment of mixed waste in accordance with Section 2.2 of this volume. Refer to Table 1.1 in Chapter 1 of this volume for the User's Guide to the waste streams in the STP. The User's Guide identifies each waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II. The sections of this chapter are divided into treatment categories as follows:

3.1 Mixed Low-Level Waste Streams with Treatment Capacity
3.2 Mixed Low-Level Waste Streams Requiring Technology Development
3.3 Mixed Low-Level Waste Streams for Which Further Characterization is Required
3.4 Mixed Low-Level Waste Streams Requiring Radionuclide Decay Prior to LDR Treatment
3.5 Mixed Low-Level Waste Stream—Other Commitments

3.1 Mixed Low-Level Waste Streams with Treatment Capacity

This section discusses the schedules and plans associated with treatment of SRS mixed waste with currently available treatment capacity. This section of the chapter is divided into treatment categories as follows:

3.1.1 Onsite Treatment
3.1.2 Offsite Treatment
3.1.3 Preferred Treatment to be Determined

3.1.1 Onsite Treatment

SRS has several onsite treatment facilities for treating mixed waste. These facilities include the Consolidated Incineration Facility (CIF) (currently in suspension of operations), the M-Area Vendor Treatment Facility (VTF) (currently in closure), the F and H Effluent Treatment Facility (F/H ETF), and the SRTC Mixed Waste Storage Tanks. Also included in this category are Treatability Variance Petition submittals and Recycling.

3.1.1.1 Consolidated Incineration Facility (CIF)

Combustion in CIF is the preferred option for certain mixed waste streams including, but not limited to, the following (Note: CIF has been placed in suspension of operation pending evaluation of PUREX alternative treatment. A decision on future operation is to be made April 1, 2002. Non-PUREX waste will be treated by commercial vendor or CIF depending on availability at the time of characterization completion.):

SR-W001, Rad-Contaminated Solvents

SR-W003, Solvent Contaminated Debris (LLW)

SR-W012, Incinerable Toxic Characteristic (TC) Material

SR-W018, Listed Incinerable Solids

SR-W022, DWPF Benzene

SR-W028, Mark 15 Filter Paper

SR-W035, Mixed Waste Oil–Sitewide

SR-W042, Paints and Thinners

SR-W045, Tri-Butyl-Phosphate and n-Paraffin (PUREX)

SR-W051, Spent Filter Cartridges and Carbon Filter Media

SR-W055, Job Control Waste Containing Solvent Contaminated Wipes

SR-W070, Mixed Waste from Laboratory Samples

SR-W071, Wastewater Suitable for Treatment at CIF

The 1995 RCRA Permit was revised February 2, 2001. This permit revision identifies that CIF operations are suspended and requires that a decision be made by April 1, 2002 on whether to restart CIF or use alternative treatment for the waste stream.

Schedule for this Onsite Facility

Submittal of all applicable permit applications:	Completed. CIF received its RCRA Part B Permit with an effective date of November 1992. The air emissions construction permit was effective in December 1992. The National Emission Standards for Hazardous Air Pollutants (NESHAP) construction permit was received in June 1989.
Entering into contracts:	Completed. Entering into contracts was completed prior to approval of the STP on September 29, 1995.
Initiating construction:	Completed. Construction was initiated on January 5, 1993, and essentially completed in July 1995.
Conducting systems testing:	Completed. Systems testing began in July 1995.
Commencing operations:	Completed. The CIF began operation on April 24, 1997.
Submit waste processing schedule:	Completed. Schedule was submitted on October 17, 1997. Schedule, as amended with this update, includes the following commitments: - Complete processing of 50% of back-logged non-PUREX SRS mixed wastes by 4QFY98. (Completed September 18, 1998. 370.9 m^3 processed of at total of 702 m^3.) - Complete the processing of non-PUREX backlogged waste and incinerable non-PUREX mixed waste in storage as of 9/30/2000 by 3QFY07 - Complete processing of 50% of back-logged PUREX solvent by 4QFY09. - Complete processing of back-logged PUREX solvent by 4QFY19.

Schedule Assumptions

The ability to perform in accordance with the schedule for the CIF depends on, but is not limited to, the following:

- "Processing" is defined as the treatment of incinerable mixed wastes to meet LDR standards in effect as of September 30, 1997. (As identified in SRS letter of October 14, 1997, which proposed the treatment schedule.) For non-PUREX mixed waste, processing could be performed at CIF or at an offsite vendor location.
- "Back-logged waste" is defined as incinerable mixed wastes which had been received into storage at RCRA-permitted or RCRA interim status storage facilities as of September 30, 1997.
- Wastes received into RCRA-permitted or RCRA interim status storage facilities between September 30, 1997 and September 30, 2000 are included in the above processing schedule. Wastes generated after September 30, 2000, are considered to be stored in accordance with the LDR storage requirements of R.61-79.268.50, including those wastes stored beyond one year to accommodate the CIF burn schedule or final vendor treatment schedule.
- New non-PUREX schedule based on original schedule completion (September 30, 2006) and time to treat additional 130 m3 accumulated since September 30, 1997.
- Receipt by DOE-SR of adequate funding.
- SCDHEC Resource Conservation and Recovery Act (RCRA) permit modifications are approved to support CIF operation.
- No changes in regulations, statutes, or the regulator's interpretations.

- The requirements for waste characterization, sorting, repackaging, and blending have been considered in determining this schedule.
- Burning and receipt of offsite wastes will be reviewed on a case-by-case basis, and requests will be filed with SCDHEC as required by paragraph 2(B) of Consent Order 95-22-HW. After completion of these steps, the additional offsite mixed wastes will be incorporated into the appropriate CIF campaign for incineration or an alternative treatment proposed. Offsite quantities are expected to be small, and thus their incorporation should have negligible impact on the treatment schedule for SRS mixed wastes.
- Completion of processing of non-PUREX incinerable mixed wastes is contingent upon SCDHEC approval of the CIF permit modification for Charleston Naval Shipyard wastes (currently stored in SRS RCRA Interim Status facility) no later than 4Q federal FY 2004 or availability of commercial treatment if CIF does not operate.
- Schedule can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of permit application(s), permit(s), or delays in approval of any other documents or other items needed to satisfy the requirements outlined,
  - any other event or series of events, including but not limited to, the discovery of new technological information or technological barriers that significantly affect the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding.

Treatment of Onsite Wastes Requiring Deactivation and Incineration

The following new waste stream, SR-W081, Reactive/Ignitable Waste, was declared a mixed waste on September 24, 1997. The treatment strategy for this waste stream was submitted verbally to SCDHEC July 14, 1998, and was documented by letter September 24, 1998. The preferred option selected was incineration by CIF. The waste is currently being stored in RCRA-regulated storage pending treatment at CIF or offsite treatment by commercial vendor.

Treatment of Offsite Waste in the Consolidated Incineration Facility (CIF)

The following Charleston Naval Shipyard (CNS) mixed waste has been brought to SRS and is stored in a RCRA-regulated storage facility pending treatment at CIF or offsite treatment by commercial vendor:

SR-W080, (CN-W001, W004), Solids and Organic Debris Containing Chromium and Lead

The following Bettis Atomic Power Laboratory mixed waste has been brought to SRS and is being stored in a RCRA interim status facility pending treatment at CIF or offsite treatment by commercial vendor:

SR-W087 (BT-W035, BT-W003), Oil Contaminated with Uranium, Lead, and Cadmium

3.1.1.2 F-Area and H-Area Effluent Treatment Facility (F/H ETF)

The previous waste stream identified in this section (SR-W041) has been treated. Treatment of waste stream SR-W047, CIF Blowdown has also been treated (nonlisted wastewater).

3.1.1.3 Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks

Currently, no additional mixed wastes are waiting to be treated by this facility. (See Section 9.1.4 of Volume II for more information.)

3.1.1.4 Onsite Treatment Via Treatability Variance Submittals

Submittal of a Treatability Variance for Macroencapsulation is the preferred option for certain mixed waste streams including the following:

SR-W009, Silver Coated Packing Material

SR-W060, Tritiated Water with Mercury

Estimated Schedule for Treatment of SR-W009

Submit applicable permit application(s):	Complete. Treatability Variance was submitted on September 18, 1997. (No RCRA permit modification will be required for performing this activity in a RCRA-permitted or interim status storage facility.)
Entering into contracts:	Initiate procurement within 3 months of approval of the treatability variance petition. Initiating procurement shall mean issuing a request for proposal based on the approved treatability variance.
Initiating construction:	Initiate construction within 12 months of approval of the treatability variance petition. Initiate construction shall mean initiating equipment and procured materials installation.
Conducting systems testing:	Initiate systems testing within 6 months of initiating construction. Initiation of system testing shall mean beginning equipment checkout, developing procedures, and planning required self-assessments.
Commencing operations:	Commence operations within 6 months of initiating systems testing. Commence operations shall mean macroencapsulating mixed waste in accordance with the approved treatability variance.
Submitting waste processing schedule:	Within 4 months after commencing operations, submit schedule for processing backlogged and currently generated mixed waste(s).

Estimated Schedule for the Treatment of SR-W060

Submit applicable permit application(s):	Complete. Treatability Variance for SR-W060 was submitted on September 18, 1997.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule depends on, but is not limited to, the following:

- Acceptable RCRA storage facility will be available when the treatability variance is approved,
- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule,
- Completion of appropriate National Environmental Policy Act (NEPA) documentation,
- Resolution of any technically related finding(s) that might result from an operational readiness self-assessment or the systems testing phase,
- No changes in regulations, statutes, or the regulator's interpretations, and
- Schedule can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of permit application(s), permit(s), or delays in approval of any other documents or other items needed to satisfy the requirements outlined,
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding.

3.1.1.5 Recycling

Recycling in D-Area Heavy Water Facility was the preferred option for certain waste streams, including the following:

SR-W032, Mercury Contaminated Heavy Water

Completion of treatment of SR-W032, Mercury Contaminated Heavy Water occurred September 25, 1997, at the D-Area Heavy Water Facility, which was closed as of September 30, 1999. No additional waste is awaiting treatment.

3.1.1.6 M-Area Vendor Treatment

M-Area Vendor

Stabilization by vitrification in the M-Area Vendor Treatment Facility (facility is in closure and is no longer available for treatment) was the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W005, Mark 15 Filtercake

SR-W029, M-Area Sludge Treatability Samples

SR-W031, Uranium/Chromium Solution

SR-W037, M-Area Plating Line Sludges

SR-W038, Plating Line Sump Material

SR-W039, Nickel Plating Line Solution

SR-W048, Soils from Spill Remediation

Completion of treatment of waste stream SR-W048 occurred February 8, 1999; however, additional waste meeting the description of SR-W048 has recently been generated (see Sec. 3.1.2.4.2 for preferred option). Completion of treatment of waste streams SR-W005, SR-W029, SR-W031, SR-W037, SR-W038, and SR-W039 occurred February 22, 1999. No additional waste is awaiting treatment, and as of October 1, 1999, the M-Area Vendor Treatment Facility underwent closure per the Clean Water Act. A small quantity of sludge generated at the time of facility closure was treated by stabilization in a 90-day accumulation area.

Treatment of Onsite Wastes Requiring Vitrification

The following new waste stream SR-W082, Radioactive Chemicals, Metals, and Pesticides (CMP) Soil, was declared a mixed waste July 7, 1998. The preferred treatment option, which was to be submitted to SCDHEC by July 30, 1999, was submitted to SCDHEC on October 16, 1998. The preferred treatment option was vitrification of the waste at the M-Area Vendor Treatment Facility. Treatment of the waste in storage at that time was completed February 24, 1999, in the M-Area Vendor Treatment Facility. Additional waste has been generated. The preferred option for this new SR-W082 waste is found in Sec. 3.1.2.4.2.

3.1.1.7 Miscellaneous Onsite Treatment

This section describes the miscellaneous technologies that are currently proposed for the onsite treatment of mixed wastes. These include SRS Macroencapsulation and Vendor Macroencapsulation onsite.

3.1.1.7.A SRS Macroencapsulation

See Section 3.1.1.4, Onsite Treatment Via Treatability Variance Petitions, for information regarding macroencapsulation at SRS.

3.1.1.7.B Onsite Vendor Macroencapsulation

Macroencapsulation by a vendor in an existing onsite facility is the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W062B, Difficult-to-Treat Low-Level Contaminated Debris

SR-W069B, Low-Level Waste (LLW) Lead – to be Macroencapsulated Onsite

Estimated Schedule for Treatment of this Waste Stream

Submit applicable permit application(s):	Submit RCRA Part B Permit Modification to SCDHEC for the treatment of any difficult-to-treat waste in an existing onsite building by the end of 3QFY03.
Issue Request for Proposal:	Issue Request for Proposal to treat any difficult-to-treat waste in an existing onsite building 120 days after SCDHEC approval of RCRA Part B Permit modification.
Enter into contract(s):	Enter into contract to treat the difficult-to-treat waste within 180 days after issuance of request for proposals.
Submit waste processing schedule:	Within 120 days after commencement of operations, submit schedule for processing the difficult-to-treat waste.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the vendor treatment process depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule,
- Completion of appropriate NEPA documentation,
- An existing SRS building will be refurbished to meet vendor treatment processing requirements,
- Resolution of any technical-related finding(s) that might result from operational readiness requirements,
- No changes in regulations, statutes, or the regulator's interpretations,
- Schedule can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of documents or other items needed to satisfy the requirements outlined,
  - any other event or series of events including, but not limited to, the discovery of new technological information or technological barriers that significantly affects the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding, and
- Approval of RCRA Part B modification no earlier than 1QFY05, and,
- Ability to complete confirmation of radiological characterization of the waste in an existing onsite RCRA permitted building to continue processing of the waste.

Definitions:

Difficult-to-treat waste – Waste that does not meet the acceptance criteria of an offsite commercial vendor and can not be readily handled by a commercial vendor.

3.1.1.7.C Onsite Decontamination

Decontamination in an existing onsite facility is the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W013, Low-Level Waste (LLW) Lead- to be Decontaminated

Estimated Schedule for Treatment of this Waste Stream

Shipment of waste:	Completed. Three boxes were shipped by December 31, 1998, which met the requirement to ship first container of waste to decontamination facility by 1QFY99. An additional commitment to issue a Request for Proposal by December 31, 1999, for any lead that is a candidate for offsite decontamination was determined to be unnecessary and was documented as complete on December 9, 1999. This potential alternate lead waste stream had previously been designated as SR-W013B. Decontamination continues.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the vendor treatment process depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule,
- Schedule can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of documents or other items needed to satisfy the requirements outlined,
  - any other event or series of events including, but not limited to, the discovery of new technological information or technological barriers that significantly affects the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding, and
- Ability to complete confirmation of radiological characterization of the waste in an existing onsite RCRA-permitted building to continue processing of the waste.

3.1.1.7.D Onsite Vendor Stabilization

Stabilization at the CIF Vendor Stabilization Facility was the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W049, Tank E-3-1 Clean Out Material

Waste stream SR-W049 was stabilized in the CIF Vendor Stabilization Facility November 4, 1998, which was prior to the commitment date, November 16, 1998. No additional waste is awaiting treatment.

3.1.2 Offsite Treatment

For those waste streams that cannot be accommodated by SRS treatment facilities, various treatment technologies available at offsite facilities have been determined to be the preferred treatment option. This section discusses the waste streams that are available for offsite treatment. Offsite treatment includes offsite vendor treatment and offsite treatment at other DOE facilities.

3.1.2.1 Offsite Vendor Decontamination

Currently, no mixed waste streams are scheduled to be decontaminated offsite by a vendor. (Note: Waste Stream SR-W013B, Low-Level waste (LLW) Lead-to be decontaminated offsite, was combined with SR-W013A, Low-Level Waste (LLW) Lead-to be decontaminated onsite to become SR-W013, Low-Level Waste (LLW) Lead-to be decontaminated onsite.) It was determined that no waste fitting the description of SR-W013B currently exists at SRS.

3.1.2.2 Offsite Vendor Macroencapsulation

Macroencapsulation at an offsite vendor's facility is the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W062A, Normal Low-Level Contaminated Debris

SR-W069A, Low-Level Waste (LLW) Lead – to be Macroencapsulated Offsite

SR-W073, Cadmium-Containing Raschig Rings

Estimated Schedule for Treatment of Waste Streams SR-W062A and SR-W069A

Submit applicable permit application(s):	Submit a treatability variance for radioactive lead acid batteries by 4QFY01 or an application for an alternative treatment method per 268.42, unless it is determined that radioactive lead acid batteries are categorized as radioactive lead solids.
Issue Request for Proposal:	Evaluate effectiveness of the DOE's Broad Spectrum Contract Vendor by end of 2QFY01. If the Broad Spectrum Contract Vendor is determined to be ineffective, issue a Request for Proposal to treat normal waste from waste streams SR-W062 and SR-W069 (normal waste is similar to standard commercial mixed waste) by an offsite vendor by end of 2QFY02.
Enter into contract(s):	If the Broad Spectrum Contract Vendor is determined to be ineffective, enter into contract for treatment by an offsite vendor by end of 4QFY02.
Waste Acceptance:	Submit waste acceptance documentation to the offsite vendor within 12 months of decision to utilize the Broad Spectrum Contract Vendor or after the award of a new contract.
Submit waste processing schedule:	Submit a schedule for sending initial shipment of waste to the offsite vendor within 90 days of vendor's acceptance of SRS waste.
Commencing operations:	Ship waste according to the shipping schedule submitted to SCDHEC.

Estimated Schedule for the Treatment of SR-W073

Submit applicable permit application(s):	Complete. Submitted Treatability Variance for SR-W073, Cadmium-Containing Raschig Rings to EPA-Region IV September 7, 1999.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the Vendor treatment process depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule,
- Completion of appropriate NEPA documentation,
- Completion of upgrades to an existing SRS building to provide capabilities to sort, segregate, confirm characterization, and repackage waste for treatment,
- No changes in regulations, statutes, or the regulator's interpretations,
- Agreement by regulatory agencies of South Carolina and the vendor facility state regulatory agency at least 60 days prior to the planned shipment date,
- Waste treatment residues will be sent to a commercial disposal facility or will be returned to SRS.
- Schedule can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of documents or other items needed to satisfy the requirements outlined,
  - any other event or series of events including, but not limited to, the discovery of new technological information or technological barriers that significantly affects the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding, and
- Ability to complete confirmation of radiological characterization of the waste in an existing onsite RCRA-permitted building to meet transportation requirements and offsite vendor’s waste acceptance requirements.

Definitions:

Normal mixed waste – Waste that is similar to standard commercial mixed waste.

Standard commercial mixed waste – Waste that meets the acceptance criteria of the commercial vendor or is readily handled by the commercial vendor under special procedures.

3.1.2.3 Offsite DOE Facilities

Some existing treatment technologies at other DOE facilities have been proposed for specific SRS mixed waste streams. This section details the SRS waste streams and the existing treatment technologies at other DOE facilities.

3.1.2.3.1 DOE Mobile Treatment Facilities

At present there are no waste streams in this section.

3.1.2.3.2 East Tennessee Technology Park (ETTP) Toxic Substances Control Act (TSCA) Incinerator

Combustion at the ETTP TSCA Incinerator at Oak Ridge, Tennessee, is the preferred option for the following waste stream:

SR-W079, Polychlorinated Biphenyl (PCB) Mixed Waste

Estimated Schedule for Treatment of This Waste Stream:

Submit commitment schedule: Completed. Schedule was submitted July 21, 1997. Schedule included the following commitments:

- Resolve comments on the preliminary application and submit a formal application by 3QFY98. Completed. Comments were resolved on the preliminary application and the formal application for the treatment of SR-W079 was submitted June 9, 1998. The Residuals Management Contingency Plan (RMCP) was approved by SCDHEC July 2, 1998, contingent upon agreement by the Tennessee Department of Environmental Conservation (TDEC).
  - Completed. Submit a shipping and treatment schedule for the PCB mixed waste within 90 days of receipt of written approval by the ETTP to accept the waste. Schedule submitted July 16, 1999.
  - Submit a shipment schedule for the PCB mixed waste within 90 days of receipt of written approval by the state of Tennessee to accept the waste.

Schedule Assumptions:

The ability to perform in accordance with the estimated schedule for the treatment of this waste in the ETTP TSCA Incinerator depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding identified for this project to support the schedule,
- Formal approval by the ETTP to ship the waste,
- Completion of the appropriate NEPA documentation,
- Agreement by the state regulatory agencies of South Carolina and Tennessee at least 60 days prior to the planned shipment date of the waste,
- SRS shipment of the waste stream according to the shipment schedule, and
- Waste treatment residuals will be sent to a commercial disposal facility or will be returned to SRS.

3.1.2.4 Offsite Commercial Facilities

Some existing treatment technologies at commercial facilities have been proposed for specific SRS mixed waste streams. This section details the SRS waste streams and the existing treatment technologies at these facilities.

3.1.2.4.1 Commercial Mercury Treatment

Roasting/retorting (RMERC) followed by a amalgamation or stabilization by a DOE Complex-wide Broad Spectrum Contractor is the preferred option for the following waste streams:

SR-W014, Tritium-Contaminated Mercury

SR-W068, Elemental (Liquid) Mercury–Sitewide

SR-W086, Characteristically Hazardous Non-Incinerable Solids

Waste streams characterized as radioactive elemental mercury will require amalgamation only.

Estimated Schedule for Treatment of these Waste Streams

Disposition of these waste streams is contingent upon completion of arrangements with a DOE Complex-wide Broad Spectrum Contractor. See STP Volume II for additional information.

Enter into contracts:	Procurement to establish work agreement with Broad Spectrum Vendor by 3QFY03 to treat streams SR-W014, SR-W068, and SR-W086. SRS to provide waste characterization data to Broad Spectrum Vendor to assure conformance to vendor's waste acceptance criteria within 6 months of work agreement.
Submit waste processing schedule:	Within 90 days of providing waste characterization data and vendor approval of the waste, SRS will submit a shipping schedule for these waste streams.

Schedule Assumptions

The ability to perform the treatment process depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding identified for this project to support the schedule,
- Completion of appropriate NEPA documentation,
- Agreement by the regulatory agencies of South Carolina and contracting state at least 60 days prior to the planned shipment date of the waste.
- SRS shipment of the waste streams according to the shipment schedule, and
- Waste treatment residues will be shipped by the offsite treatment contractor to a commercial disposal facility in conformance with LDR requirements, or will be returned to SRS.

3.1.2.4.2 Commercial Stabilization Treatment

Stabilization by a DOE complex-wide broad spectrum contractor is the preferred option for certain mixed waste streams including, but not limited to, the following:

SR-W048, Soils from Spill Remediation

SR-W082, Radioactive CMP Soils

Estimated Schedule for Treatment of these Waste Streams

Disposition of these waste streams is contingent upon completion of arrangements with a DOE Complex-wide Broad Spectrum Contractor. See STP Volume II for additional information.

Enter into contracts:	Procurement to establish work agreement with Broad Spectrum Vendor by 4QFY03 to treat streams SR-W048 and SR-W082. SRS to provide waste characterization data to Broad Spectrum Vendor to assure conformance to vendor's waste acceptance criteria within 6 months of work agreement.
Submit waste processing schedule:	Within 90 days of vendor approval of the waste, SRS will submit a shipping schedule to SCDHEC for these waste streams.

Schedule Assumptions

The ability to perform the treatment process depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding identified for this project to support the schedule,
- Completion of appropriate NEPA documentation,
- Agreement by the regulatory agencies of South Carolina and contracting state at least 60 days prior to the planned shipment date of the waste.
- SRS shipment of the waste streams according to the shipment schedule, and
- Waste treatment residues will be shipped by the offsite treatment contractor to a commercial disposal facility in conformance with LDR requirements, or will be returned to SRS.

3.1.3 Preferred Treatment to be Determined

The waste stream, SRS-W086, Characteristically Hazardous Non-Incinerable Solids, requires submittal of a treatment strategy by February 24, 2001. A strategy was submitted on this date and incorporated into the 2001 update The waste stream, SRS-W088, Aqueous Halogenated Salts, requires submittal of a treatment strategy by May 24, 2001.

3.2 Mixed Low-Level Waste Streams Requiring Technology Development

Due to the complexity of some waste streams, technologies have not been developed that can adequately treat the waste. Therefore treatment strategies for some waste streams have not been selected. This section addresses those mixed low-level waste streams that require technology development for the treatment of the waste stream.

3.2.1 Development of Mobile Unit Technology

Currently, there are no waste streams in this category.

3.2.2 Development of Characterization Technology

The waste stream, SR-W056, Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes, previously included in this section, has been determined to be nonhazardous. Currently, there are no additional waste streams requiring development of chemical characterization technology.

3.3 Mixed Low-Level Waste Streams for Which Further Characterization is Required

This section discusses the schedules for those specific waste streams that require further chemical or radiological characterization prior to the selection of a preferred treatment option. The categories in this section are divided into waste streams to be further characterized and hazardous wastes awaiting radiological screening.

3.3.1 Waste Streams to be Further Characterized

Currently, there are no waste streams in this category.

3.3.2 Hazardous Waste Awaiting Radiological Screening

The following waste stream awaits radiological characterization/method development:

SR-W078, LDR Hazardous Waste Awaiting Radiological Screening (new waste stream identified January 22, 1996; processing schedule submitted to SCDHEC January 9, 1997).

<u>Estimated Schedule for Treatment of this Waste Stream</u>

Completing radionuclide characterization for wastes included in stream SR-W078 as of January 22, 1996:	Complete radiological characterization for this waste by 4QFY01.

Within 6 months of determination that a new mixed waste stream has been identified from waste components in SR-W078, submit a proposed treatment path description to SCDHEC for this new mixed waste stream.

Within 6 months of determination that additional mixed waste has been identified for which a treatment path already exists within the STP, incorporate the additional mixed waste into the STP by separate notification to SCDHEC or by STP Annual Update.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule identified above depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified to support the schedule,
- Availability of appropriate sampling protocol necessary to characterize the waste,
- Availability of appropriate analytical methods necessary to analyze the waste,
- No changes in regulations, statutes, or the regulator's interpretations, and
- Schedules can be extended where good cause exists including, but is not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding.

3.4 Mixed Low-Level Waste Streams Requiring Radionuclide Decay Prior to LDR Treatment

Radioactive aging, followed by combustion and appropriate mercury treatment, is the preferred option for the following waste stream:

SR-W036, Tritiated Oil with Mercury

Estimated Schedule for Treatment of this Waste Stream

The tritiated oil will be stored in a RCRA interim status, permitted, or accumulation area in compliance with S.C. 61-79.262.34. Based on tritium half-life of 12 years and the present tritium contamination of up to 185 Ci/l, the projected worst-case radioactive decay time appropriate to eliminate release of excessive tritium during combustion would be 2060. A location for combustion and mercury treatment will be selected at a later date. See Volume II, Section 3.4.1, for additional details about this waste stream and its proposed treatment.

3.5 Mixed Low-Level Waste Streams—Other Commitments

Aisle Spacing Requirements

SRS will revise the storage configuration for Buildings 643-29E and 643-43E to rows of two drums wide by 4QFY02. All newly generated waste drums received into Buildings 643-29E and 643-43E will be aisle spaced in rows two drums wide. Assumptions of this schedule are based on

- Receipt of containers is consistent with historical receipts (A modification to this agreement may be requested if unusually large mixed waste streams or containers requiring storage are generated as a result of environmental restoration or decommissioning and dismantling activities).

Chapter 4. Mixed TRU (MTRU) Waste Streams

The current DOE strategy for management of mixed transuranic (MTRU) waste is to maintain the MTRU wastes in safe interim storage; to characterize, certify, process if necessary, and package the wastes to meet the Waste Acceptance Criteria (WAC) of the Waste Isolation Pilot Plant (WIPP); and to permanently dispose of applicable MTRU waste in WIPP. The Defense Authorization Bill for federal FY 97, which contained amendments to the 1992 WIPP Land Withdrawal Act, was signed by the President on September 22, 1996, and the Secretary of Energy declared WIPP open and ready to receive waste in May 1998.

The amendments also exempt DOE from the requirements to obtain a RCRA no-migration determination from EPA. EPA agrees that the no-migration determination is redundant to the more stringent radioactive waste disposal standard, and that the exemption will not jeopardize the environment. WIPP has obtained a RCRA Part B Permit from the state of New Mexico to receive mixed TRU for disposal.

Site specific information is included in the following section to outline activities being performed at the Savannah River Site to maintain safe compliant storage, waste characterization activities, and other activities planned to support the ultimate goal of shipment to and disposal at WIPP.

The following project activity schedules are planned for the treatment of Mixed Transuranic (MTRU) waste in accordance with Section 2.2 of this volume. Refer to Table 1.1, Chapter 1 of this volume for the User's Guide to the waste streams. The User's Guide identifies each waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II of the STP. The sections of this chapter are divided into treatment categories, as follows:

4.1 Site MTRU Waste Management Approach
4.2 MTRU Waste Stream Proposed for In-Depth Option Analysis (IDOA)

4.1 Site MTRU Waste Management Approach

TRU waste is defined in DOE Order 435.1 as waste contaminated with alpha-emitting transuranic radionuclides (radionuclides with atomic numbers greater than 92) with half lives greater than twenty (20) years in concentrations greater than 100 nanocuries per gram (nCi/g) of waste matrix. TRU waste at the Savannah River Site that also contains hazardous constituents as defined in 40 CFR 261 and the South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.261 is managed in accordance with both DOE Orders and S.C. Hazardous Waste Management Regulations and is referred to as Mixed-TRU (MTRU) waste.

MTRU waste streams are, and have been, generated primarily by Plutonium Separations Facilities and the Analytical Laboratories. Other past generators of significantly smaller volumes include Naval Fuels Facility, the Reactor Facility, the Fuel Fabrication Facility, the High-Level Waste Tank Farms, and the Solid Waste Management Facility. In the 1970's, SRS received a large volume of MTRU waste from offsite generators including the Los Alamos National Laboratory, Knolls Atomic Power Laboratory, and the DOE Mound Site. DOE Mound Site MTRU waste shipments are expected in the future (see Vol. II, Sec. 4.2.2).

MTRU waste generated at SRS is primarily job control waste which includes combinations of the following: plastic, paper, rubber, glassware, metal items, lead lined gloves, filters, used equipment and other contaminated materials from routine processing.

Due to the variety of container types, MTRU waste is generally categorized by its container: drums, polyethylene boxes, concrete casks, large steel black boxes, and other odd-sized containers. The type container also dictates the storage configuration, for example drums are either stored in culverts which are stored on uncovered pads that are exposed to the weather or stored directly on covered pads.

Currently, four MTRU waste streams and two mixed low-level waste (MLLW) streams are managed as MTRU waste. The actual amount of waste will depend on assay and treatment technologies available during processing and the final WIPP WAC review.

The waste streams identified in the Mixed Waste Inventory Report (MWIR) are

Waste Stream No.	Description	Current Inventory Volume (Cubic Meters)
SR-W006	CH Mixed TRU/Liquids	<0.1
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	3560
SR-W026	CH Mixed TRU/Thirds	143
SR-W027	CH Mixed TRU/F-Listed Solvents	3355
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	9
SR-W053	Rocky Flats Ash*	<0.1

*Also known as CH Mixed TRU/Residues

Waste streams SR-W025 and SR-W033 are categorized as ≤100 nCi/g but are managed as MTRU waste. These two streams potentially fit into one or more waste classifications. These waste streams will be further characterized and the portion that is MTRU (>100 nCi/g) will be sent to WIPP. The remaining mixed low-level component will be used to blend high activity MTRU waste down to meet the transportation and packaging limits for transportation to WIPP for disposal. Estimates indicate that the largest fraction of these two streams will fall into the mixed low-level waste category.

Estimated Schedule for Facility Startup and Shipping of Waste to WIPP

Submit applicable schedule for WIPP	Completed: The preliminary TRU shipping schedule is identified in Volume II, Chapter 7 of the STP. On an annual basis, SRS will re-evaluate the TRU shipping schedule listed in Volume II, Chapter 7, Section 7.5. and revise, as appropriate.

Category III Facility:

Submit applicable permit application(s):	Submit RCRA Part B permit modification to SCDHEC by 4QFY01 for the storage, treatment, and disposal of RCRA hazardous waste. Initial construction and operation for treatment of nonhazardous waste will commence prior to approval of the RCRA permit.
Initial Construction:	Within 90 days of the permit effective date, initiate construction. Initiation of construction shall mean equipment ordering.
Conducting start-up testing:	Initiate startup testing within 12 months of the permit modification approval.
Commencing Operations:	Commence operations within 25 months of permit modification approval. “Commence operations” means begin preparation of the first drum.

Estimated Schedule for Facility Startup and Shipping of Waste to WIPP (cont'd)

Category II Facility:

Submit applicable permit application(s):	Submit RCRA Part B permit application to SCDHEC by 4QFY08.
Initiating Construction:	Within 90 days of the permit effective date, initiate construction. Initiation of construction shall mean equipment ordering.
Conducting start-up testing:	Initiate startup testing within 30 months of the permit effective date.
Commencing Operations:	Commence operations within 15 months of initiating start-up testing. Commence operations means begin preparation of the first drum.

Due to a change in the interpretation of the aisle spacing guidelines, SRS must revise the storage configuration to 2-drum wide rows on covered TRU pads. The covered TRU pad storage drum reconfiguration will be complete by May 31, 2002.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule depends on, but is not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule,
- Resolution of any technically related finding(s) that might result from an operational readiness self-assessment or the systems testing phase,
- Availability and demonstration of the HANDSS-55 technology and development,
- approval of Part B modification for HANDSS-55 (Category III facility) in August 2002.
- No changes in regulations, statutes, or the regulator's interpretations,
- Operation of WIPP until 2035 as described in the Carlsbad Field Office "National TRU Waste Management Plan" (Document DOE/MP-96-1204, Revision 1),
- Schedule can be extended where good cause exists, including, but not limited to:
  - circumstances unforeseen at the time the schedule was prepared that significantly affect the work required,
  - delays in review of permit application(s), permit(s), or delays in approval of any other documents or other items needed to satisfy the requirements outlined,
  - any other event or series of events including, but not limited to, the discovery of new technological information or technological barriers that significantly affects the work required, or
  - a delay caused by insufficient funding where DOE, in a timely manner and in good faith, requested adequate funding in accordance with the federal appropriations process, but Congress failed to appropriate such funding
- Receipt of RCRA Part B Permit no earlier than end of 4QFY 2012.
- Shipments to WIPP from SRS begin in FY01 and continue in accordance with the latest approved shipping schedule. (As of February 2001, the SRS TRU waste shipping schedule is 4 shipments in FY01, 12 shipments per year from FY02 through FY14, 60 shipments per year from FY15 through FY22, and 120 shipments per year from FY23 through FY32.)
- Receipt of newly generated waste at the TRU pads is in the same proportions as historically received. (This includes the ratio of mixed to non-mixed TRU waste received, as well as the distribution between pad stored and culvert stored TRU waste drums. The storage configuration needed for each container of newly generated waste will impact the storage area remaining for drum storage on these pads).

4.2 Other MTRU Waste Stream

4.2.1 Waste Shipped Offsite

The preferred treatment for the following waste stream is shipment to WIPP.

SR-W053, Rocky Flats Ash

Estimated Schedule for Treatment of the Waste Stream

Submit applicable schedule for WIPP:	Waste is being incorporated into 026-027 and will be disposed of at WIPP as part of the proposed TRU waste shipping schedule.

4.2.2 Waste Received from Offsite DOE Facilities

The preferred treatment for the following waste stream is characterization/preparation in SRS TRU facilities followed by shipment to WIPP.

SR-W089, TRU Waste Received from Mound Site

Estimated Schedule for Treatment of the Waste Stream

Submit applicable schedule for WIPP	Revise shipping schedule (if necessary) for MTRU waste shipments to WIPP within 180 days of program certification by CBFO.

Chapter 5. High-Level Waste (HLW)

The following project activity schedules are planned for the treatment of HLW in accordance with Section 2.2 of this volume. Refer to Table 1.1, Chapter 1 of this volume for the User's Guide to the waste streams. The User's Guide identifies each waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II of the STP.

High-Level Waste Treated Onsite in Existing Facilities

Currently, DWPF is the only facility at SRS that treats high-level waste.

Vitrification in the Defense Waste Processing Facility (DWPF) is the preferred treatment option for certain mixed waste streams, including, but not limited to, the following:

SR-W016, 221-F Canyon High-Level Liquid Waste
SR-W017, 221-H Canyon High-Level Liquid Waste

Estimated Schedule for this Onsite Facility

Submittal of all applicable permit applications:	Completed. The industrial wastewater treatment construction permit was received in June 1982. The operating permit was received in August 1992. The NESHAP permit was granted in April 1988. The air emissions construction permit was granted in July 1984.
Entering into contracts:	Completed. Contracts were entered prior to approval of the STP on September 29, 1995.
Initiating construction:	Completed. DWPF construction was initiated in April 1983.
Conducting systems testing:	Completed. Systems testing was initiated in January 1993.
Commencing operations:	Completed. Operations commenced March 7, 1996.
Processing backlogged and currently generated mixed waste:	Completed. The schedule was submitted May 21, 1996. Commitments in the schedule stated that DWPF would remain in a start-up mode through 1996. During that time operating conditions will be confirmed. Upon the beginning of full operations, DWPF will maintain canister production sufficient to meet the commitment for the removal of the backlogged and currently generated waste inventory by 2028.

APPENDIX A

CURRENT FISCAL YEAR COMMITMENTS

FEDERAL FISCAL YEAR 2001

Appendix A is a summary of commitments compiled from Volume I for the current federal fiscal year 2001, including the deliverable date to meet each commitment. The process used to prepare this Appendix is found in Section 2, Chapter 2, of this volume.

Appendix A

Project Activities Schedule for the Federal Fiscal Year 2001

Federal Fiscal Year Identified: 2001

No.	Commitment Schedule	Date
A-1	Provide treatment strategy for SR-W086, Characteristically Hazardous Non-incinerable Solids	Complete
A-2	Evaluate effectiveness of DOE's Broad Spectrum Contract Vendor	3/31/01
A-3	Within 90 days of Treatability Variance approval, issue a Request for Proposal for treatment of SR-W009, Silver-Coated Packing Material (Volume I, Sec. 3.1.1.4)	Estimated Date** (6/1/01)
A-4	Within 90 days of SRS receipt of written approval from the state of Tennessee to ship South Carolina PCB wastes, SRS will provide to SCDHEC the date that SR-W079 shipment to ETTP will be completed. (Volume I, Sec. 3.1.2.3.3)	Estimated Date** (6/1/01)
A-5	Within 180 days of SRS TRU program certification, SRS will provide SCDHEC with the shipping schedule for SRS MTRU wastes to WIPP. (Volume I, Sec. 4.1)	Estimated Date* (6/1/01)
A-6	Provide treatment strategy for SR-W088. Aqueous Halogenated Salts.	5/24/01
A-7	Submit RCRA Part B Application to SCDHEC for treatment of MTRU waste (Volume I, Sec. 4.1).	9/30/01
A-8	Complete radionuclide characterization of SR-W078, Hazardous Waste Awaiting Radiological Screening (Vol. I, Sec. 3.3.2).	9/30/01
A-9	Submit treatability variance or determination of equivalent treatment for radioactive lead-acid batteries if necessary (Volume I, Sec. 3.1.1.7 B)	9/30/01

* Commitment deleted and identified as "complete" (Reference letter from SRS to SCDHEC, 12/9/99).

** Estimated date; actual date will be determined by the completion of an action by others.

APPENDIX B

COMMITMENTS FOR UPCOMING FEDERAL FISCAL YEAR +1 AND +2

Appendix B is a summary list of commitments compiled from Volume I for the first and second years after the current federal fiscal year including the deliverable dates for each commitment. The process used to prepare this Appendix is found in Section 2, Chapter 2, of this volume.

Appendix B

Project Activities Schedule for the Federal Fiscal Year +1 and +2

Federal Fiscal Year Identified: 2002 and 2003

No.	Commitment Schedule	Date
B-1	If the Broad Spectrum Contract Vendor is determined to be ineffective, Issue a Request for Proposal for offsite vendor decontamination for waste streams SR-W062A, SR-W069A, and SR-W073 (Volume I, Sec. 3.1.2.2).	3/30/02
B-2	Submit waste acceptance documentation to the offsite vendor within 12 months of decision to utilize the Broad Spectrum Contract Vendor or after the award of a new contract (Volume I, Sec. 3.1.2.2).	Estimated Date* (3/31/02)
B-3	Complete the storage configuration to 2-drum-wide rows on covered TRU pads.	5/31/02
B-4	Revise the storage configuration for Mixed Waste Storage Buildings 643-29E and 643-43E to meet the “2 drums wide” rows (Volume I, Sec. 3.5).	9/30/02
B-5	If the Broad Spectrum Contract Vendor is determined to be ineffective, enter into contract for treatment of waste streams SR-W062A, SR-W069A, and SR-W073 (Volume I, Sec. 3.1.2.2).	9/30/02
B-6	Procurement to establish work agreement with Broad Spectrum Vendor to treat streams SR-W014 and SR-W068 (Volume I, Sec. 3.1.2.4.1)	6/30/03
B-7	Procurement to establish work agreement with Broad Spectrum Vendor to treat streams SR-W048 and SR-W082 (Volume I, Sec. 3.1.2.4.2)	9/30/03

* Estimated date; actual date will be determined by the completion of an action by SRS or by another party.

Volume II

Volume II - Background Volume

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Chapter 1. Introduction

This chapter discusses the development of the Site Treatment Plan (STP) as well as the regulatory basis behind the STP. It also covers the history and mission of the Savannah River Site (SRS). In Section 1.4, the organization of the STP is described, and several tables are included for reference.

1.1 Regulatory Basis and STP Development

The Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDR) require the treatment of hazardous waste (including the hazardous component of mixed waste) to certain standards before the waste can be land disposed and prohibit storage of hazardous wastes that do not meet LDR standards, except for the purposes of accumulating sufficient quantities to facilitate proper recovery, treatment, or disposal of the waste. U.S. Department of Energy (DOE) is currently storing mixed waste inconsistent with the LDR provisions because the treatment capacity for such wastes, either at DOE sites or in the commercial sector, is not adequate or is unavailable at this time.

The Federal Facility Compliance Act (FFCAct), signed on October 6, 1992, waived sovereign immunity for fines and penalties for RCRA violations at federal facilities. However, the FFCAct postponed the waiver for 3 years for LDR storage prohibition violations for DOE's mixed wastes and required DOE to prepare plans for developing the required treatment capacity for its mixed waste at each site at which it stores or generates mixed waste. Each plan may be approved, approved with modification, or disapproved by the state after consultation with other affected states and consideration of public comment. Upon approval of the plan, the state shall issue an order requiring compliance with the approved plan. The FFCAct further provides that DOE will not be subject to fines and penalties for LDR storage prohibition violations for mixed waste as long as it is in compliance with an approved plan and order.

The FFCAct requires the plans to contain schedules for developing capacity for mixed waste for which identified treatment technologies exist and for mixed waste without an identified existing treatment technology, schedules for identifying and developing technologies. The FFCAct also requires the plan to provide certain information where radionuclide separation is proposed. The FFCAct states that the plans may provide for centralized, regional, or onsite treatment of mixed waste, or any combination thereof, and requires the states to consider the need for regional treatment facilities in reviewing the plans.

The Department of Energy (DOE) was required by Section 3021(b) of RCRA, as amended by the FFCAct, to prepare site treatment plans describing the development of treatment capacities and technologies for treating mixed waste. Plans were required for facilities at which DOE generates or stores mixed waste, defined by the FFCAct as waste containing both a hazardous waste subject to RCRA, and a source, special nuclear, or byproduct material subject to the Atomic Energy Act (AEA) of 1954 (42 U.S.C. 2011 et seq.). The Savannah River Site (SRS) Site Treatment Plan was provided to South Carolina, approved, and incorporated into a Consent Order, effective September 29, 1995, in accordance with the FFCAct. Provision 3 under Conclusions of Law in the STP Consent Order requires that updates to the STP be submitted annually no later than April 30 of each year.

DOE and SRS followed an iterative process in developing the plans, as described in an April 6, 1993, Federal Register (FR) notice (58 FR 17875), working closely with state regulatory agencies and the Environmental Protection Agency (EPA) at the site and national level throughout the process. The STP development followed a three-step interim process – a Conceptual Site Treatment Plan (CSTP) submitted in October 1993, a Draft STP (DSTP) submitted in August 1994, and a Proposed STP (PSTP) submitted in March 1995, which were provided to regulatory agencies and made publicly available. The CSTP identified a range of preliminary options for treating the mixed waste at SRS. The DSTP identified site-specific preferred treatment options that had not yet been evaluated for impacts to other DOE sites or to the overall DOE program. The PSTP further narrowed the preferred treatment options based upon feedback from the State of South Carolina and the public. DOE initially planned to submit the PSTP at the end of February 1995. However, DOE revised its submittal date with the support of the states and EPA to allow for additional discussions (see 60 FR 10840, February 28, 1995). The PSTP was submitted to SCDHEC on March 30, 1995.

The PSTP was modified in response to comments from the South Carolina Department of Health and Environmental Control (SCDHEC) and the public. On September 20, 1995, the PSTP was approved by SCDHEC subject to subsequent specific modifications. The approved STP and other related information are available at the public reading room at the University of South Carolina-Aiken library.

This approved STP, now referred to simply as the STP, contained DOE's preferred options developed after evaluation and integration of the site-specific treatment options contained in the DSTP and the PSTP of the other sites with DOE mixed waste. The process DOE followed was coordinated with state and EPA regulators and is described in Section 2.2 of this volume. DOE believes the treatment options contained in the STP represent a sensible national configuration for mixed waste treatment systems that balances DOE's interests and concerns and the input DOE received on the PSTP from the regulatory agencies and others. As new information is learned affecting the status of mixed waste inventories or treatment capacity, modifications are proposed in annual updates to the STP.

The approved STP also contains schedules for constructing new facilities, modifying existing facilities, and otherwise obtaining treatment for mixed wastes. DOE faces increasingly tight budgets throughout the DOE complex and anticipates that funding will continue to be constrained. The schedules in the STP and annual updates reflect those constraints and modifications that may be necessary in treatment options or schedules in response to constraints. DOE has provided schedules in the STP and annual update to support further discussions with the expectation that schedules will require some modifications as mixed waste treatment efforts progress.

The schedules contained in the STP and annual update are based on funds currently budgeted for and projected to be available for waste management activities. As a result, schedules in the STP and annual update for some facilities, particularly the largest and most costly facilities, may be protracted.

DOE has discussed with states and EPA the difficulty DOE faces in providing timely schedules for some new treatment facilities given current budgetary constraints and the need to consider whether funds from other activities should be shifted to support more timely schedules. The states and EPA recommended that the STP be submitted with schedules consistent with current budget and priorities, even though they recognized schedules may be extended. This process has continued through the submittal of the annual update. As part of its efforts to develop budget requests, DOE has asked regulatory agencies to work with DOE and other interested parties at the site and national level to assist DOE in prioritizing its activities, including mixed waste treatment, and assessing activities under way and that need to be accomplished at the Site.

DOE anticipates that modifications and adjustment to the STP in annual updates will be necessary because of the technical and funding uncertainties that naturally exist with long-term activities like those covered by the Plans. For example, emerging or new technologies not yet considered may be identified in the future that provide opportunities to manage waste more safely and effectively, and at a lower cost, than the current technologies identified in the Approved Plan. DOE will continue to evaluate and develop technologies that offer potential advantages in the areas of public acceptance, risk abatement, and performance and life-cycle cost. Should more promising technologies be identified, DOE may request a modification of its treatment plan through the annual update or other processes in accordance with provisions of the STP and/or the Consent Order.

1.2 Documents and Activities Related to Site Treatment Plan Development

Other DOE efforts are closely linked to the STP development. These include the Mixed Waste Inventory Report (MWIR), activities conducted pursuant to the National Environmental Policy Act (NEPA) and other planning and management actions, and compliance and cleanup agreements containing commitments relevant to treatment of mixed waste.

The MWIR initially required by the FFCAct, provided an inventory of mixed waste currently stored, generated, or expected to be generated over the next 5 years at each DOE site and treatment capacities and technologies. The Interim MWIR, published by DOE in April 1993, provided information on each mixed waste stream generated or stored by the DOE sites. DOE made updated waste stream and technology data available to the states and

EPA. The 1995 MWIR, which was distributed to the states, represents the DOE's mixed waste inventory at SRS as of September 1994. To reflect the most current information in the STP Annual Update, SRS plans to update the mixed waste inventories and 5-year forecasts each year.

The STP reflects the most current and accurate data on waste streams and technology needs. As a result, there may be some differences in the reported volumes and forecasts from the previous annual update of the STP. In general, these differences result from refinements of volume estimates for existing and future projections of mixed waste generation as better information on stored waste or more accurate estimates of future waste generation have become available. Other differences involve mixed waste streams that have been combined, deleted, or have had waste stream volumes added. Some waste streams or volumes have been treated to LDR standards and no longer need to be addressed; however some waste streams, such as SR-W040, have been retained in the STP at this time for reference even though the mixed waste in this stream meets the LDR standards.

The National Environmental Policy Act (NEPA)

NEPA requires federal agencies to assess and address environmental impact of their proposed activities and consider alternative actions. NEPA requires detailed Environmental Impact Statements (EIS) for major federal projects. Environmental Assessments (EA) are prepared for smaller activities with unclear levels of impact to determine the need to prepare an EIS. Small, routine activities can be categorically excluded from NEPA review under the Council on Environmental Quality (CEQ) and DOE regulations. NEPA provides for public review of and input to federal actions. The status of SRS facilities under NEPA is indicated below.

While there is no sitewide EIS for SRS, the EIS for Waste Management Activities for Groundwater Protection at SRP (DOE/EIS-0120), prepared in 1987, addressed sitewide waste management issues. Existing, planned, and proposed mixed waste treatment facilities have been and are being addressed under NEPA. Summary information providing a NEPA status on mixed waste treatment facilities is found in succeeding paragraphs.

Defense Waste Processing Facility (DWPF): An EIS and Record of Decision (ROD) were published in 1982 documenting the decision of DOE to construct and operate DWPF. Since then, DOE has modified the DWPF process and facilities to improve efficiency and safety. A supplemental EIS (SEIS) was prepared to address these modifications.

This SEIS examined the environmental impacts of the modifications made to the DWPF and associated high-level waste facilities at SRS and enabled DOE to determine that the decisions reached as a result of the 1982 EIS and subsequent Supplement Analysis remain valid in light of process and facility modifications made over the last 12 years.

The DWPF modifications addressed in the SEIS included the following: In-Tank Precipitation (ITP), Saltstone Processing and Disposal, the Late-Wash Facility addition, nitric acid introduction, ammonia mitigation modification, hydrogen modifications, and benzene treatment. The SEIS evaluated additional modifications that may result from the need to mitigate cumulative impacts or to further enhance safety and efficiency.

A final SEIS was issued in November 1994. Following the public review of this document, a ROD was issued on March 28, 1995.

Consolidated Incineration Facility (CIF): An EA was completed, and a Finding of No Significant Impact (FONSI) was issued by DOE-Headquarters (HQ) on December 18,1992.

M-Area Vendor Treatment Facility: An EA was prepared for this project. A FONSI was issued by DOE-HQ on August 1, 1994. The M-Area Vendor Treatment Facility was closed per the Clean Water Act as of October 1, 1999.

Waste Management Environmental Impact Statement (WMEIS)

DOE-SR prepared a sitewide Waste Management EIS (WMEIS) to provide a basis to select a sitewide strategy to manage present and future SRS waste generated from ongoing operations, environmental restoration activities, and decontamination and decommissioning activities. In selecting a sitewide SRS waste management strategy, technology development and waste minimization were considered. In addition, the WMEIS provided a baseline for analyzing future waste management activities and evaluating specific waste management alternatives. DOE could, in turn, base supplemental EISs or EAs on the WMEIS to evaluate future mission activities, decontamination and decommissioning alternatives, and technological development opportunities. The WMEIS included the investigation of existing mixed waste treatment facilities such as the F-Area and H-Area Effluent Treatment Facility (ETF), as well as facilities under construction or planned, including the CIF and the Transuranic Waste Certification/Characterization Facility (TWCCF). SRS reassessed the NEPA evaluations performed for these facilities to determine whether, in light of changing DOE goals and missions, the evaluations performed in regard to these projects remain appropriate. All No Action and Proposed Action alternatives regarding these facilities were evaluated in the WMEIS.

Analysis of options for onsite treatment of SRS mixed waste streams developed by the STP supported the WMEIS for mixed waste and was the foundation for EIS evaluations regarding mixed waste.

The final WMEIS was made available to the public in July 1995. A ROD was approved and issued on September 23, 1995. A second ROD was issued on May 9, 1997, covering additional mixed and transuranic (TRU) waste activities. A supplemental ROD is expected 2QFY01 for the WMEIS that facilitates offsite treatment and disposal of mixed wastes.

The Waste Management Programmatic Environmental Impact Statement (WMPEIS)

DOE has prepared a Programmatic Environmental Impact Statement (PEIS) to formulate and implement a complexwide waste management program for five types of radioactive and hazardous waste, including mixed waste, in a safe and environmentally sound manner and in compliance with applicable laws, regulations, and standards. The PEIS presented to the public, states, EPA, and DOE understanding of impacts to human health and the environment together with the costs associated with a wide range of alternative strategies for managing DOE's environmental program. The PEIS examined the following waste types and activities: high-level, transuranic mixed low-level, low-level, and hazardous waste. The analysis for the waste management PEIS evaluated decentralized, regional, and centralized approaches for storage of high-level waste, treatment and storage of transuranic waste, treatment and disposal of low-level and mixed low-level waste, and treatment of hazardous waste.

Development of the Waste Management (WM) PEIS was coordinated with the preparation of STPs under the FFCAct. Information generated to support the WMPEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) was shared with states to support STP discussions.

The draft WMPEIS was presented for public comment in October 1995. The final PEIS was issued in May 1997, and ROD was issued February 2000.

Environmental Restoration/Waste Management Outyear Budget

DOE's Office of Environmental Restoration and Waste Management (EM) uses a variety of interrelated planning initiatives to accomplish its mission. One of these is the Outyear Budget. The Outyear Budget is the principal planning document for EM activities and is updated annually. The Outyear Budget identifies

activities needed to accomplish EM's mission over the planning period. The SRS portion of the Outyear Budget is available as a part of the supporting data and documentation prepared for the STP and can be reviewed by interested parties.

Waste Management Plans

To provide tools for planning consistent with the SRS Outyear Budget but with further, more specific detail on waste management activities, SRS has developed waste management plans. These plans have been organized according to the type of waste being discussed. The *System Plan for the Solid Waste Division* addresses planning for sanitary waste, hazardous waste, mixed low-level waste, low-level radioactive waste, and transuranic waste. The *High-Level Waste System Plan* addresses planning for the high-level wastes that are liquid radioactive wastes and include high-level mixed wastes.

The purpose of the *System Plan for the Solid Waste Division* is to present recommended options for managing solid waste at SRS. The plan identifies the approximate funding and schedule requirements and the numerous issues and assumptions that must be addressed during implementation. The *System Plan for the Solid Waste Division* has been developed to meet current and anticipated solid waste needs at SRS and provide a strategic plan for the treatment, storage, and disposal of SRS solid waste streams. It has been recognized that the strategy for mixed waste developed in the *System Plan for the Solid Waste Division* is dependent on the development of the SRS STP and input into the STP by the regulatory agencies and other stakeholders. As a result, significant changes could be made to the mixed waste management strategy in the *System Plan for the Solid Waste Division*. The plan will be revised on a regular basis to reflect changes as a result of the STP development as well as new regulatory developments, advances in technology, and funding changes.

The *High-Level Waste System Plan* provides the same long-range planning function for high-level waste as the *System Plan for the Solid Waste Division* provides for solid waste. Mixed high-level waste treatment also will be affected by developments in the STP, and the plan for high-level waste must reflect the changes brought about as the STP is prepared and approved.

Compliance Agreements

In addition to SCDHEC Consent Order 95-22, another agreement that concerns mixed waste activities has been executed among SRS, the EPA, and SCDHEC.

The Federal Facility Agreement (FFA): Section 120, Federal Facilities, of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), requires that a federal facility placed on the National Priorities List (NPL) enter into an interagency agreement (FFA) with the EPA for the expeditious completion of all necessary remedial actions at the facility.

SRS has entered into an FFA with EPA-IV and SCDHEC that directs the comprehensive remediation of SRS. It details the method by which the three parties will interact in the process of remediating SRS. It directs the three parties in their respective responsibilities, and requires the parties to meet, discuss, and prepare schedules for the remediation. The FFA contains requirements for the prevention and mitigation of releases or potential releases from the high-level radioactive waste tank systems. It also affects how environmental restoration activities at SRS dealing with mixed waste will be undertaken. See Chapter 6 regarding management of environmental restoration and decommissioning and decontamination wastes.

1.3 Site History and Mission

This section discusses the role of SRS, the principal operations located at the SRS site, and the principal mixed waste facilities at SRS.

1.3.1 Role of the Savannah River Site

SRS was established by the United States Atomic Energy Commission (USAEC) in 1950 to produce and recover nuclear materials (primarily tritium, plutonium-239 [Pu^{239}], and highly enriched uranium fuel) for national defense and medical use. Most of the nuclear materials produced at SRS were used for the production of components for nuclear weapons necessary for the national defense in accordance with DOE authority and responsibility under the AEA. Figure 1.1 shows the general location of SRS. SRS is owned by DOE and is operated through management and operating contracts.

The mission of SRS is to serve local and national interests by applying its technical, physical, and human resources to protect and improve environmental quality, support a secure national defense and reduce the nuclear danger, and enhance industrial competitiveness and economic development in a safe, environmentally sound, socially responsible, and cost-effective manner in partnership with its stakeholders.

Recent Site mission changes have reduced the need for nuclear material production at SRS and heightened the need for environmental restoration and decontamination and decommissioning (D&D) activities. However, there will be continued operation of the tritium, separations, and certain plutonium operations as well as analytical support activities.

Tritium requirements and the need for special isotopes, such as Pu^{238}, dominate anticipated demand for separations operations for nuclear materials processing. SRS was the sole source of tritium required to maintain the nuclear weapons stockpile. Recycling and reloading of tritium is a continuing Site mission. Another mission for SRS is the processing of Pu^{238} used in radioisotopic thermal generators to provide electrical power for space missions.

Existing plutonium-bearing materials are being stored at SRS awaiting final disposition.

1.3.2 Savannah River Site Principal Operations

Historically, SRS produced nuclear materials by manufacturing fuel and target components, irradiating the components in nuclear reactors, and chemically extracting the desired nuclear materials from the irradiated fuel and targets.

The largest SRS facilities were for production. These facilities include the fuel and target component manufacturing complex in M Area; the production reactors located in P, K, L, C, and R Areas; and the separations process lines in F and H Areas. The M-Area production facilities and the reactors are not operating, and there are no plans to resume their operations. Separations canyon facilities are fully operational and have been selectively operated recently depending on the need. Recently, HB Line has operated to provide Pu^{238} in support of the National Aeronautics and Space Administration (NASA) and to process plutonium in storage to produce a more stable material.

Other major facilities are used to manage wastes. The largest, DWPF, began treating high-level liquid waste in March 7, 1996.

A major generator of mixed waste at SRS was the preparation, in M Area, of target and fuel assemblies for the reactors. This process was similar to a commercial metal-forming and finishing operation. Mixed wastes were generated from the electroplating operations and the creation of waste nickel-plating solutions after M-Area metal-forming and finishing facilities were shut down.

The major types of radionuclide recovery in the Separations area were Pu^{239} recovery, uranium-235 (U^{235}) and neptunium-237 (Np^{237}) recovery, and tritium recovery. The liquid high-level waste remaining after the nuclear materials are recovered in both Separations canyon facilities is made alkaline (pH 10-13) and transferred by gravity to the F-Area and H-Area High-Level Radioactive Waste (HLW) Tank Farms. High pH is maintained to prevent corrosion of the carbon steel tanks. The waste liquid is a major mixed waste component at SRS.

Tritium is recovered in a complex of buildings in H Area. Tritium was extracted from irradiated lithium-aluminum targets until September, 1999. Future extractions will use different target material and will be performed at the new Tritium Extraction Facility in FY06. Tritium is also recycled from reservoirs removed

from weapons in the field. Old reservoirs are refurbished and refilled as necessary. Mixed waste is generated from these operations.

SRS also contains many production support and research and development facilities including powerhouses, laboratories, administrative, and support facilities. Figure 1.2 shows the location of major production, support, and research and development areas at SRS.

1.3.3 Savannah River Site Principal Mixed Waste Facilities

The existing facilities that manage mixed waste are the F-Area and H-Area High-Level Waste (HLW) Tank Farms, the F/H ETF, the Mixed Waste Storage Shed (Building 316-M), the Mixed Waste Storage Pad (Building 315-4M), the Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks (MWST), New Solvent Storage Tanks (H33-H36), the TRU Waste Storage Pads, the Mixed Waste Storage Buildings (MWSB) (Buildings 643-29E and 643-43E), the Hazardous Waste Storage Facility (HWSF) (645-N, 645-2N, and 645-4N), the Solid Waste Storage Pads (SWSP), the DWPF Vitrification Facility, the DWPF Organic Waste Storage Tank (OWST), the Z-Area Saltstone Processing Facility (standby), and the Consolidated Incineration Facility (CIF) (suspension of operations).

Liquid HLW generated by the Separations facilities is stored in underground tanks in the F-Area and H-Area HLW Tank Farms. Waste must be stored prior to treatment to allow radioactive decay to reduce the radionuclide contamination to a safer level for processing. To reduce the volume of HLW in storage, the liquid waste containing metals, salts, and fission products from reactor processing is routed through evaporators. The evaporator overheads are piped to the F/H ETF where they are treated by a series of physical/chemical treatment steps that include pH adjustment, submicro filtration, reverse osmosis, and ion exchange. Treated effluent is discharged to surface water as authorized by a National Pollutant Discharge Elimination System (NPDES) permit. This system also treats contaminated cooling water and storm water releases.

Treatment residues from the F/H ETF processes and the low-level radioactive portion (decontaminated salt solution) of the high-level liquid radioactive wastes in the F-Area and H-Area HLW Tank Farm are piped to the Z-Area Saltstone Processing and Disposal Facility. This waste stream is mixed waste due to its corrosivity and potential to exceed the Toxicity Characteristic Leaching Procedure (TCLP) limits for chromium. The waste stream is stabilized by mixing with grout and flyash to create saltstone. The nonhazardous saltstone is disposed in the Z-Area Vaults.

The remainder of the high-level waste, salt slurry and sludge, will be mixed with glass frit and stabilized in borosilicate glass at the DWPF.

The CIF is a rotary kiln incinerator followed by a cement stabilization unit for ash and blowdown processing. CIF is currently in suspension of operations.Some blowdown is sent to F/H ETF for treatment. A portion of the incinerator capacity will be used to treat organic solid and liquid mixed waste generated by various activities at SRS.

Another treatment facility at SRS is the SRTC MWST, where high and low activity waste streams from SRTC undergo neutralization and ion exchange to remove hazardous characteristics before receiving further processing at the F-Area HLW Tank Farm.

Mixed wastes are stored on the TRU pads, in the MWSB, in the HWSF, on the SWSP, on the M-Area storage pad, in storage tanks, and the Mixed Waste Storage Shed until they can be sent to the appropriate treatment and disposal facilities.

The site treatment plan and the annual update analyze treatment options for mixed waste using these facilities, with and without modifications, and investigate other options for treatment of mixed waste streams generated at SRS.

Figure 1.1 – General Location of Savannah River Site

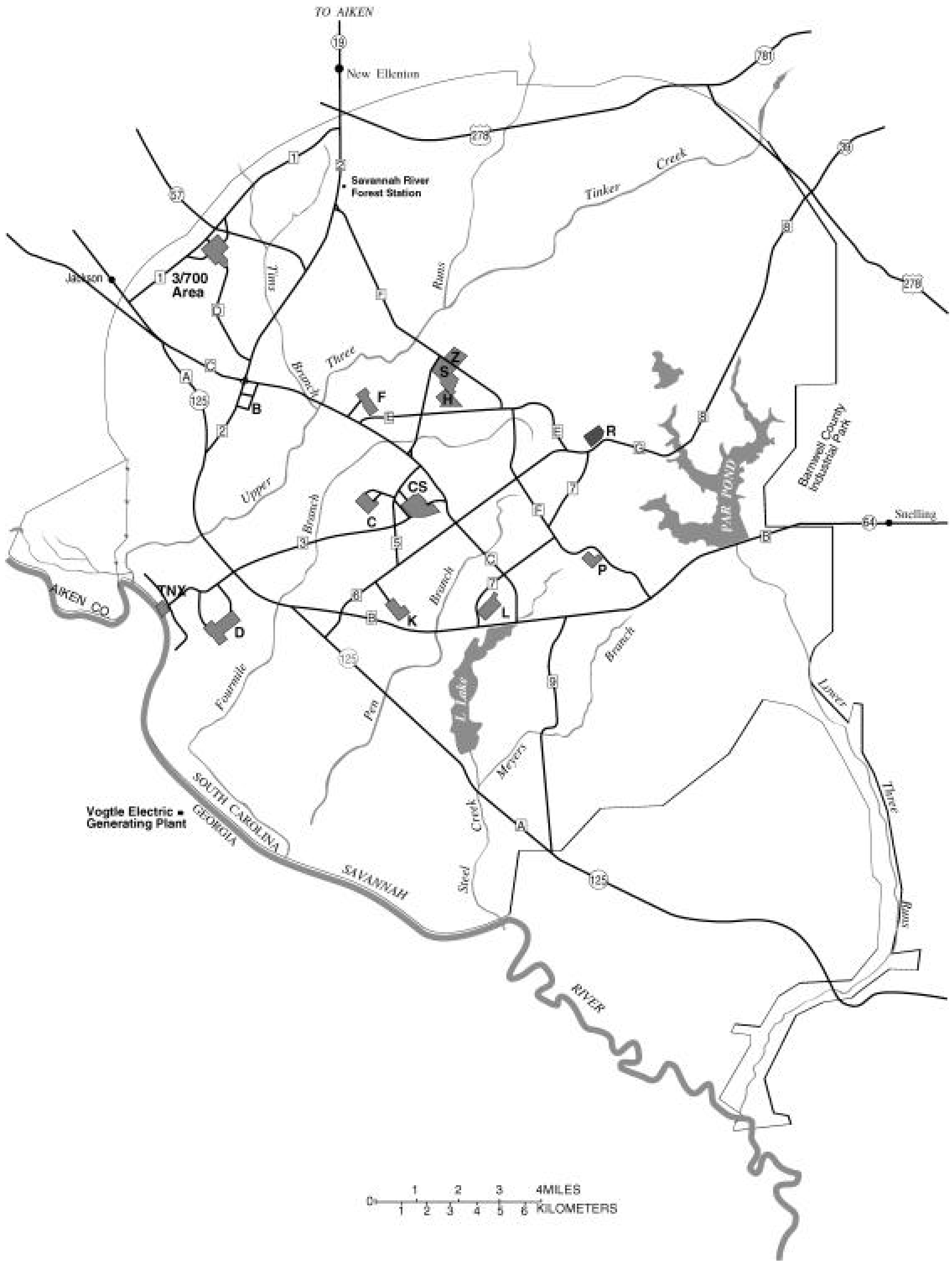


Figure 1.2 – Location of Major Production, Support, and Research and Development Areas at the Savannah River Site

1.4 STP Organization

The STP and annual update are organized in two separate, but integrated, volumes. The *Background Volume*, Volume II, provides the detailed discussion of the options. It contains information on the waste streams and treatability groups a particular treatment option or options would address and describes uncertainties associated with that option, as well as the budget status of the option and regulator and stakeholder input. The *Compliance Plan Volume,* Volume I, is a short, focused document containing the preferred options and schedules for implementing the options and contains all the information required by the FFCAct. The *Compliance Plan Volume* also contains a mechanism to implement the plan and establish milestones enforced by the Order. It references, but does not duplicate, details on the options listed in the *Background Volume*.

Chapters 1 and 2 in both volumes contain introductory material relevant to the purpose of the volume. Chapters 1 and 2 of the *Compliance Plan Volume* contain certain administrative provisions appropriate for implementing the plan, such as project activity schedules describing funding considerations.

Chapters 3 through 5 discuss the preferred option for low-level mixed waste, mixed transuranic waste, and mixed high-level waste, and each volume discusses the same waste streams and options in parallel. The *Background Volume* discusses the waste streams, technology needs, and uncertainties and other details on the preferred options; the *Compliance Plan Volume* includes schedules, to the extent feasible, as required under the FFCAct.

The *Background Volume* includes seven additional sections not included in the *Compliance Plan Volume*. Chapter 6 of the *Background Volume* discusses mixed wastes expected to be generated from future activities such as environmental restoration and D&D actions. These waste streams will be incorporated into the *Background Volume*, and treatment approaches and schedules developed, when the wastes are generated. Chapter 7 discusses storage capacity, describes compliant storage provided, and gives information on projected storage needs.

Chapter 8 describes the process being followed by DOE and the states for evaluating options for disposal of mixed waste treatment residues. Information regarding disposal in Chapter 8 has been developed by DOE-HQ.

Chapter 9 provides a description of all existing treatment facilities at SRS for the treatment of mixed wastes.

Chapter 10 provides information on offsite waste from the Naval Reactors Program that lists SRS as the preferred treatment option. Final decisions on actual treatment were made by the requesting DOE site, SRS, DOE-HQ, affected states, and other stakeholders in the course of negotiations leading to the development of the consent order.

Chapter 11 provides summary information in three tables. Table 11.1 lists SRS mixed waste streams, their preferred treatment options, currently generated volume, and future estimated generation over the next five years. Table 11.2 provides the same information but lists waste streams by treatment facility or treatment method. Table 11.3 provides the volumes and status of mixed waste treatment residues resulting from the treatment of wastes listed in the STP.

Chapter 12 is a list of acronyms and definitions for terms used in the STP and annual updates.

The following table (Table 1.1) is a user's guide that is being provided as an aid in reviewing waste stream information in the STP and annual update. This table was originally Table 3.1 and was located in Chapter 3 in the 1998 Annual Update. Table 1.1 provides the status of each waste stream, the preferred treatment option (PO), and the location of the waste streams in Volumes I and II of the STP.

Table 1.1 User's Guide to Chapters 3, 4, and 5

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification	Waste Stream Status
SR-W001	Rad-Contaminated Solvents	Combustion in CIF or at Commercial Facility	3.1.1.1	3.1.1.1.A	Awaiting Treatment
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A	1.4, Table 1.1	Consolidated with SR-W001
SR-W003	Solvent Contaminated Debris (LLW)	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.B	Awaiting Treatment
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	Consolidated with SR-W037	N/A	1.4, Table 1.1	Consolidated with SR-W037
SR-W005	Mark 15 Filtercake	Stabilization by Vitrification– M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W006	CH Mixed TRU/Liquids	Characterization at SRS–WIPP Disposal	4.1	4.2.2	Awaiting Characterization
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	N/A	Appendix to Chapter 3	Complies with LDR
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	N/A	Appendix to Chapter 3	Complies with LDR
SR-W009	Silver Coated Packing Material	Macroencapsulation in a Steel Container– Onsite	3.1.1.4	3.1.1.4.B	Awaiting Treatment
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	1.4, Table 1.1	Consolidated with SR-W001
SR-W011	Cadmium Coated HEPA Filters	Scrap Metal Exclusion	N/A	Appendix to Chapter 3	Recycled under Scrap Metal Exclusion
SR-W012	Toxic Characteristic Solids For Treatment in CIF	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.C	Awaiting Treatment
SR-W013	Low-Level Waste (LLW) Lead – To be Decontaminated Onsite	Decontamination in an onsite facility	3.1.1.7.C	3.1.1.7.C	Awaiting Treatment
SR-W014	Tritium Contaminated Mercury	Amalgamation- Offsite, DOE- Complex-wide Broad Spectrum Vendor	3.1.2.3.1	3.1.2.3.1.A	Awaiting Treatment
SR-W015	Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	N/A	Appendix to Chapter 3	Awaiting Treatment
SR-W016	221-F Canyon High-Level Liquid Waste	Stabilization by Vitrification–DWPF	5	5	Awaiting Treatment
SR-W017	221-H Canyon High-Level Liquid Waste	Stabilization by Vitrification–DWPF	5	5	Awaiting Treatment

SR-W018	Listed Incinerable Solids	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.B	Awaiting Treatment
SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	N/A	1.4, Table 1.1	Consolidated with SR-W017

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification	Waste Stream Status
SR-W020	Salt Processing Filters	Acid Washing followed by Placement in an Engineered S. S. Container	N/A	3.1.1.4.A	Future Generation
SR-W021	Poisoned Catalyst Material	Waste Stream Eliminated	N/A	1.4, Table 1.1	Waste Stream Eliminated
SR-W022	DWPF Benzene	Combustion in CIF or at Commercial Facility	3.1.1.1	3.1.1.1.A	Future Generation
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a Cask as a 90-Day Generator	N/A	Appendix to Chapter 3	Complies with LDR
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	N/A	Appendix to Chapter 3	Complies with LDR
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization at SRS	4.1	4.2.1.2	Awaiting Treatment
SR-W026	CH Mixed TRU/Thirds	Characterization at SRS–WIPP Disposal	4.1	4.2.1	Awaiting Treatment
SR-W027	CH Mixed TRU/F-listed Solvents	Characterization at SRS–WIPP Disposal	4.1	4.2.1	Awaiting Treatment
SR-W028	Mark 15 Filter Paper	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	1.4, Table 1.1	Waste Stream Treated
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	1.4, Table 1.1	Consolidated with SR-W001
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification-M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W032	Mercury-Contaminated Heavy Water	Waste Stream Eliminated	3.1.1.5	1.4, Table 1.1	Treated to meet LDR
SR-W032B	Mercury-Contaminated Heavy Water Residues	Solidification in container as a 90-day generator	N/A	Appendix to Chapter 3	Complies with LDR

SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization at SRS	4.1	4.2.1.2	Awaiting Treatment
SR-W034	Calcium Metal	Future Generation – Treatment to be Determined	N/A	6.6	Future Generation
SR-W035	Mixed Waste Oil-Sitewide	Combustion in CIF or at Commercial Facility	3.1.1.1	3.1.1.1.A	Awaiting Treatment
SR-W036	Tritiated Oil with Mercury	Treatment by Aging followed by Combustion	3.4	3.4	Awaiting Treatment
SR-W037	M-Area Plating Line Sludges	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W038	Plating Line Sump Material	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification	Waste Stream Status
SR-W040	Listed Stabilized Sludge/Listed LDR – Compliant Debris	Waste Stream Treated in Compliance with LDR	N/A	Appendix to Chapter 3	Treated to meet LDR
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	N/A	Appendix to Chapter 3	Treated to meet LDR
SR-W042	Paints and Thinners	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.B	Awaiting Treatment
SR-W043	Lab Waste with Tetraphenyl Borate	Consolidated with SR-W012	N/A	1.4, Table 1.1	Consolidated with SR-W012
SR-W044	Tri-Butyl-Phosphate & n-Paraffin-TRU	Consolidated with SR-W045	N/ A	1.4, Table 1.1	Consolidated with SR-W045
SR-W045	Tri-Butyl-Phosphate & n-Paraffin (PUREX)	Combustion in CIF	3.1.1.1	3.1.1.1.A	Awaiting Treatment
SR-W046	Consolidated Incineration Facility Ash	Stabilization CIF Ashcrete Unit	N/A	3.1.1.1.D	Awaiting Treatment

SR-W047	Consolidated Incineration Facility Blowdown	Stabilization CIF Ashcrete Unit or Wastewater Treatment at F/H ETF	N/A	3.1.1.1.D	Awaiting Treatment
SR-W048	Soils from Spill Remediation	Stabilization by Vitrification M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W049	Tank E-3-1 Clean Out Material	Stabilization–Onsite CIF Vendor	3.1.1.7.D	1.4, Table 1.1	Treated to Meet LDR
SR-W050	Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	N/A	Appendix to Chapter 3	Complies with LDR
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.C	Awaiting Treatment
SR-W052	Cadmium Contaminated Glovebox Section	Waste Stream Eliminated	N/A	1.4, Table 1.1	Waste Stream Eliminated
SR-W053	Rocky Flats Ash	Characterization at SRS–Ship to WIPP	4.2	4.2.2	Awaiting Treatment
SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	1.4, Table 1.1	Consolidated with SR-W037
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.B	Awaiting Treatment
SR-W056	Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes	Waste Stream Re-characterized	N/A	1.4, Table 1.1	Waste Stream Eliminated
SR-W057	D-Tested Neutron Generators	Waste Stream Eliminated	N/A	1.4, Table 1.1	Waste Stream Eliminated

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification	Waste Stream Status
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	N/A	Appendix to Chapter 3	Treated to meet LDR
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	1.4, Table 1.1	Consolidated with SR-W001
SR-W060	Tritiated Water with Mercury	Macroencapsulation in a Steel Container via a Treatability Variance	3.1.1.4	3.1.1.4.B	Awaiting Treatment

SR-W061	DWPF Mercury	Consolidated with SR-W068	N/A	1.4, Table 1.1	Consolidated with SR-W068
SR-W062A	Normal Low-Level Contaminated Debris	Macroencapsulation by a vendor at an offsite facility	3.1.2.2	3.1.2.2	Awaiting Treatment
SR-W062B	Difficult-to-Treat Low-Level Contaminated Debris	Macroencapsulation by a vendor in an existing SRS facility	3.1.1.7.B	3.1.1.7.B	Potential Future Generation
SR-W063	Macroencapsulated Low-Level Waste	Meets Treatment Standard	N/A	Appendix to Chapter 3	Complies with LDR
SR-W064	IDW Soils/Sludges/ Slurries	Awaiting ROD, etc.	N/A	6.1	Future Generation
SR-W065	IDW Monitoring Well Purge/Development Water	Awaiting ROD, etc.	N/A	6.1	Future Generation
SR-W066	IDW Debris	Awaiting ROD, etc.	N/A	6.1	Future Generation
SR-W067	IDW Personal Protective Equipment (PPE) Waste	Awaiting ROD, etc.	N/A	6.1	Future Generation
SR-W068	Elemental (Liquid) Mercury–Sitewide	Amalgamation Offsite DOE-Complex-wide Broad Spectrum Vendor	3.1.2.3.1	3.1.2.3.1.A	Awaiting Treatment
SR-W069A	Low-Level Waste (LLW) Lead – To be Macroencapsulated Offsite	Macroencapsulation by a vendor at an offsite facility	3.1.2.2	3.1.2.2	Awaiting Treatment
SR-W069B	Low-Level Waste (LLW) Lead –To be Macroencapsulated Onsite	Macroencapsulation by a vendor in an existing SRS facility	3.1.1.7.B	3.1.1.7.B	Potential Future Generation
SR-W070	Mixed Waste from Laboratory Samples	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1	3.1.1.1.E	Awaiting Treatment
SR-W071	Wastewater Suitable for Treatment in CIF	Combustion in CIF or at Commercial Facility	3.1.1.1	3.1.1.1.E	Awaiting Treatment
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Extraction or Immobilization Alternative Debris Technologies as a 90-Day Generator	N/A	Appendix to Chapter 3	Complies with LDR
SR-W073	Cadmium-Containing Raschig Rings	Macro-encapsulation Onsite	3.1.2.2	3.1.2.2	Awaiting Treatment

Table 1.1 User's Guide to Chapters 3, 4, and 5 (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification	Waste Stream Status
SR-W077	Aqueous Characteristic Wastewater	Ion Exchange, Filtration, and/or Stabilization at F/H ETF, Saltstone, or D Area or Combustion at Commercial Facility	N/A	Appendix to Chapter 3	Awaiting Treatment
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	Awaiting Characterization	3.3.2	3.3.2	Awaiting Treatment
SR-W079	Polychlorinated Biphenyl (PCB) Mixed Waste	Combustion in the TSCA Incinerator at ETTP	3.1.2.3.3	3.1.2.3.3	Awaiting Treatment
SR-W080 (CN-W001, CN-W004)	Charleston Naval Shipyard Waste– Solids and Organic Debris with chromium and lead	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1*	3.1.1.1.C*	Awaiting SCDHEC Approval for Treatment
SR-W081	Reactive/Ignitable Waste	Deactivation followed by Combustion in CIF or at Commercial Facility	3.1.1.1	3.1.1.1.F	Awaiting Treatment
SR-W082	Radioactive Chemicals, Metals, and Pesticides (CMP) Soil	Stabilization by Vitrification in M-Area Vendor Treatment Facility	3.1.1.6	1.4, Table 1.1	Waste Stream Treated
SR-W083	Mercury- and Chromium-Contaminated Residues	Waste Stream Re-Characterized	3.1.3	3.1.3	Waste Stream Eliminated
SR-W084	Remediation Waste Soils that Meet LDR	Meets Treatment Standard	N/A	1.4, Table 1.1	Complies with LDR
SR-W085	Rocky Flats Plutonium Fluoride Residues	Future Generation-Treatment to be Determined	N/A	6.3	Future Generation
SR-W086	Characteristically Hazardous Non-Incinerable Solids	Roasting/retorting followed by Amalgamation-Offsite, DOE-Complex-wide Broad Spectrum Vendor	N/A	6.3	Future Generation
SR-W087 (BT-W035, part of BT-W003)	Bettis Atomic Power Laboratory Contaminated Oil	Combustion in CIF or at Commercial Facility or Macroencapsulation or Stabilization at Commercial Facility	3.1.1.1*	3.1.1.1.B*	Awaiting SCDHEC Approval for Treatment
SR-W088	Aqueous Halogenated Salts		3.1.3	1.4, Table 1.1	
SR-W089	TRU Mixed Waste from Mound Site		4.2.2	4.2.2	

* Information on Charleston Naval Shipyard waste and Bettis Waste is also found in Volume II, Chapter 10.

All the waste streams listed in the MWIR have been included in the *Background Volume*. Some waste streams may be only briefly mentioned if they have been treated to meet LDR standards, re-characterized, or consolidated. Only the waste streams that require a schedule and a compliance order will be found in the *Compliance Plan Volume*. Waste streams not found in the *Compliance Plan Volume* have been re-characterized, combined, or are in compliance with applicable regulations. The lists below provide the status of the waste streams regarding their presence or absence from the Compliance *Plan Volume* and justification.

SRS Mixed Waste Streams included in Volume I of the Annual Update.

SR-W001	Rad-Contaminated Solvents
SR-W003	Solvent Contaminated Debris
SR-W005	Mark 15 Filtercake
SR-W006	CH Mixed TRU/Liquids
SR-W009	Silver Coated Packing Material
SR-W012	Toxic Characteristic Solids for Treatment at CIF
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated Onsite
SR-W014	Tritium-Contaminated Mercury
SR-W016	221-F Canyon High-Level Liquid Waste
SR-W017	221-H Canyon High-Level Liquid Waste
SR-W018	Listed Incinerable Solids
SR-W022	DWPF Benzene
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g
SR-W026	CH Mixed TRU/Thirds
SR-W027	CH Mixed TRU/F-listed Solvents
SR-W028	Mark 15 Filter Paper
SR-W029	M-Area Sludge Treatability Samples
SR-W031	Uranium/Chromium Solution
SR-W032	Mercury Contaminated Heavy Water
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g
SR-W035	Mixed Waste Oil - Sitewide
SR-W036	Tritiated Oil with Mercury
SR-W037	M-Area Plating Line Sludges
SR-W038	Plating Line Sump Material
SR-W039	Nickel Plating Solution
SR-W042	Paints and Thinners
SR-W045	Tri-Butyl & N-Paraffin (PUREX)
SR-W048	Soils from Spill Remediation
SR-W049	Tank E-3-1 Clean Out Material
SR-W051	Spent Filter Cartridges and Carbon Filter Media
SR-W053	Rocky Flats Ash
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes
SR-W060	Tritiated Water with Mercury
SR-W062A	Normal Low-Level Contaminated Debris
SR-W062B	Difficult-to-Treat Low-Level Contaminated Debris
SR-W068	Elemental (Liquid) Mercury - Sitewide
SR-W069A	Low-Level Waste (LLW) Lead – to be Macroencapsulated Offsite
SR-W069B	Low-Level Waste (LLW) Lead – to be Macroencapsulated Onsite
SR-W070	Mixed Waste from Laboratory Samples

SR-W071	Wastewater Suitable for Treatment at CIF
SR-W073	Cadmium-Containing Raschig Rings
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening
SR-W079	Polychlorinated Biphenyl (PCB) Mixed Waste
SR-W081	Reactive/Ignitable Waste
SR-W082	Radioactive Chemicals, Metals, and Pesticides (CMP) Soil
SR-W089	Mound Waste

Offsite Waste Streams included in Volume I.

SR-W080 (CN-W001, CN-W004)	Charleston Naval Shipyard Waste - Solids and Organics Debris with Chromium and Lead
SR-W087 (BT-W035, part of BT-W003)	Bettis Atomic Power Laboratory Contaminated Oil

Waste streams that do not appear in the *Compliance Plan Volume* or the *Background Volume* because they have been eliminated as mixed waste.

SR-W021	Poisoned Catalyst Material
SR-W052	Cadmium Contaminated Glovebox Section
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators
SR-W057	D-Tested Neutron Generators
SR-W083	Mercury- and Chromium-Contaminated Residues

Waste streams that do not appear in the *Compliance Plan Volume* preferred option discussion because they meet the Land Disposal Restrictions (LDR) Treatment Standard, meet the LDR standard when they are generated, or are recycled (includes scrap metal).

SR-W007	SRL (SRTC) Low Activity Waste	Sufficient LDR capacity available
SR-W008	SRL (SRTC) High Activity Waste	Sufficient LDR capacity available
SR-W011	Cadmium-Coated HEPA Filters	Recycled under the scrap metal exclusion
SR-W015	Mercury/Tritium Contaminated Equipment	Treated to meet LDR standard as a 90-day generator
SR-W023	Cadmium Safety/Control Rods	Treated to meet LDR standard as a 90-day generator
SR-W024	Mercury/Tritium Gold Traps	Meets LDR treatment standard
SR-W032B	Mercury-Contaminated Heavy Water Residues	Treated to meet LDR treatment standards as a 90-day generator
SR-W040	Listed Stabilized Sludge/Listed LDR-Complaint Debris	Meets LDR treatment standard
SR-W041	Aqueous Mercury and Lead	Treated to meet LDR standards - May 1995
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treated to meet LDR standards - March 1996

SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	To be treated to meet LDR standards as a 90-day generator in a containment building
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	Meets LDR treatment standard
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	To be treated to meet LDR standards in a 90-day staging area
SR-W077	Aqueous Characteristic Waste Water	Treated to meet LDR standards

Waste streams that do not appear in the *Compliance Plan Volume* or the *Background Volume* preferred option discussion because they have been consolidated with other waste streams.

SR-W002	Rad-Contaminated Chlorofluorocarbons – Combined with SR-W001
SR-W004	M-Area Plating Line Sludge from Supernate Treatment - Combined with SR-W037
SR-W010	Scintillation Solution – Combined with SR-W001
SR-W019	244-H RBOF High Activity Liquid Waste – Combined with SR-W017
SR-W030	Spent Methanol Solution – Combined with SR-W001
SR-W043	Lab Waste with Tetraphenyl Borate – Combined with SR-W012
SR-W044	Tri-Butyl-Phosphate & n-Paraffin – TRU – Combined with SR-W045
SR-W054	Enriched Uranium Contaminated with Lead – Combined with SR-W037
SR-W059	Tetrabutyl Titanate (TBT) – Combined with SR-W001
SR-W061	DWPF Mercury - Combined with SR-W068

Waste streams that will be generated in the future are described in Volume II, Chapter 6.

SR-W034	Calcium Metal
SR-W064	IDW Soils/Sludges/Slurries
SR-W065	IDW Monitoring Well Purge/Development Water
SR-W066	IDW Debris
SR-W067	IDW Personal Protective Equipment (PPE) Waste
SR-W084	Remediation Waste Soils that Meet LDR
SR-W085	Rocky Flats Putonium Fluoride Residues
SR-W086	Characteristically Hazardous Non-Incinerable Solids

Waste Stream Order

Also included in this section is newly renumbered Table 1.2 (previously Table 3.2 in the 1998 Annual Update), which lists the waste stream arrangement in Chapters 3 through 5 of the *Compliance Plan Volume*, Volume II, of the STP. Waste streams are arranged in the chapters by radioactivity type - mixed low-level waste (MLLW) streams in Chapter 3, mixed transuranic (MTRU) waste in Chapter 4, and high-level mixed waste in Chapter 5. Definitions for these terms can be found in Chapter 12, "Definitions," of Volume II. Table 1.3, previously Table 3.3 in the 1998 Annual Update, provides EPA Hazardous Waste Codes with subcategories.

Waste Stream Analysis Information

For each waste stream with a proposed treatment option that is discussed in Chapter 3 through 5 of the STP, Volume II, the following is provided.

General Information

This section contains a description for each waste stream. Waste streams that have been deleted or consolidated have been noted in Table 1.1 and have no additional detail provided in Chapters 3-5.

This section also provides the waste stream number and description of the determined preferred treatment option. Some of these waste streams did not undergo an in-depth option analysis in the STP because the analysis for these waste streams was performed as a part of the design work to justify a waste treatment facility project and to identify suitable waste streams for treatment.

It should be understood that no option identified in the STP as a preferred option is absolutely final. As treatment technology and input from the state or other stakeholders is received, the preferred option may change.

Mixed transuranic waste streams are designated for disposal in the Waste Isolation Pilot Plant (WIPP) and therefore will not undergo option analyses. These waste streams will be characterized, followed by preparation, shipment to, and disposal at WIPP. Since TRU mixed waste will not be treated to LDR standards, treatment standards for the TRU mixed waste codes are not listed. The management of these waste streams is discussed in the SRS solid waste management strategy in Chapter 4, Section 4.1 of this volume.

Option analyses have been developed for two mixed low-level waste (MLLW) streams (SR-W025 and SR-W033). These streams will continue to be managed as TRU waste and used to blend without higher activity TRU waste.

The General Information Section also provides a brief description for each waste stream, which includes the following:

Volume: To facilitate future changes, waste stream volumes are not listed for the mixed wastes discussed in Chapter 3-5 in Volume II. Waste volume summary tables are found in Chapter 11, Volume II, of the STP.

Waste Stream Composition: Provides information about the physical form of the waste and serves as a major heading under which like streams are grouped.

Waste Characterization: Provides information on the chemical characterization of the waste stream and the confidence level of the information listed. The basis for waste characterization is either by sampling and analysis or by process knowledge. The confidence level for either method of waste characterization for the hazardous waste constituent is expressed as high, medium, or low.

A high-confidence level reflects detailed knowledge of the waste through extensive sampling and analysis, which may include regulatory prescribed tests such as TCLP, or by process knowledge, which is based on process specification or design, reliable mass balance calculation, or other controlled and accurate information.

A medium-confidence level is based on partial sampling and analysis or the use of test methods that do not provide the most accurate results. Medium process knowledge confidence is based on indirect or less controlled knowledge that enables conclusions to be drawn about contaminants in a waste, but with uncertainty concerning contaminant levels.

A low-confidence level indicates no sampling and analysis data or highly uncertain data due to chemical or radiological interference. A low-confidence level for process knowledge indicates a great amount of uncertainty about the characterization of the waste. Only a few SRS waste streams have a low confidence level. These streams are addressed in a conservative manner in the treatment option analysis performed in the STP.

Radiological Characterization: Describes the radiochemical nature of the waste. Radionuclides and activity levels are listed, if known. Wastes are contact handled unless specified to the contrary. Mixed low-level wastes are found in Chapter 3, mixed transuranic wastes are found in Chapter 4, and mixed high-level wastes are found in Chapter 5.

Waste Codes: Lists the RCRA waste code classification of the contaminants present in the waste. The use of an additional letter at the end of the RCRA code is a descriptor used by DOE to denote the particular LDR treatment subcategory that is applicable in cases where RCRA treatment standards list more than one treatment method or concentration standard depending on the wasteform. (See Table 1.3 of this section for further information.)

LDR Treatment Standards: Provides treatment information from the RCRA regulations regarding LDR requirements for the waste stream. Explanation on the basis and regulatory background for the LDR treatment standards is found later in this chapter.

Technology and Capacity Needs

The second part of the discussion on each waste stream in Volume II deals with the treatment technology. A flow diagram of the process steps is provided. Justification is provided for how the treatment option meets the regulatory standard if an IDOA has been performed. Information is given on capacity requirements to treat the waste and what treatment facility needs must be met to facilitate treating the waste.

Treatment Option Information

This part discusses the type of treatment technology and other technical features regarding the identified treatment option. Information is provided on the operational and regulatory status of the treatment option. For onsite treatment options, a description of the action needed to bring the facility into operation is given if applicable. Discussion of offsite DOE facilities lists the facility status.

Treatment Option Status and Uncertainties

A status on the budget requirements for the treatment option and known external uncertainties of a budgetary, technical, or administrative nature are provided.

MLLW in Sections 3.2 and 3.3 of Chapter 3 are described with a slightly modified format than that described above. Section 3.2 addresses waste streams that do not have an identified technology and must undergo further technology development or request a treatability variance. Section 3.3 contains MLLW streams being managed as MTRU that require further waste characterization.

MTRU in Chapter 4 has a three-part description that includes General Information, Technology and Capacity Needs, Treatment Option Status, and Uncertainty Issues.

The description format for waste streams in Chapter 5 follows the same outline for the waste streams in Section 3.1.

Land Disposal Restrictions

Each contaminant regulated by RCRA is given a waste code (for example, D008 or F006). The waste code either identifies the contaminant, the industrial process creating the waste, or both. For some of the waste codes, DOE has assigned a letter suffix to further identify a waste stream matrix (for example, D008A describes a waste hazardous for lead content, D008B describes hazardous waste lead in the form of lead/acid batteries, and D008C describes hazardous waste lead in the form of radioactive lead solids). (See Table 1.3, Chapter 1, Volume II.)

For each waste stream in Volume II, Land Disposal Restriction (LDR) data provide the concentration based treatment standard or range of standards or the specified technology required to be met by the LDR regulations. If the waste stream meets the LDR definition of debris, one of seventeen alternative debris technologies may be applied to meet the LDR regulations, or the waste may be treated to meet the waste specific treatment standard. These standards were developed for waste that is to be disposed of on the land (defined as landfills, surface impoundments, waste piles, injection wells, land treatment units, salt dome, or salt bed formations). The treatment standards, set by EPA, must be met before the waste can be land disposed. The standards are usually a concentration level for the waste based on Toxicity Characteristic Leaching Procedure (TCLP) test results or total composition analysis results. The standards vary based on whether the waste stream is a wastewater, which is water contaminated with less than 1% total organic carbon (<1% TOC) and with less than 1% total suspended solids (<1% TSS); or a nonwastewater, which is everything else. For F001-F005 listed wastes, the definition of wastewater is less than 1% by weight total organic carbon (<1% TOC) for the solvent water mixture or the F001-F005 solvent constituent listed in 40 CFR Part 268.41.

In September 1994, EPA issued the Phase II LDR rule that established a Universal Treatment Standard list (UTS) of concentration based standards for almost all hazardous characteristic and listed waste. Also, concentration based treatment standards based on UTS were established for the organic TC wastes (D018- D043), ten newly listed wastes, and D012-D014 pesticides. The new rule also required that UTS be met for any underlying hazardous constituent in wastes determined to be hazardous for waste codes D001, D002, and D012-D043. In April 1996, EPA issued the Phase III LDR Rule that established that generators would be required to treat the underlying hazardous constitutes in wastes determined to be hazardous for waste codes D001, D002, D003, and D012-D043 that were disposed in non-CWA facilities (land-based units) as well as CWA facilities. In March 1996, the President signed into law the Land Disposal Program Flexibility Act of 1996 which, among other things, negated the provision that generators with decharacterized wastewater managed in CWA equivalent facilities have to identify Underlying Hazardous Constituents and treat them to the Universal Treatment Standard. The Flexibility Act removed a large portion of the intent and strength of the finalized Phase III rule.

One of the issues that remained in the Phase III Rule was the formalization of EPA's Combustion Strategy. The Strategy provides guidance that combustion of certain inorganic, metal-bearing hazardous wastes is impermissible dilution under the LDR program. In order to be incinerated or substituted as fuel in a BIF, certain inorganic metal-bearing hazardous wastes would have to meet one of six criteria.

1. The waste must contain hazardous organic constitutes or cyanides at levels exceeding the constituent specific UTS.
2. The waste is an organic, debris-like material (wood, paper, plastic or cloth) that is contaminated with inorganic, metal-bearing hazardous waste.
3. The waste has a BTU value equal to or greater than 5,000 BTU/lb.
4. The waste is co-generated with other wastes for which combustion is a specified treatment standard.
5. The waste is subject to a federal and/or state provision that requires a reduction of organics (including biological agents).
6. The waste contains >1% TOC.

This combustion strategy will play an important role in what hazardous/mixed waste streams may use combustion as a method of treatment.

In a continuing effort to simplify LDR notification, certification, and recordkeeping requirements, EPA completely revamped §268.7 in the May 12, 1997, Phase IV, Part 1 rulemaking. Most significantly, a one-time LDR notice will suffice (after authorized states modify their programs) compared to previous requirements for a notice to accompany each shipment. In addition, the federal California list waste program was eliminated by this rule. The Phase IV, Part 2 rulemaking was finalized May 26, 1998. The most significant aspects of this rule include: (1) revision of UTS for 12 metal wastes; (2) modification of LDR treatment standards for the eight toxicity characteristic (TC) metals (D004-D011); and (3) promulgation of alternative LDR treatment standards for contaminated soils.

In determining the concentration based treatment standards, EPA has examined data from various treatment methods and determined which method is the best (and commercially available) for treating each waste code. That method has been identified as the Best Demonstrated Available Technology (BDAT). Wastes are not required to be treated by the BDAT. Any treatment method may be used, but where concentration based standards exist for a waste code, that standard must be met regardless of the treatment method employed. The BDAT is simply the treatment method that EPA examined and used in developing the concentration based treatment standards for the LDR program.

In some cases, the nature of the waste makes chemical analysis of a treated wasteform very difficult or unreliable. In these cases, EPA has required a treatment method called a specified technology to be performed before land disposal. When specified technologies are identified as the treatment standard for a particular waste code, that technology must be used to treat that waste (alternative treatments would only be allowed if a treatability variance were submitted and approved or regulatory discretions were granted).

In addition to setting those standards noted above, EPA also has recognized that these treatment standards were developed based upon determination of the BDAT for the “normal” waste stream matrices such as electroplating sludges, paint thinners, solvents, etc. EPA believes that treatment standards based on BDATs for these waste matrices are not appropriate for treating wastes with a significantly different physical form such as soil, rocks, equipment, plastic, etc. Therefore, EPA issued treatment standards specifically for debris (these regulations were published in the August 18, 1992 Federal Register) and has committed to issuing treatment standards specifically for soil (regulations still under development at EPA). Until such time as the new soil standards are issued, soils receiving treatment must meet the treatment standards promulgated for the "normal" waste streams as noted.

Specified Technology Treatment Requirements

The following are regulatory definitions regarding specific treatment technology requirements for particular waste streams from the LDR regulations. These are not all the definitions but are the ones used in listing treatment requirements for SRS mixed waste streams. These definitions are listed here as well as in Chapter 12 for ease of reference.

ADGAS-venting of compressed gases into an absorbing or reacting media (i.e., solid or liquid); venting can be accomplished through physical release utilizing valves/piping; physical penetration of the container, and penetration through detonation.

AMLGM-amalgamation of elemental mercury with inorganic reagents such as copper, zinc, nickel, gold, and sulfur that results in a nonliquid, semi-solid amalgam and thereby reduces potential emissions of elemental mercury vapors to the air.

CHOXD-chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combinations of reagents: (1) hypochlorite (e.g., bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent efficiency, performed in units operated such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals (e.g., total organic carbon can often be used as an indicator parameter for the oxidation of many organic constituents that cannot be directly analyzed in wastewater residues). Chemical oxidation specifically includes what is commonly referred to as alkaline chlorination.

CMBST-High-temperature organic destruction technologies, such as combustion in incinerators, boilers, or industrial furnaces operated in accordance with the applicable requirements of RCRA regulations Part 264, Subpart O, Part 265, Subpart O or Part 266, Subpart H, and in other units in accordance with applicable technical operating requirements. Certain noncombustive technologies, such as the Catalytic Extraction Process, also qualify.

DEACT-deactivation to remove the hazardous characteristic of a waste due to its ignitability, corrosivity, and/or reactivity.

HLVIT-vitrification of high-level mixed radioactive waste in units in compliance with all applicable radioactive protection requirements under control of the Nuclear Regulatory Commission.

IMERC-incineration of wastes containing organics and mercury in units operated in accordance with the technical operating requirements of 40 CFR Part 264 Subpart O and Part 265 Subpart O. All wastewater and nonwastewater residues derived from this process must then comply with the corresponding treatment standards per waste code with consideration of any applicable subcategories (e.g., High or Low Mercury Subcategory).

MACRO (Specified Technology Treatment Standard)-macroencapsulation with surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include any material that would be classified as a tank or container according to 40 CFR 260.10.

MACRO (**alternative standard for debris)**-identical definition to the one immediately above for the technology based standard except this definition excludes the last sentence referring to use of materials that could be classified as a tank or container.

NEUTR-neutralization uses these chemicals either alone or in combination: (1) acids; (2) bases; or (3) water (including wastewaters) resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals.

RLEAD-thermal recovery of lead in secondary lead smelters.

RMERC-retorting or roasting in a thermal processing unit capable of volatilizing mercury and subsequently condensing the volatilized mercury for recovery. The retorting or roasting unit (or facility) must be subject to one or more of the following: (a) a National Emissions Standard for Hazardous Air Pollutants (NESHAP) for mercury; (b) a Best Available Control Technology (BACT) or a Lowest Achievable Emission Rate (LAER) standard for mercury imposed pursuant to a Prevention of Significant Deterioration (PSD) limit; or (c) a state permit that establishes emission limitations (within meaning of section 302 of the Clean Air Act) for mercury. All wastewater and nonwastewater residues derived from this process must then comply with the corresponding treatment standards per waste code with consideration of any applicable subcategories (e.g., High or Low Mercury Subcategory).

RMETL-recovery of metals or inorganics utilizing one or more of the following direct physical/removal technologies: (1) ion exchange; (2) resin or solid (i.e., zeolites) adsorption; (3) reverse osmosis; (4) chelation/solvent extraction; (5) freeze crystallization; (6) ultrafiltration; and/or (7) simple precipitation (i.e., crystallization). (Note: This does not preclude the use of other physical phase separation or concentration techniques such as decantation, filtration (including ultrafiltration), and centrifugation when used in conjunction with the above listed recovery technologies).

RORGS-recovery of organics utilizing one or more of the following technologies: (1) distillation; (2) thin film evaporation; (3) steam stripping; (4) carbon adsorption; (5) critical fluid extraction; (6) liquid-liquid extraction; (7) precipitation/crystallization (including freeze crystallization); or (8) chemical phase separation techniques (i.e., addition of acids, bases, demulsifiers, or similar chemicals): (Note: This does not preclude the use of other physical phase separation techniques such as decantation, filtration [including ultrafiltration], and centrifugation when used in conjunction with the above listed recovery techniques.)

RTHRM-thermal recovery of metals or inorganics from nonwastewaters in units identified as industrial furnaces according to 40 CFR 260.10 (1), (6), (7), (11), and (12) under the definition of “industrial furnaces”.

STABL-Stabilization with the following reagents (or waste reagents) or combinations of reagents: (1) Portland cement; or (2) lime/pozzolans (e.g., fly ash and cement kiln dust). (Note: This does not preclude the addition of reagents [e.g., iron salts, silicates, and clays] designed to enhance the set/cure time and/or compressive strength, or to overall reduce the leachability of the metal or inorganic.)

Permitting Strategy for Treatment Activities

There are several options for locating and obtaining regulatory approval for RCRA treatment. A strategy for determining the appropriate and allowable option is important in developing costs and schedules for the implementation of treatment activities determined by the STP. A strategy is also important in determining and minimizing issues to be addressed in the compliance order pertaining to continued storage and future treatment of prohibited wastes. Treatment may occur in RCRA 90-day accumulation areas (also referred to as staging areas), RCRA interim status units, or RCRA permitted units. It must be ensured that certain conditions are met prior to selecting one of these options.

90-Day Accumulation Areas: A provision exists that allows generators who meet the requirements of SCHWMR R.61-79.262.34, to store and treat hazardous waste in a 90-day accumulation area (staging area) without having to obtain a RCRA permit or interim status. Treatment in a staging area must occur in tanks or containers or in a containment building. General design and operating standards must be met as well as specific standards as applicable for containers, tanks, and containment buildings. Waste must be removed from the staging area within 90 days. Specific notifications must be made in accordance with the requirements of the Land Disposal Restrictions for wastes that undergo treatment in a 90-day staging area. In addition, a Waste Analysis Plan may be necessary depending on the wastes and treatment to be performed in the staging area.

It is advantageous to select the 90-day staging area provision as an option for treatment strategy. No regulatory approvals or permitting is necessary. This results in an accelerated schedule for treatment implementation and reduced costs due to the lack of any permitting activities.

However, several instances may exist where 90-day areas are not allowed as an option for treatment. Treatment must then occur in a RCRA interim status unit or a permitted unit. This may occur in the following instances:

- Waste is currently already in permitted storage.
- It may not be possible to complete treatment of waste in the accumulation area within the 90 days.
- Treatment will not occur in a tank, container, or containment building.

Interim Status Unit: Interim status is a relatively short-term mechanism that allows certain limited activities to be conducted while the associated unit awaits or undergoes a thorough review in the permitting process. A unit may operate for more than 90 days under interim status without a permit when certain conditions are met. A unit that currently operates under interim status may be allowed to add new treatment processes. New additional storage or treatment units may also be allowed to operate under interim status. Regulatory approval of changes in interim status units are based on several criteria such as being necessary to comply with federal, state, or local requirements, or a demonstrated lack of available treatment or storage capacity at the facility. To request interim status unit changes or additions, a revised Part A application must be filed along with a justification for the request based on required approval criteria.

Part A revision is a relatively uncomplicated task and can be accomplished with a minimal amount of time and expense. Regulatory review may be accomplished in moderate time frames. It is important to note that once interim status is granted for a facility a request for a full permit application, as discussed below, may be requested by the regulatory agencies at any time.

Part A revisions to add treatment processes or operate a new unit under interim status may not always be approved by the regulatory agency based on inadequate justification by the facility requesting the revision. In addition, it is not allowable to add interim status treatment processes to a unit that is already operating under a RCRA permit. In these cases where treatment processes may not gain interim status, a modification to the RCRA permit may be necessary to add treatment processes or operate a new unit.

Permitted Unit: A final option for obtaining regulatory approval for a treatment process is a RCRA permit modification. A permit is obtained by first revising Parts A and B of the RCRA permit application. As discussed, a revision to the Part A is a relatively uncomplicated process.

If a unit already operates under a RCRA permit, a revision to the Part B permit application will be necessary to add a new treatment process. The difficulty in preparing this type of revision is dependent on the complexity of the treatment activity. Generally this task is not difficult or costly.

If a unit does not already operate under a RCRA permit, a Part B application revision to add the new unit for treatment will be necessary. This is a complicated process requiring a detailed description of the design and operation of the unit and discussion on how the unit will comply with all applicable RCRA requirements. The preparation of this documentation is costly and time consuming.

Regulatory review times are dependent on the complexity of the application revisions. Reviews of modifications to existing units may take weeks while those for a new unit may take years. The review process may include the issuance of one or more Notices of Deficiency by the agencies requesting a revision to the application to add or clarify information. Once the regulatory agencies determine the modification to the permit application is complete, a draft and final permit modification is issued for the new treatment process or new treatment unit. This process is also determined by the complexity of the permit application modification.

Wastewater and Recycling: In addition to treatment in RCRA 90-day accumulation areas, interim status units, or permitted units, hazardous waste may be managed in a wastewater treatment facility or through recycle activities if certain conditions are met [SCHWMR R.61-79.264.1 (g) and R.61-79.265.1(c)].

Hazardous waste may be treated in an eligible wastewater treatment unit that is operated and discharged in accordance with the requirements of the South Carolina Pollution Control Act (PCA). The unit must also meet the regulatory definition of a tank. Eligible wastewater treatment units managing hazardous waste are subject to PCA performance standards and permitting requirements, but may not be subject to RCRA permitting requirements. However, there are LDR notification requirements under 40 CFR 268.7 and equivalent state hazardous waste management regulations for hazardous wastes that are managed in PCA facilities.

In some cases, treatment activities performed as a recycling operation would not be subject to RCRA permitting requirements. This exclusion is dependent on what the material is and how it is recycled.

Table 1.2-STP Volume II Waste Stream Order
Chapters 3-5

Chapter 3 Mixed Low-Level Waste Treatment

3.1 Mixed Low-Level Waste Streams with Treatment Capacity

3.1.1 Onsite Treatment

3.1.1.1 Consolidated Incineration Facility (CIF)

3.1.1.1.A Organic Liquids Waste Group

SR-W001, Rad-Contaminated Solvents
SR-W022, DWPF Benzene
SR-W035, Mixed Waste Oil-Sitewide
SR-W045, Tributyl Phosphate & N-Paraffin (PUREX)

3.1.1.1.B Organic Solids Waste Group

SR-W003, Solvent Contaminated Debris
SR-W018, Listed Incinerable Solids
SR-W042, Paints and Thinners
SR-W055, Job Control Waste Containing Solvent Contaminated Wipes
SR-W087, Bettis Atomic Power Laboratory Contaminated Oil (BT-W035, part of BT-W003)

3.1.1.1.C Toxic Characteristic Solids Waste Group

SR-W012, Toxic Characteristic Solids for Treatment in CIF
SR-W051, Spent Filter Cartridges and Carbon Filter Material
SR-W080 (CN-001/CN-004), Charleston Naval Shipyard Waste

3.1.1.1.D CIF Ash and Blowdown Waste Group

SR-W046, CIF Ash
SR-W047, CIF Blowdown

3.1.1.1.E Mixed Waste with Listed Contaminants Waste Group

SR-W070, Mixed Waste from Laboratory Samples
SR-W071, Wastewater Suitable for Treatment in CIF

3.1.1.1.F Reactive/Ignitable Waste Group

SR-W081, Reactive/Ignitable Waste

3.1.1.2 F and H Effluent Treatment Facility (ETF)

SR-W077, Aqueous Characteristic Wastewater

3.1.1.3 Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks

(Waste streams in this category are in compliance with RCRA regulations and are found in Chapter 1, Table 1.1, Volume II.)

3.1.1.4 Onsite Treatment Via Treatability Variance Petition

3.1.1.4.A Pretreatment/Macroencapsulation Waste Group

SR-W020, In-Tank Precipitation (ITP) and Late Wash (LW) Filters

3.1.1.4.B Macroencapsulation

SR-W009, Silver Coated Packing Material
SR-W060, Tritiated Water with Mercury

3.1.1.5 Recycling

(No waste streams remain in this category at the present time.)

3.1.1.6 M-Area Vendor

3.1.1.6.A Design Basis Waste Group

(No waste streams remain in this category at the present time.)

3.1.1.6.B Liquid Waste Group

(No waste streams remain in this category at the present time.)

3.1.1.6.C Solids Waste Group

(No waste streams remain in this category at the present time.)

3.1.1.7 Miscellaneous Onsite Treatment

3.1.1.7.A SRS Macroencapsulation

3.1.1.7.B Onsite Vendor Macroencapsulation

SR-W062B, Difficult-to-Treat Low-Level Contaminated Debris
SR-W069B, Low-Level Waste (LLW) Lead – to be Macroencapsulated Onsite

3.1.1.7.C Onsite Decontamination

SR-W013, Low-Level Waste (LLW) Lead - to be Decontaminated Onsite

3.1.1.7.D Onsite Vendor Stabilization

(No waste streams currently remain in this category.)

3.1.1.7.E Waste Streams Meeting the Treatment Standard

(Waste streams in this category are in compliance with RCRA regulations and are found in Chapter 1, Table 1.1, Volume II.)

3.1.1.7.F Waste Streams Treated in 90-Day Staging Areas or Containment Buildings

(Waste streams in this category are in compliance with RCRA regulations and are found in Chapter 1, Table 1.1, Volume II.)

3.1.2 Offsite Treatment

3.1.2.1 Offsite Vendor Treatment

(No waste streams currently remain in this category.)

3.1.2.2 Offsite Vendor Macroencapsulation

SR-W062A, Normal Low-Level Contaminated Debris
SR-W069A, Low-Level Waste (LLW) Lead – to be Macroencapsulated Offsite
SR-W073, Cadmium-Containing Raschig Rings

3.1.2.3 Offsite DOE and Commercial Facilities

3.1.2.3.1 Commercial Treatment

3.1.2.3.1.A Amalgamation Waste Group

SR-W014, Tritium-Contaminated Mercury

SR-W068, Elemental (Liquid) Mercury-Sitewide

3.1.2.3.1.B Stabilization Waste Group

(No waste streams currently remain in this category.)

3.1.2.3.2 DOE Mobile Treatment Facilities

(No waste streams currently remain in this category.)

3.1.2.3.3 East Tennessee Technology Park (ETTP) Toxic Substances Control Act (TSCA) Incinerator

SR-W079, Polychlorinated Biphenyl (PCB) Mixed Waste

3.1.3 SR-W088; Preferred Treatment to be Submitted by May 24,2001

(No waste streams currently remain in this category at the present time.)

3.2 Mixed Low-Level Waste Streams Requiring Technology Development

3.2.1 Development of DOE Mobile Treatment Unit Technology

(All waste streams formerly in this category have been assigned alternative treatment options.)

3.2.2 Development of Characterization Technology

(No waste streams are in this category at the present time.)

3.3 Mixed Low-Level Waste Streams for Which Further Characterization is Required

3.3.1 Waste Group Requiring Radiological (Alpha) Characterization

(No waste streams are in this category at the present time.)

3.3.2 Waste Group Requiring Verification of Radiological Contamination or Development of Analytical Methodology

SR-W078, Hazardous Waste Awaiting Radiological Screening

3.4 Mixed Low-Level Waste Streams Requiring Radionuclides Decay Prior to LDR Treatment

SR-W036, Tritiated Oil with Mercury

Chapter 4 Mixed Transuranic Waste (MTRU)

4.1 Site MTRU Waste Management Approach

4.2 MTRU Waste Streams Proposed for Shipment to WIPP

4.2.1 MTRU Waste Requiring Certification/Characterization for WIPP

4.2.1.1 Defense-Related TRU Job Control Waste Group

SR-W026, CH Mixed TRU/Thirds
SR-W027, CH Mixed TRU/F-listed Solvents

4.2.1.2 TRU Job Control Waste Group

SR-W025, Solvent/TRU Job Control Waste <100 nCi/g
SR-W033, Thirds/TRU Job Control Waste <100 nCi/g

4.2.2 Other MTRU Waste Streams for Shipment to WIPP

SR-W006, CH Mixed TRU/Liquids
SR-W053, Rocky Flats Ash
SR-W089, Mound Waste

Chapter 5 Mixed High-Level Waste (HLW)

5.1 MHLW Treated Onsite in Existing Facilities

SR-W016, 221-F Canyon High-Level Liquid Waste
SR-W017, 221-H Canyon High-Level Liquid Waste

EPA Hazardous Waste Codes with Subcategories Defined under the LDR Program

Table 1.3 lists EPA hazardous waste codes for which EPA has developed subcategories (40 CFR Sections 268.41 through 268.43, Tables CCWE, 2, 3, and CCW). For each subcategory, DOE has assigned a letter subcode. The subcategories represent unique LDR treatability groups with distinct treatment standards. In addition, DOE has assigned a subcategory (with subcode "X") for wastes that, because of a lack of characterization information, could not be put into an appropriate EPA defined subcategory. This table has been developed in support of the MWIR to provide explanation for the letter subcodes used in Chapters 3-5 of the STP, Volume II. The table may be subject to change.

Table 1.3
EPA Hazardous Waste Codes with Subcategories

EPA Code	Sub Code	Subcategory	Description
D001	A	Ignitable liquids high TOC nonwastewaters	Ignitable liquids as defined in 40 CFR 261.21 containing 10% or greater Total Organic Carbon (TOC)
	B	Ignitable liquids, wastewaters	Ignitable wastes as identified in 40 CFR 261.21 managed as wastewater [e.g., in Clean Water Act surface impoundments or land disposal units (or their equivalent); or in Safe Drinking Water Act underground injection wells]
	C	Ignitable waste, low TOC nonwastewaters	All other ignitable waste as identified in 40 CFR 261.21 that is neither a high TOC nor managed as wastewater
D002	A	Corrosive wastewater-acid, alkaline or other	Corrosive waste, as identified in 40 CFR 261.22, managed as wastewater. [e.g., in Clean Water Act surface impoundments or land disposed units (or their equivalent); or in Safe Drinking Water Act underground injection wells]
	B	Corrosive nonwastewater-acid, alkaline or other	Corrosive waste, as identified in 40 CFR 261.22, not managed as wastewater
D003	A	Reactive cyanides	Cyanide-bearing wastes that, when exposed to pH conditions between 2 and 12.5, generate hazardous quantities of toxic gases
	B	Reactive sulfides	Sulfide-bearing wastes that, when exposed to pH conditions between 2 and 12.5, generate hazardous quantities of toxic gases
	C	Explosives	Waste capable of detonation or explosive reaction under various conditions, or is a forbidden Class A or Class B explosive under DOT regulations
	D	Water reactives	Waste, as defined in 40 CFR 261.23(a)(2), (3), or (4), that is either very reactive with water, or is capable of generating toxic or explosive gases with water

	E	Other reactives	Reactive waste that, per 40 CFR 261.23(a)(1), is normally unstable and readily undergoes violent change without detonating
D006	A	TCLP toxic for cadmium	Those wastes that exhibit the toxicity characteristic for cadmium
	B	Cadmium-containing batteries	Batteries containing leachable levels of cadmium above 1.0 mg/liter
D008	A	TCLP toxic for lead	Those wastes that exhibit the toxicity characteristic for lead
	B	Lead acid batteries	Lead acid batteries that are identified as RCRA hazardous wastes and which are not excluded from regulation under the land disposal restrictions
	C	Radioactive lead solids	Lead solids, including elemental forms of lead, but not including treatment residuals that can be stabilized or organo-lead materials that can be incinerated (then stabilized as ash)

Table 1.3
EPA Hazardous Waste Codes with Subcategories (cont'd)

EPA Code	Sub Code	Subcategory	Description
D009	A	TCLP toxic for mercury	Nonwastewaters that exhibit the toxicity characteristic for mercury and contain less than 260 mg/kg total mercury
	B	High mercury (contains organics)	Nonwastewaters that exhibit the toxicity characteristic for mercury, contain greater than or equal to 260 mg/kg total mercury, also contain organics, and are not incinerator residues.
	C	High mercury (contains inorganics)	Nonwastewaters that exhibit the toxicity characteristic for mercury, contain greater than or equal to 260 mg/kg total mercury, are inorganic, and may include incinerator residues and residues from mercury roasting and retorting (RMERC) operations
	D	Elemental mercury contaminated with radioactive materials	Elemental mercury contaminated with radioactive materials
	E	Hydraulic oil contaminated with mercury and radioactive materials	Hydraulic oil exhibiting the toxicity characteristic for mercury and which is contaminated with radioactive materials
	F	Mercury wastewaters	All D009 waste managed as wastewater
F003	A	Spent nonhalogenated solvents	F003 solvent due to the presence of one of the following: acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, and xylene. Also cyclohexane, but only if F001-F005 solvents other than methanol and/or carbon disulfide (F005) are also present. Also methanol, but only if F001-F005 solvents other than cyclohexane and/or carbon disulfide (F005) are also present.
	B	Cyclohexane/methanol/carbon disulfide only	F003 solvent due to the presence of cyclohexane, methanol or carbon disulfide, but only if no other F001-F005 solvents are present (except cyclohexane, methanol and/or carbon disulfide are also present)
F005	A	Spent nonhalogenated solvents	The following spent non-halogenated solvents: benzene, isobutanol, methyl ethyl ketone, pyridine, and toluene. Also, carbon disulfide if F001-F005 solvents other than cyclohexane (F003) and/or methanol (F003) are also present. Also, 2-ethoxyethanol and 2 nitropropane, but only if other F001-F005 solvents are also present.
	B	Solvent waste listed for 2-nitropropane only	Waste containing 2-nitropropane as the only F001-F005 listed solvent
	C	Solvent waste listed for 2-ethoxyethanol only	Waste containing 2-ethoxyethanol as the only F001-F005 listed solvent
	D	Cyclohexane/methanol/ carbon disulfide only	F005 listed mixed waste for which the specific F005 constituent is not identified. F005 solvent due to the presence of carbon disulfide, but only if no other F001-F005 solvents are present, except that cyclohexane (F003) and/or methanol (F003) may also be present.

F025	A	F025 light ends	Light ends listed for one or more of the following: carbon tetrachloride; chloroform; 1, 2-Dichloroethane; 1, 1-Dichloroethylene; Methylene chloride; 1, 1, 2 Trichloroethane; Trichloroethane or vinyl chloride; plus wastes qualifying as F025 light ends, but characterization information is insufficient to determine specific contaminants.

Table 1.3
EPA Hazardous Waste Codes with Subcategories (cont'd)

EPA Code	Sub Code	Subcategory	Description
F025	B	Spent filter/aids and desiccants	Spent filters/aids containing one or more of the following: Carbon tetrachloride, chloroform, methylene chloride, 1, 1, 2-Trichloroethane, Trichloroethylene, vinyl chloride, hexachlorobutadiene, or hexachloroethane, plus wastes qualifying as F025 spent filters/aids or desiccants, but characterization is insufficient to determine specific contaminants.
P047	A	4, 6-dinitro-o-cresol	4,6-Dinitro-o-cresol as a discarded commercial chemical product, off-specification species, container residue, or spill residue.
	B	4, 6-dinitro-o-cresol salts	4, 6-Dinitro-o-cresol salts as discarded commercial chemical products, off-specification species, container residues, or spill residues.
P059	A	Heptachlor	Heptachlor as a discarded commercial chemical product, off-specification species, container residue, or spill residue.
	B	Heptachlor epoxide	Heptachlor epoxide as a discarded commercial chemical product, off-specification species, container residue, or spill residue.
P065	A	Mercury fulminate-high mercury incinerator or RMERC residues	Nonwastewaters with greater than or equal to 260 mg/kg total mercury and that are residues from either incineration or mercury roasting or retorting (RMERC) of wastes containing mercury fulminate.
	B	Mercury fulminate waste (not from incineration or RMERC)	Nonwastewater mercury fulminate waste, regardless of mercury content that is neither residues from incineration nor residues from RMERC.
	C	Mercury fulminate - low mercury RMERC residues	Nonwastewaters with less than 260 mg/kg total mercury and that are residues from RMERC of wastes containing mercury fulminate.
P065	D	Mercury fulminate - low mercury incinerator residues (not RMERC)	Nonwastewaters with less than 260 mg/kg total mercury and that are residues from RMERC of wastes containing mercury fulminate.
	E	Mercury fulminate wastewaters	All P065 (mercury fulminate) waste managed as wastewaters.
P092	A	Phenyl mercury acetate nonwastewater high mercury incinerator or RMERC residues	Nonwastewater phenyl mercury acetate wastes, regardless of mercury content, that are residues from either incineration or mercury roasting or retorting (RMERC) of wastes containing phenyl mercury acetate.
	B	Phenyl mercury acetate nonwastewater phenyl mercury acetate waste (not from incineration or RMERC)	Nonwastewater phenyl mercury acetate wastes, regardless of mercury content, that are not residues from incineration or residues from RMERC.
	C	Phenyl mercury acetate nonwastewater low mercury RMERC residues	Nonwastewaters with less than 260 mg/kg total mercury and that are residues from RMERC of wastes containing phenyl mercury acetate.
	D	Phenyl mercury acetate nonwastewaters low mercury incinerator residues (not RMERC)	Nonwastewater with less than 260 mg/kg total mercury and that are residues from incineration, but not RMERC, of waste containing phenyl mercury acetate.
	E	Phenyl mercury acetate wastewaters	All P092 (mercury fulminate) waste managed as wastewaters.

Table 1.3
EPA Hazardous Waste Codes with Subcategories (cont'd)

EPA Code	Sub Code	Subcategory	Description
U151	A	High mercury nonwastewater	Nonwastewaters with greater than or equal to 260 mg/kg total mercury [including residues from mercury roasting or retorting (RMERC) of U151 waste if it contains greater than or equal to 260 mg/kg total mercury].
	B	Low mercury nonwastewaters from RMERC	Nonwastewaters with less than 260 mg/kg total mercury and that are residues from RMERC of U151 wastes
	C	Low mercury nonwastewaters	Non wastewaters with less than 260 mg/kg total mercury that are not residues from RMERC
	D	Elemental mercury contaminated with radioactive materials	
	E	Mercury wastewaters	All U151 (mercury) waste managed as wastewaters
U240	A	2, 4-D (aka dichlorophenoxyacetic acid)	2, 4-D as a discarded commercial chemical product, off-specification species, container residues, or spill residues.
	B	2,4-D (dichlorophenoxyacetic acids) salts & esters)	2, 4-D salts or esters as discarded commercial chemical products, off-specification species, container residues, or spill residues
	C	Unspecified U240 waste	U240 waste, but characterization information is insufficient to determine whether the A or B subcode is appropriate.

Chapter 2. Methodology

This chapter discusses the methodology for preparing the STP, including the assumptions used, the treatment option selection process, the coordination with regulatory agencies and other stakeholders, the process of mixed waste characterization, and waste minimization/pollution prevention (WMin/PP).

2.1 Assumptions Used for Preparation of STPs

The assumptions listed below were in effect at the time of approval of the STP on September 29, 1995. However, changes in conditions affecting the STP have occurred since approval. For example, with the signing of the Defense Authorization Bill on September 22, 1996, the No-Migration Petition requirement for the operation of WIPP was eliminated and an EPA certificate of compliance was added in place.

All sites used the following assumptions to provide a degree of consistency when preparing the STP. The assumptions were developed as a part of the "Draft Site Treatment Plan Development Framework" and reflect review and comment from the states and EPA.

- HLW will continue to be managed according to current plans at each site (i.e., Hanford, West Valley, SRS, Idaho National Engineering and Environmental Laboratory [INEEL]). Primarily due to potential safety concerns, HLW will not be transported offsite except as a treated, stable waste ready for disposal. The STP will not change management strategies for HLW.
- Regarding defense-related TRU waste, the STPs reflect DOE's current strategy on the Waste Isolation Pilot Plant (WIPP) opening and receiving a No-Migration Variance (NMV). An NMV is approved if the disposal facility can be shown to protect the environment. Wastes disposed in such a unit are not required to meet the LDR treatment standards. The STPs identify characterization, processing, and treatment of TRU waste to meet the WIPP Waste Acceptance Criteria (WAC). Consistent with this policy, treatment of mixed TRU waste to meet LDR standards will not be included in the STP.
- The STPs will recognize that DOE's policy regarding WIPP is under review and may change in the future. The STPs provide the flexibility to modify activities and milestones regarding TRU waste to reflect potential future changes in DOE policy.
  Under current DOE policy, nondefense related TRU waste would not be disposed at WIPP. STPs should reflect LDR treatment of nondefense mixed TRU waste.
- DOE recognizes some states' preference for treatment of all wastes onsite. Where appropriate, existing onsite capacity will be used before new facilities are constructed. When onsite treatment or use of commercial or mobile facilities is not feasible, the use of existing offsite capacity, as well as the construction of new facilities, will be considered.
- Sites in the same state will investigate the practicality of consolidating treatment facilities.
- Mixed waste resulting from environmental restoration (ER) and decontamination and decommissioning (D&D) activities will be factored into planning activities and equity discussions, particularly where using facilities in the STP are being considered for managing ER and D&D mixed waste streams.
- On a volume basis, most of DOE's mixed wastes are to be treated onsite. Because of transportation concerns and costs, this includes process wastewater and some explosives and remotely handled waste. In addition, other large volume waste streams generally will be treated onsite. At a minimum, Richland (RL), Oak Ridge (OR), Idaho (ID), and Savannah River (SR) are to have onsite facilities to treat the majority of their wastes.
- The Programmatic Environmental Impact Statement (PEIS) is being performed in parallel with the development of the STPs. The STP process will provide information to the PEIS. Each site will prepare any necessary specific National Environmental Policy Act (NEPA) documentation before proceeding with a given project or facility required by the state or EPA as a result of the STP process.
- In support of DOE's "cradle to grave" waste management philosophy, disposal site location and criteria will be factored into state equity discussions, waste treatment facility designs, and the characteristics of the final wasteforms.

In addition to the general DOE complexwide assumptions, SRS developed site-specific assumptions for use in developing the STP.

- To the extent possible, all mixed waste streams will have a preferred treatment option identified and/or option analysis complete in the STP. Those waste streams without a preferred treatment option will have a schedule for the development of the preferred option.
- All Savannah River Site high-level waste will be treated onsite.
- ER, Transition, and D&D waste streams will be addressed in the STP to the extent that they are known. The STP does not address corrective action or remedial action pursuant to RCRA, Hazardous and Solid Waste Amendments, or CERCLA that do not involve the land disposal of hazardous waste (e.g., the placement of remediation wastes into or within a corrective action management unit). Corrective action or remedial action issues shall be addressed by the CERCLA Section 120 Federal Facility Agreement (FFA) effective August 16, 1993, and any hazardous waste permits issued or to be issued by the State of South Carolina and EPA or other actions under CERCLA. Methodology for modifying the STP for new ER, Transition, and D&D waste streams will be incorporated into the text of the document. Investigation Derived Waste (IDW) will be managed per the IDW Management Plan as agreed by SCDHEC, EPA - Region IV, and SRS.
- If existing onsite treatment capacity is available for a particular waste stream, no further analysis will be performed for that waste with the exception of waste streams going to the CIF. To be responsive to stakeholders, alternatives to incineration were addressed. Existing mixed waste treatment facilities are those facilities at SRS that are either presently operating or under construction (i.e., having been issued regulatory operating or construction permits). Existing mixed waste treatment facilities at the Savannah River Site include Savannah River Laboratory High Activity and Low Activity Treatment Tanks, M-Area Liquid ETF, F-Area and H-Area ETF, Z-Area Processing Facility, DWPF, M-Area Vendor Treatment Facility, and CIF. Existing non-RCRA disposal facilities include the E-Area Vaults and the Z-Area Saltstone Disposal Vaults.
- Since permits had not yet been issued for the M-Area Vendor Treatment Facility at the time of STP development, the Facility was referred to as a “new facility”. However, treatment options analyses were not performed in the DSTP for the six original streams that served as a design basis for treatment by the M-Area Vendor Treatment Facility. Options analysis was conducted before the site treatment plan preparation and resulted in the selection of this treatment process that produces a superior wasteform. Options analyses for other SRS waste streams for which this technology is appropriate treatment have been done.
- Treatment schemes such as treatment in containers or containment buildings, privatization, mobile treatment, and others have been and will be investigated.
- The STP did not address moratorium waste in the preferred option analysis process.
- The level of detail for option analysis will vary in the STP from waste stream to waste stream.
- The five-year window for waste forecasting will continue to be used as established in the Final MWIR (1996 through 2001).
- In all relevant STP flow diagrams, after the waste has been removed from the containers, the containers will be considered "empty" according to R61-79.261.7 of South Carolina Hazardous Waste Management Regulations (SCHWMR), thus requiring no treatment.

2.2 Treatment Options Selection Process

Because the STPs were prepared by the sites using a “bottom-up” approach, the resulting treatment configuration, when viewed from a national level, contained many redundancies and inefficiencies. The DSTP option selection process and methodology are explained in the Volume II, Sections 2.2.1, 2.2.2, and 2.2.3. As development of the STPs continued, an assessment was performed to determine what accommodations were necessary to blend the initial “bottom-up” approach into a more sensible national configuration of treatment systems as STP development was finalized. To facilitate this assessment, DOE established the Options Analysis Team (OAT) comprised of site representatives and members of the Headquarters' FFCAct Task Force. The OAT coordinated their efforts with the states through the National Governors' Association (NGA) to ensure the national mixed waste configuration reflects both the states and DOE's concerns. As part of this evaluation, the impacts of implementing the emerging STP configuration, as well as alternative configurations, were evaluated.

The focus of the OAT's efforts was on mixed low-level waste (MLLW). While the FFCAct also covers high-level waste (HLW) and mixed transuranic waste (MTRU), the strategies for managing these wastes have already been established. However, DOE recognized that modifications of these strategies might be needed as the programs evolve, and new information becomes available.

Changes to the baseline STP configuration proposed by the OAT were based on the following analyses:

1. Review of the STP baseline configuration to identify redundant and technically inefficient proposed treatment options.
2. Identification of alternative treatment configurations that emphasize key state and DOE concerns.
3. Evaluation of the STP baseline and alternate configurations against key evaluation areas to determine what combination of treatment options results in a configuration that best meets DOE's, the states', EPA's, and other stakeholders' concerns.

The results of the initial OAT analysis were shared with each of the sites and the state regulators, as well as DOE management. The OAT worked for several more months responding to state requests for additional analysis, incorporating ongoing site analysis, and responding to comments. The resulting configuration, as presented in the final development of the PSTPs, was DOE's best attempt to balance competing DOE and stakeholder interests.

As Site Treatment Plans throughout the DOE complex are approved, DOE has created five focus groups to carry on the work of the OAT and provide oversight not only for development and implementation of treatment processes but also for disposal of treatment residuals. These focus groups address a broad range of mixed, hazardous, and low radioactive waste treatment and disposal concerns. The focus groups are Landfills, Groundwater, Mixed Waste, Tanks, and D&D.

2.2.1 Preferred Option (PO) Selection Process

DOE-HQ prepared several guidance documents to assist the sites in working through treatment identification and selection of preferred options. Guidance is found in these documents:

- U. S. Department of Energy, *Annotated Outline for the Draft Site Treatment Plans*, Rev. 3 – draft, March 28, 1994
- U. S. Department of Energy, *DSTP Development Framework Implementation Guidance*, Revision 0, February 15, 1994
- U. S. Department of Energy, *Draft Site Treatment Plan Cost Guidance*, Revision 1, April 28, 1994
- U. S. Department of Energy, *Draft Site Treatment Plan Development Framework*, Revision 7, April 7, 1994
- U. S. Department of Energy, *Guidance for Draft Site Treatment Plan (DSTP) Development*, Rev. 4, May 10, 1994
- U. S. Department of Energy, *Guidance for Preparation of DSTP*, Appendix A, Revision 1, April 7, 1994
- U. S. Department of Energy, *Protocol for Identifying a Potential Offsite Mixed Waste Treatment Option in the DSTP*, Revision 1, March 7, 1994
- U. S. Department of Energy, *Treatment Selection Guides*, Revision 0, March 14, 1994

The Treatment Selection Guides provide information on selecting among treatment options by comparing the options on fundamental criteria such as regulatory compliance, environmental health and safety, treatment effectiveness, implementability, stakeholder concerns, life-cycle costs, and technology development. The DSTP Cost Information Guidance provides a level of consistency in the cost information by providing common cost assumptions. Drafts of these and other technical assistance documents were provided to the states and their comments incorporated into the final revision. These documents are available for review.

SRS technical personnel developed a method for selecting one preferred treatment process for each waste from a wide variety of treatment options. The SRS approach to treatment option analysis combined methods stipulated in the guidance provided by DOE (see above) with technology assessment techniques developed by WSRC. The detailed description of the treatment selection process appears in Sections 2.2.2 and 2.2.3. This process was completed for waste streams described in the PSTP. However, additional waste streams identified since the preparation of the PSTP required a technical option analysis for inclusion in the STP. As a result, it is appropriate to retain this section for the STP. Further justification for including this section is so that readers who are not familiar with previous developments to the STP can understand preferred treatment options listed in the approved STP.

Options Evaluation Process

This section contains two subsections. Subsection 2.2.2 contains an overview of the three-step process used to identify preferred options (POs). Subsection 2.2.3 contains detailed descriptions of each process step.

2.2.2 Process Methodology Overview

This section describes step by step the evaluation process used to determine preferred options (POs) for waste treatment.

Step 1 Identify Feasible Options

Purpose

To identify existing treatment facilities, existing production facilities with waste treatment capabilities, and planned treatment facilities that are technically feasible options for treating the SRS mixed waste streams.

It was assumed that facility modifications, permit modifications, etc., would be achievable.

Performed by

Technical personnel from each treatment and processing facility, along with the engineers and scientists assigned to the technical group who developed the STP.

Step 2 Perform Initial Screening

Purpose

To reduce the number of feasible options by assessing the technology success of the option.

The technology success assessment addresses the maturity and complexity of a feasible option to determine “viable” treatment options.

By assigning a Technology Success Factor (TSF) score to each feasible option, the feasible options are ranked. Those feasible options that received a high score become viable options requiring further analysis. Those feasible options that received a low score were rejected.

Performed by

Technical personnel from each treatment and processing facility, along with the engineers and scientists assigned to the technical group (IDOA), who developed the STP will perform the initial screening.

Step 3 Perform In-Depth Options Analysis (IDOA)

Purpose

The purpose of the IDOA is to identify the PO for each waste stream.

Performed by

Technical personnel from each treatment and processing facility, along with the engineers and scientists assigned to the technical group who developed the STP will perform the IDOA process.

2.2.3 Process Methodology Detailed Explanation

For those mixed low-level waste streams requiring In-Depth Options Analysis (IDOA) to determine the preferred treatment option, the in-depth analysis considered five types of treatment:

- Existing onsite treatment facilities (e.g., F-Area and H-Area ETF; CIF)
- Existing production facilities with some potential capability to treat waste, or available floor space that could be refurbished to accommodate installation of treatment processes under the "Containment Building" provision of 40 CFR 265 and SCHWMR
- Planned treatment facilities
- Vendor processes operated either onsite or at the vendor's facility
- Waste treatment processing available from other DOE sites

Initial Screening

Technology Risk Assessment and Technology Success Factor

A methodology for assessing technology risk of a process or facility based upon *Risk Management Concepts and Guidance* written by the Analytical Sciences Corporation for the Defense Systems Management College was used. The methodology was originally developed by the Department of Defense (DOD) to assist with evaluation of new weapons systems.

The "risk" assessed in a technology risk assessment is the possibility that a process under consideration may be too new and too complex to perform as required. This type of assessment is biased in favor of simple and well established technology. According to the WSRC *Conduct of Engineering Manual E7*, Procedure 2.16, "Technology Risk Assessment," some questions to help determine technology risk indicators include:

- Are state-of-the-art advances in technology being used in the design?
- Is the equipment exposed to a harsh or unique environment?
- Does the design require complex integration of control systems or computer software?
- Is the design based on research and development or does it use mathematical models for prediction?
- Is the cost of recovery from system failure high?
- Is the design evolving as construction is going on?
- Is the design new or an extension of successful existing designs?
- Are familiar components being used in new, non-standard ways?
- Does the facility or process stand alone or must it interface with other facilities or processes?

Technology risk assessment does not determine whether the process or system is safe. Special analyses done in the design phase of a project ensure that new processes pose no hazard to workers, the public, or the environment.

No process or facility can be simpler than its most complex part or more mature than its newest part. Thus, a technology risk assessment begins with an examination of the whole process or facility to identify the part that has the most complex and the least mature technology. While the interaction of numerous parts and features may result in an overall process that is more complex and novel than its individual pieces, the identification of the crucial part is the first step in assessing the probability of a process or system failure.

The Maturity Factor (Pm) and the Complexity Factor (Pc) are assigned "magnitudes," based on guidance in Table 2.1. When engineering assessment indicates the factors fall between the extremes noted, other magnitudes can be assigned. The Maturity and Complexity Factors are averaged to give the probability of failure (Pf). (Pm + Pc)/2 = Pf.

Table 2.1 – Probability of Failure

Magnitude	Maturity Factor (Pm)	Complexity Factor (Pc)
0.1	• Components exist. • Performance requirements are specific. • Design is not based on numerous, wide-ranging assumptions.	• Design is simple. • Design is complete before installation begins. • New process or facility has few interfaces with other facilities, or processes.
0.5	• Components are used in non-standard ways. • Requirements are changing. • Design is based on major assumptions that have a significant impact on the design output.	• Design has many interconnected facets. • Construction has begun on some parts of the process or facility without the whole design being finalized. • Process or facility must interface with other processes or facilities to achieve overall objectives.
0.9	• Design is state-of-the-art. • Research is still on-going. • Functional processes have not been built. • Requirements are undefined. • Design is based largely on assumption instead of fact.	• Design is very complex. • Design and construction are proceeding almost at the same time. • Process or facility depends on new and extensive software. • Process or facility is a vital part of an interdependent group of other facilities.

Next, a magnitude is assigned to the consequence of failure (Cf). Such consequences range from minor inconveniences from which recovery is quick and inexpensive, to technical catastrophes from which recovery, if possible at all, is prolonged and costly. Table 2.2 provides the guidance for assigning the magnitude.

Table 2.2 – Consequences of Failure

Magnitude	Consequence of Failure (Cf)
0.1 (low)	Minimal, or no consequences, unimportant
0.3 (minor)	Small reduction in technical performance
0.5 (moderate)	Some reduction in technical performance
0.7 (significant)	Degradation in technical performance
0.9 (high)	Technical goal cannot be achieved

For all assessments of the technology risk of the waste treatment options, a Cf was chosen equal to 0.7. Should a preferred treatment option suffer a technical failure, it was postulated that the result would be a costly and time-consuming redesign to develop another process to meet requirements. Until the redesign was complete and implemented, waste treatment performance would be significantly degraded.

The maturity and complexity factors are combined with the consequence factor in an equation to give the risk factor (RF):

$$RF = (Pf + Cf) - (Pf \times Cf)$$

The resulting risk factor (RF) is a number between 0.19 and 0.99.

If Pf = 0.1 and Cf = 0.1, then RF = (0.1 + 0.1) – (0.1 x 0.1) = 0.19

If Pf = 0.9 and Cf = 0.9, then RF = (0.9 + 0.9) – (0.9 x 0.9) = 0.99

As can be seen from the above, the closer the RF is to 0.99 the greater the technology risk.

In the model used to screen and evaluate waste treatment options, numbers ranging from 0 to 100 were assigned to treatment option attributes with high numbers representing more desirable features. To make technology risk assessment scores work the same way (high numbers indicating a low technology risk), the risk factor was converted arithmetically to a number between 0 and 100 and called the Technology Success Factor (TSF). A TSF score near 100 indicates a high degree of simplicity and maturity for a treatment option.

In the initial screening of treatment options, those with TSF scores under 50 were discarded. It means only that, at this time, such technologies remain unproved and cannot be recommended in the Site Treatment Plan. Other departments at SRS are investigating and encouraging innovative waste treatment technologies. When these technologies mature, the SRS waste management approach will assess them for the Site's waste treatment program.

In-Depth Options Analysis (IDOA)

After the elimination of those treatment options with a low possibility for technological success, most waste streams still had several viable treatment options. It became necessary to choose the “best” treatment for each waste stream. To determine the best option, all viable treatment options were subjected to an In-Depth Options Analysis. Comparison among treatment options for a given waste stream is facilitated when each option can be assigned a number that reflects the degree to which the option satisfies a set of criteria or requirements. The method of developing a numerical ranking of treatment options is known as the IDOA model.

The IDOA process took several steps:

1. Attributes by which all treatment processes would be analyzed were determined.
2. The relative importance of the attributes was determined.
3. The IDOA model was applied to each viable treatment option.
4. Engineering assessment took the IDOA model results into account with other factors to determine the Preferred Option to treat a given waste stream.

The categories and attributes analyzed were:

Process Parameters

- Volume alteration
- Secondary waste generation
- Destruction, removal, and demobilization efficiency
- Flexibility
- Ability to be shipped
- Final wasteform

Engineering Parameters

- System implementability
- Availability
- Scalability
- Remedial measures
- Schedule for treatment of waste

Personnel Parameters

- Consequences of unmitigated accident scenarios
- Non operational worker potential exposure
- Operational worker potential exposure
- Transportation potential exposure

Regulatory Parameters

- Need for a variance
- Ability to obtain a permit
- Waste disposal

Public Acceptance

- Public acceptance

Cost Considerations

- Life-cycle cost
- Funding availability

Industry Involvement

- Market for technology
- Private sector involvement

"Enabling statements," clarifying the above attributes, assisted with the process expert's evaluation of treatment options. The "enabling statements" appear in Table 2.3. The attributes and enabling statements formed the basis with which "viable" treatment processes were assessed and compared.

To evaluate a viable treatment option, a team of waste treatment process experts applied the enabling statements to each option. The team assigned a number from 0 (low) to 100 (high) to each attribute. The score reflected the experts' assessment of how well the process satisfied the requirement posed by the attribute.

For example, consider the attribute of "Secondary Waste Generation". If the process produced a small quantity, all of which could be handled by existing technologies, the process experts would give the process a "high" numerical rating (median 80). If the process produced as much as 10% additional waste that existing technologies could handle, the process experts rated it "medium" (median 50). If the process produced large amounts of secondary waste, or if existing technologies could not handle the secondary waste, the experts rated it "low" (median 20). If the experts felt a score other than the median better reflected conditions, they could assign another number, provided they gave an explanation for the variation (e.g., in the preceding case, if the process produced 20% additional secondary waste, the evaluation would include a statement such as "subtract 10 points because of additional waste generation").

For the cost attribute, a team of cost estimators determined the life-cycle cost. The estimators developed:

- Operating and maintenance cost for the life of the facility
- Disposal cost of all final wasteforms in compliance with LDR
- Decontamination and decommissioning cost to return the facility to a safe and environmentally benign condition at the end of its useful life.

The process experts' evaluation resulted in a raw *technical* score for each attribute, and inclusion of the cost estimators' life-cycle cost data resulted in a raw *total* score. Nevertheless, these raw scores did not reflect the relative importance of the attributes. The Technical Advisory Committee (TAC), a group of experienced technical experts with backgrounds in engineering design, environmental protection, process technology, safety, and health, was appointed to oversee the treatment selection process. They recognized that not applying a weighting factor to each attribute assigned the same weight to all of them. So, the Technical Advisory Committee proposed a weight for each factor. The weighting factors were then reviewed and modified by independent reviewers, regulators, and a citizens' focus group. The final weight factors appear in Table 2.3.

Each option's weighted technical scores were summed. The total fell between 0 (least preferable) and 100 (most preferable). The sums enabled the treatment option to be ranked according to the technical weighted score. Then, the weighted life-cycle cost data were added to the technical weighted score in a way that ensured that the cost of a treatment facility was equitably apportioned among the waste streams that would be processed using that facility. This resulted in a total weighted score. The IDOA model generated the technical and total weighted scores for each treatment option. These IDOA model scores were useful tools to narrow the entire population of options.

- The IDOA model ensured the same attributes were analyzed for every process or facility.
- The IDOA model provided some guidance to help make analyses consistent among the facilities.
- The IDOA model enhanced the engineering assessment by incorporating consistent structure and logic.

Application of the IDOA model ensures consistency and completeness in performing the in-depth analysis of the potential treatment options associated with each waste stream. The primary function of the model is to lower the number of possible treatment options to a more manageable number for further analysis and review. The model was not developed to provide a clear PO winner, and the reader is cautioned against believing that the PO having the best model score is the PO of choice. On the contrary, the application of the model results in a smaller set of POs that may have model scores within a 10 to 15% range of each other that serve as the focus of further analysis. It was not expected, and in practice has not always been the case, that the treatment with the best model score is the PO of choice.

Sixteen of the waste streams also have treatment options proposed by outside vendors. Many of these options, however, remain technologically unproven. The vendors have offered to perform studies to demonstrate that their technology can produce a wasteform that will meet LDRs. A separate task team is working with the vendor proposals to determine which technologies appear worthy of further investigation. As rapidly as procurement rules allow, and as completely as budgetary constraints permit, contracts are being made with vendors to pursue the most promising innovative treatment methods.

Nonetheless, the technical viability of these technologies has been assumed, and hypothetical vendor processes have been projected, to permit application of the IDOA model and a comparison of the potential vendor processes with other treatment options. In the months ahead, successful vendors' studies will be translated into process designs that can be compared with the preferred options selected. This comparison will verify the conclusions drawn from the potential vendors' processes and may reveal a vendor treatment technology for a waste stream that is preferable to the option previously favored.

Table 2.3 – Attributes and Enabling Statements for Options Analysis

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
22%	PROCESS PARAMETERS			
5%	Volume Alteration	A factor of 5 reduction of waste occurs.	The volume is maintained at 1:1 after processing.	The volume is increased by a factor of 2 or more after processing.
4%	Secondary Waste Generation	A small quantity is produced, all of which can be handled by existing technologies.	An additional amount of waste, in the range of 10%, is generated, which can be handled by existing technologies.	Large quantities are produced, or existing technologies are not available for treatment.
2%	Destruction Removal, and Demobilization Efficiency	All applicable LDR standards are met.	Additional LDR treatment is required for some of the constituents; technology exists.	Additional treatment is required to meet requirements, and technology does not exist, or requires modification.
3%	Flexibility	The process can treat waste streams of similar compositions to that assumed as a design basis without producing a final wasteform that fails to meet requirement. The process does not need to be reconfigured or monitored with special care to meet throughput specifications.	The process can treat waste streams of similar compositions to that assumed as a design basis without producing a final wasteform that fails to meet requirement; but the process must either be reconfigured or monitored with special care to meet throughput specifications.	The process cannot treat waste streams of compositions that differ from that assumed as a design basis. Special care must be taken to monitor influent streams to ensure that they conform to the composition assumed as a design basis.
2%	Ability to be Shipped	Treatment residuals meet shipping requirements without any additional treatment.	Treatment residuals require simple physical treatment to meet shipping requirements.	Treatment residuals require extensive treatment to meet shipping requirements or technologies do not exist.
6%	Final Wasteform	Wasteform meets the expected disposal WAC.	Final forms require additional treatment to meet disposal WAC; technologies exist.	A significant additional treatment is required before disposal or technologies do not exist.
19%	ENGINEERING PARAMETERS			
13%	System Implement-ability	Most of the elements and processes have been previously demonstrated on similar uses and applications.	50% or fewer of the elements have been previously demonstrated on similar uses and applications.	Few or none of the elements have been demonstrated.
3%	Availability	Key components arranged in similar systems have resulted in availability greater than 80%.	Process is expected to be available about 50% of the time.	Process is expected to be available about 20% of the time, or large uncertainties exist in ability to predict availability.
1%	Scalability	Process can be easily expanded to take advantage of economies of scale. Also, processes go from laboratory scale directly to plant scale.	Process can accept a range of input but has limitations for expansion. Also, pilot scale tests are required before plant-scale design.	Process cannot be expanded to take advantage of economies of scale. Also, laboratory or pilot scale testing would be impractical, or not yield meaningful results. Plant-scale design must come directly from engineering calculations.

1%	Remedial Measures	Process failure or malfunction does not create a waste that cannot be treated by other means; alternative treatment methods for the original waste exist and can be implemented within three months of recognition of need.	Process failure or malfunction creates other wastes that must be characterized to determine treatability; alternative treatment methods must be developed to treat new waste created by the process malfunction.	Process failure or malfunction creates other wastes for which there is no known treatment; no alternative methods for treatment of original waste exist.

Table 2.3 – Attributes and Enabling Statements for Options Analysis (cont'd)

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
1%	Schedule for Treatment of Waste	A schedule for addressing and processing waste can be determined with high confidence.	Some technology issues can produce uncertainty in schedule development. System complexities may prolong schedule.	Availability, technology or flexibility issues severely limit confidence in developing schedules. Extensive training, system, and operational complexity may also create problems.
6%	Consequence of Unmitigated Accident Scenarios	There are little or no facility emissions for routine operations under all but the most catastrophic accidents.	There are little or no emissions for routine operations, but significant releases occur under most accident scenarios.	There are marginally acceptable releases under routine operations or extensive releases under most accident scenarios.
6%	Non-Operational Worker Potential Exposure	Significantly fewer workers required to construct and decommission a facility with the proposed process as compared to other technologies. There is lower than average non-routine maintenance.	Average number of workers and non-routine maintenance required.	The process is more complex than average facility construction. Non-routine maintenance and decommissioning is required.
6%	Operational Worker Potential Exposure	There are significantly fewer workers potentially exposed or the potential exposure is much lower than average.	There are an average number of workers and potential exposure levels.	There are a greater than average number of workers or there is a greater than average potential exposure to the work force.
2%	Transportation Potential Exposure	No transportation of treated or untreated waste is required.	Limited additional characterization is required to support transportation, no new packaging/ certification facilities required, and limited number of waste transports are required.	Significant additional waste characterization is required for transportation, new packaging/ certification facilities are required, a large number of waste transports are needed, or a large number of miles are required for each waste shipment.
14%	REGULATORY PARAMETERS			
4%	Need for Variance	Processes are in full compliance with all applicable regulations with little or no difficulty or with no process modifications.	Processes are in partial compliance with all applicable regulations with little or no difficulty. Full compliance may be achieved through requests for variances or with limited modifications to the process.	Majority of the applicable regulations cannot be met without vast modifications to the process or other extensive variances.

6%	Ability to Obtain a Permit	Permitting process is well-defined and relevant precedents for success have been established. Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with little or no difficulty.	Process or key elements have been permitted elsewhere, but some key differences may exist (for example, differences in waste streams, or waste stream characterization). Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with moderate difficulty.	The process is unproved technology or a new arena of application or the need for multiple permits builds in substantial permitting barriers. Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with extreme difficulty or have never been previously permitted.
4%	Waste Disposal	80% of both primary and secondary wastes have been rendered non-hazardous. The other 20% remain hazardous.	50% of both primary and secondary wastes have been rendered non-hazardous. The other 50% remain hazardous.	80% of both primary and secondary wastes remain hazardous. The other 20% have been rendered non-hazardous.

Table 2.3 – Attributes and Enabling Statements for Options Analysis (cont'd)

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
9%	PUBLIC ACCEPTANCE			
9%	Public Acceptance	Stakeholders accept the process and the risks. Similar processes have been publicly acknowledged by stakeholders as being acceptable.	Some stakeholder concerns that could affect successful utilization of the technology. Stakeholders have publicly stated reservations about the safety or effectiveness of similar processes.	Significant stakeholder concerns about process. Stakeholders have publicly stated disapproval about the safety or effectiveness of similar processes, or stakeholder opinion is unknown.
14%	Life-cycle Cost ***Costs Developed According To DSTP Cost Guidance Rev. 1.*** Costs are estimated for • pre-operating costs • facility costs • operating and maintenance costs • disposal cost • decontamination and decommissioning costs The **SUM** of the above costs is assigned a score in proportion to where it falls between $1 and $35 million. The higher the cost, the lower the score. Any cost totaling more than $35 million receives a score of zero.			
1%	Funding Availability	Life-cycle costs can be supported within target budget.	Life-cycle costs can be supported with less than 10% increase in target funding levels.	Line item funding required at high-levels.
1%	INDUSTRY INVOLVEMENT			
0.5%	Market for Technology	Numerous markets are identified within and outside DOE. More than three DOE and commercial nuclear facilities have similar wastes.	More than one market is identified within and outside DOE. Two DOE and commercial nuclear facilities have similar wastes.	No markets or needs are identified. SRS waste is unique.
0.5%	Private Sector Involvement	A private sector technology company is identified with experience and interest and the company has experience in permitting activities. A vendor has submitted a proposal and has permitting experience.	A private sector party has expressed an interest; however, has little or no experience in this type of activity or permitting process. A vendor with non-technical experience has submitted a proposal.	No private sector companies have expressed an interest or a need for the technology.

Engineering Assessment

The last step in the IDOA was to perform an engineering assessment, taking into account the score generated by the IDOA model. While application of the IDOA model analyzed the degree to which the treatment option satisfied the requirements of the prescribed attributes, engineering assessment took a broader perspective, considering factors that combine to identify the preferred treatment option.

2.3 Coordination with Regulatory Agencies and Other Stakeholders

Coordination with Regulatory Agencies

The Federal Facility Compliance Act (FFCAct) offered an opportunity for DOE and the state and EPA regulators who approved the plans to work cooperatively toward defining mixed waste treatment strategies. As requested by the states, DOE signed a cooperative agreement in August 1993 with the National Governor's Association (NGA) to facilitate the DOE-to-state interactions. The NGA has sponsored national meetings on a routine basis with DOE, the states, EPA, and the Indian Nations throughout development of the STPs.

Public Participation

The FFCAct requires the states and EPA to provide for public involvement after the Proposed Plans are submitted. DOE has provided additional opportunities for public input into the development of Conceptual Site Treatment Plans (CSTP) and Draft Site Treatment Plans (DSTP) through existing public involvement mechanisms at the site.

The public has been informed and invited to participate throughout the STP development process. In December 1993, a CSTP fact sheet was mailed to stakeholders on the Site's public involvement distribution list. In response to the fact sheet, citizens volunteered to participate in a focus group to look at three STP development documents: the Site Treatment Plan Assumption List, Site Treatment Plan Development Flowchart, and Site Treatment Plan In-Depth Options Analysis Model.

The focus group, which consisted of volunteers from the general public and members of the Citizens Advisory Board (CAB), met on May 9, 1994, to give comments on the documents. Representatives of SCDHEC also attended the meeting. SRS considered the comments and made revisions to the DSTP based on the expressed concerns.

The DSTP also was discussed at the SRS Waste Management Environmental Impact Statement (WMEIS) informational workshops held in April 1994 and the WMEIS scoping hearings held in May 1994.

When the DSTP was issued, SRS also issued a fact sheet summarizing the highlights of the plan and conducted DSTP public workshops and briefings for special interest groups. Information about other sites that identified SRS as a preferred option for the treatment of their mixed waste streams was provided. A public workshop was held in Aiken on the afternoon and evening of October 4, 1994. In addition, an edited videotape of the workshop was carried on cable channels in Augusta, Columbia, and Savannah. Showings of the video were given on October 11, 12, and 13. After each presentation SRS personnel were available to answer questions and take comments over a toll-free number that was flashed on the screen at the time of the video viewing.

Copies of the Savannah River Site DSTP and executive summary and other sites' DSTPs were placed in the Public Reading Room at the University of South Carolina (USC) Aiken library. The plan's availability and public workshops were announced through public service announcements, newspaper, television and radio advertisements, and news releases using the Site's media list. Copies of the DSTP were mailed to stakeholders upon request.

SRS representatives offered briefings on the highlights of the DSTP to interested community groups. Stakeholders attending the public workshops were invited to give comments at the workshop or to provide them later. Stakeholders who attended the public workshop or called on the toll-free number after the videotape viewings were invited to participate in focus group meetings to provide further comment on the DSTP. Focus group meetings were held on October 18, 20, and 26. Although sparsely attended, some valuable input was provided and incorporated into the PSTP. Comments, also accepted through the mail, were considered in the development of the Proposed STP (PSTP).

Copies of the PSTP, Executive Summary, and other sites' plans were placed in the Public Reading Room at USC-Aiken. The public was made aware of the plan's availability through public service announcements, newspaper, television and radio advertisements, and news releases using the site's media list. A revised fact sheet was developed and issued to stakeholders. Stakeholders were informed that comments on the PSTP could be submitted to SCDHEC.

The PSTP was submitted to SCDHEC on March 30, 1995. Under requirements of the FFCAct, SCDHEC then assumed responsibility for public notice. SCDHEC performed an internal review and put a modified PSTP out for a 45-day public review and comment period beginning on July 14, 1995. The public notice period concluded with a public hearing held on August 30, 1995. SCDHEC reviewed public comments and requested changes to the PSTP where appropriate.

SCDHEC requested changes to the PSTP as a result of responses from the public as well as its own review. During September 1995, SRS and SCDHEC combined discussion on language for the Consent Order and changes to the PSTP. On September 20, 1995, SCDHEC approved the PSTP with modification and issued a proposed Consent Order 95-22-HW for the implementation of the STP. SRS submitted the requested modifications. The Consent Order was signed by all parties and became effective on September 29, 1995, after which time the modified PSTP became the approved STP or, simply, the STP.

The Consent Order 95-22-HW includes a provision for public notice and comment on changes that SRS may propose to waste stream treatments in future modifications to the STP. This helps to keep stakeholders aware of future change in treatment strategies as technologies evolve.

Conclusion

The Savannah River Site developed an aggressive and active public participation plan, which comprehensively included surrounding communities, regulatory agencies, and other identified stakeholders. The overall purpose was to ensure the public participation program for the STP was proactive, responsive to public concerns, and serves the best interests of stakeholders and the DOE. Activities were designed to meet the overall program objectives, coordinate with other activities, and provide opportunity for meaningful public involvement.

National Level

At the national level, DOE presented information on the development of the STPs to the Environmental Management Advisory Board, and held an open house in Washington, DC when the Draft Plans were released. DOE also met informally with representatives of Indian tribes and separately with representatives of other groups that had interest in Site Treatment Plan development. The purpose of the meeting was to determine if there were national issues that had not been identified through site-specific activities. Additional opportunities to obtain input at the national level may be offered in coordination with the states and EPA. The Center for Environmental Management provides information on Act activities at the national level (1-800-736-3282; 202-863-5084 in Washington, DC).

2.4 Mixed Waste Characterization

General

Westinghouse Savannah River Company (WSRC) is responsible for day-to-day management and operation of the waste management programs for the Department of Energy. DOE provides oversight and overall direction for solid waste management programs at SRS.

The process for defining and determining whether a waste material or stream is hazardous or nonhazardous is defined in the WSRC *Environmental Compliance Manual* (ECM) Procedure 6.03 as well as the Waste Acceptance Criteria Manual, 1S. The requirements of the ECM are applicable to WSRC and its subcontractors handling wastes and making the determination of whether the wastes are hazardous or nonhazardous as defined by the federal Resource Conservation and Recovery Act and the South Carolina Hazardous Waste Management

Regulations. Specific guidance and requirements for making these determinations are provided in the SRS *Waste Disposal Manual*, WSRC-IM-90-138. By Memoranda of Understanding, other site organizations such as the U. S. Forest Service have agreed to abide by WSRC requirements when WSRC services or facilities are utilized.

As described below, SRS is composed of several major facilities, each with its own operating and support organizations. A number of these organizations play a role in characterizing waste at SRS.

Facility Management and Environmental Compliance Authorities

Facility Management ensures the facility is in compliance with all applicable federal/state regulations and site requirements. This includes management of waste generated and stored at the facility, including characterization of the waste prior to shipment to an onsite or offsite waste storage, treatment, or disposal facility.

Each major facility, group of facilities, or operating organization has a designated Environmental Compliance Authority (ECA) to advise and assist facility management in developing and maintaining the facility's environmental programs. The ECAs are individuals knowledgeable of environmental regulations and how the regulations apply to those facilities for which the ECAs are responsible.

ECM Procedure 6.03 requires the ECA or department representative at the facility or area generating a waste first to determine whether a waste is hazardous. If information to determine that a waste is hazardous is unavailable or inadequate, the waste is sampled and analyzed, provided sampling and analysis does not result in excess exposure of personnel to radiation.

The facility or area generating a waste also is responsible for preparing a waste characterization form for each routinely generated waste stream. The completed form is submitted to the Solid Waste Division (SWD) Department. The generator of a new waste must work closely with SWM and the Environmental Protection Department (EPD) to ensure the new waste can be managed under existing permits and that adequate onsite or offsite storage, treatment, and disposal capacity is available; or that, until sufficient waste volume is generated, satellite accumulation areas and/or 90-day staging areas are established in compliance with RCRA regulations. The generator also is responsible for determining appropriate EPA/SCDHEC hazardous waste codes and assigning appropriate SRS Hazardous Waste Index (HWI) number(s) for quarterly hazardous waste reporting purposes. A waste characterization form also must be completed when a new hazardous waste stream is generated or a hazardous waste generation process has changed.

Environmental Protection Department (EPD) and Office of General Counsel (OGC)

The EPD is the WSRC organization responsible for coordinating and overseeing sitewide environmental protection programs and assisting operating organizations with compliance issues including waste characterization. The WSRC OGC is consulted in all matters pertaining to environmental compliance that may have legal implications.

The *SRS Waste Disposal Manual*, prepared by EPD, includes a section on the identification and characterization of hazardous waste. The manual summarizes the applicable federal and state environmental regulations and provides site guidance for identifying, characterizing, managing, transporting, treating, storing, and disposing of mixed, hazardous, and nonhazardous waste. In addition, the *Waste Disposal Manual* provides guidance for waste minimization and environmental training.

The EPD issues regulatory guidance in the form of letters and memoranda to various site organizations to address specific regulatory questions as they arise. Many of these memoranda and letters are issued to provide guidance on the proper classification of a waste. These memoranda and letters are included in an appendix to the *Waste Disposal Manual*. The manual is updated periodically to incorporate changes in the regulations and add newly issued internal guidance documents. These periodic updates are issued to the custodians of each copy of the *Waste Disposal Manual* through the WSRC Document Control Section.

Environmental Health and Program Support Department

The Environmental Health and Program Support Department (EH&PSD) serves as the primary resource to various site waste generators during the preliminary waste identification and characterization phase. EH&PSD provides hazardous waste sampling services conducted in accordance with a sampling plan. These sampling plans are developed to ensure that sampling is representative, that sample collection and shipping meet regulatory protocols, and that proper analytical methods are requested. Alternatively, site organizations may collect their own samples. EH&PSD offers consultation services to those organizations. Technical support is available to waste generators for sampling activities involving radioactive wastes. EH&PSD has also developed sitewide sampling guidance. EH&PSD directs samples to onsite laboratories for screening prior to offsite shipments and also works with the Environmental Monitoring Section (EMS) to ship samples to offsite laboratories for analysis. To the extent possible, EH&PSD sends hazardous waste samples it collects to SCDHEC-certified laboratories. However, in some cases, because of high radioactivity levels or need for specialized analytical techniques, analyses are conducted onsite. EH&PSD also provides technical review services for analytical data generated by offsite laboratories. Assistance on the statistical aspects of a sampling plan can be obtained from the Applied Statistics Group, Scientific Computations Section of the Savannah River Technology Center.

Solid Waste Division

The Solid Waste Division (SWD) is responsible for management of many of the facilities for waste treatment storage and disposal at SRS. SWD also coordinates all offsite shipment and disposal of hazardous waste.

SWD issued the *SRS Waste Acceptance Criteria Manual* (1S Manual) for developing a waste classification system for managing each waste type, establishing waste acceptance criteria (WAC) for storage and disposal facilities, and instituting a Waste Certification Program to assure the waste received for treatment, storage, or disposal at SWD facilities meets the waste acceptance criteria (WAC).

The 1S Manual requires each generator that delivers waste to treatment, storage, or disposal facilities to implement a Waste Certification Program. This program provides assurance that the requirements for waste acceptance by the receiving facility are met. Waste certification provides assurance that waste has been properly identified, characterized, segregated, packaged, and shipped to the appropriate receiving facility in accordance with that receiving facility's waste acceptance criteria (WAC). Under this program, each waste generator designates a Generator Certification Official (GCO) to administer the waste generator's certification program and to assure that the waste generator's waste management programs implement and document controls to meet established waste acceptance criteria.

The SWD reviews and assesses a waste generator's certification plan, characterization methodology, other documentation, and procedures to assure compliance with the certification plan and TSD facility requirements. The SWD Department is responsible for performing surveillances, audits, or assessments of the waste generator's waste certification program as needed and for providing guidance and assistance.

Process Knowledge, Sampling, and Analysis

Hazardous waste management regulations obligate the generator of a solid waste to “determine if that waste is a hazardous waste”. The generator may accomplish this by testing the waste according to the methods set forth in Subpart C, or according to an equivalent method approved under 40 CFR 260.21. The regulations also allow the generator to apply “knowledge of the hazard characteristic of the waste in light of the materials or the processes used” to make the hazardous waste determination. This approach is generally referred to as a “process knowledge” determination.

Guidance has been provided to SRS waste generators in both the Waste Disposal and 1S Manuals that the ideal way to determine if a waste is characteristically hazardous is by collecting and analyzing a representative sample of the waste. Generators are directed to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (EPA Publication SW-846, Third Edition, November 1986) for the methods necessary to ensure that a sampling program meets this objective. SW-846 cautions against the “haphazardly selected sample”. As indicated above, technical support to waste generators is available from the EH&PSD for sampling activities involving radioactive wastes. EH&PSD also provides technical review services for waste characterization analytical data.

Although generators are strongly encouraged to make hazardous waste determinations based on representative samples, it is recognized that this is not always possible. Many of the waste streams onsite are nonhomogeneous job control or debris type waste making it extremely difficult to obtain a sample that is conclusively "representative."

To supplement information provided in SW-846, SRS has developed internal procedures to provide instructions to waste sampling personnel for collecting representative samples. This sampling procedure has been developed by the Analytical Laboratories Section and is found in the Westinghouse Savannah River Company procedure manual L3.13, PRR 4326 J.

Some SRS waste streams contain levels of radioactivity sufficient to make sampling prohibitively expensive or prevent strict adherence with the sampling and analytical protocols in SW-846. For waste streams such as these, the provision to allow characterization by process knowledge is exceptionally important when the unique difficulties presented by the radioactive component of the waste are considered. Paramount among these difficulties is the control of radiation exposure of personnel during collection, packaging, transportation, and analysis of samples.

An overriding principle of working with radioactive materials is maintaining personnel exposure to radiation at levels that are "as low as reasonably achievable" or ALARA. This principle includes not only exposure of the whole body or extremities to external sources of radiation but also control of surface and airborne radioactive contamination to prevent exposures through inhalation, skin absorption, or ingestion of the radioactive materials. The presence of radioactivity also adds other administrative and regulatory requirements to transporters who must comply with Department of Transportation regulations for the transport of radioactive materials. Commercial laboratories that analyze mixed waste samples must be properly licensed to receive, analyze, and dispose of radioactive materials. The processing and disposal of hazardous waste that is also radioactive requires additional specialized equipment, handling, and technologies which adequately address the radioactivity concerns in addition to the regulatory requirements for hazardous constituents.

Approximately 95% of the total volume of mixed waste being generated or currently in storage at SRS is characterized by sampling and analysis. In addition, a number of streams are hazardous for toxic metals that are used for their unique properties, and their classification is relatively straightforward. Thus, there is a high degree of confidence that approximately 75% of the current or past wastes are appropriately classified. However, it is possible that some of the listed waste streams (for example, solvent rags used for cleaning and decontamination) that have not been sampled may contain trace quantities of toxic metals. Where this is known to be a possibility, other waste codes that are thought to be appropriate have been conservatively added to those waste streams.

Radiological Characterization

A variety of methods are used to characterize the radioactive component of mixed waste. This includes hand held portable monitoring instruments used by Health Protection personnel to conduct measurements of radioactivity levels in the work environment. These instruments are capable of measuring alpha, beta, neutron, and gamma radiation. Although less sophisticated and less precise than laboratory measurements of waste samples, this instrumentation provides the means to quantify the level of radioactivity in mixed waste for the purpose of controlling exposure of personnel to levels that are ALARA. Field measurements can also be used to provide a conservative estimate of the amount of radioactivity present. More precise determination of the amount and type of radioactive material present in a waste material can be made by analyzing a representative sample of the material in a counting or radiochemical laboratory. The sample may or may not be prepared using various chemical separation, purification, and concentration techniques to enhance the overall sensitivity of the analytical technique. Typical laboratory instruments used to analyze or count prepared samples include gas-flow proportional counters for analysis of alpha and nonvolatile beta emitters, liquid scintillation counters for use in analyzing for low energy beta emitters such as tritium, silicon surface barrier detectors used for alpha particle spectroscopy measures, and high-purity germanium detectors used for gamma-ray spectroscopy to identify and quantify specific gamma-emitting radionuclides.

Transuranic (TRU) waste is waste containing an alpha-emitting transuranic isotope (atomic number greater than 92) with a half-life greater than 20 years and containing more than 100 nanocuries per gram (nCi/g) of radioactivity. A combination of process knowledge and instrument measurement is used to determine if a waste is TRU waste. Waste in contact with TRU material in facility gloveboxes is automatically assumed to be TRU waste and handled accordingly. This waste is placed in five-gallon cans. The contents of the can are evaluated by a pulse height analyzer (PHA) that measures the various energy levels of gamma rays emitted by TRU wastes. The energy profile is used to determine the quantity of TRU material in the can. In almost every case, this material is determined to be TRU waste. Waste generated from maintenance activities outside the glovebox, which may contain TRU material, is handled as TRU waste if contamination surveys are greater than the procedural limit. The combination of process knowledge and instrument readings normally leads to a conservative determination.

2.5 Waste Minimization/Pollution Prevention (WMin/P2)

At the Savannah River Site all pollutant-generating organizations and all operations are concerned with increasing Pollution Prevention (P2) awareness and successes. Environmentally sound and economically practical source reduction and recycling of all types of wastes and pollutants are mainstay activities in the SRS Pollution Prevention Program. These activities also include practices that reduce the use of raw materials, energy, water, and other resources and practices that protect natural resources through conservation and more efficient use.

In concert with good conduct of operations, SRS strives to reduce employee exposure to toxic and radioactive materials, mitigate environmental impacts of site operations, and in the process, reduce the costs of operations including waste management. The following results in the area of pollution prevention are representative of the types pollution prevention activities ongoing at the Savannah River Site.

- Documented waste minimization (source reduction and recycling) initiatives have saved over two million cubic feet of disposal space for radioactive and hazardous wastes since 1991. Total radioactive and hazardous annual solid waste generation volumes have declined by over 70% (700,000 cubic feet) during the same period due to Site mission changes and waste reduction activities. During 1998 and 1999 alone, over 120,000 cubic feet of hazardous and radioactive waste was eliminated through 229 separate documented waste reduction initiatives, saving over $25 million in annual waste management costs.

- Since 1992, SRS has recycled more than 22,000 tons of materials that were potentially sanitary waste. In 1999, SRS exceeded national sanitary waste recycle goals by recycling 47% (3,147 MTons) of its industrial/sanitary waste. Efforts are ongoing to beneficially reuse/recycle >75% of the SRS sanitary waste resulting from key operations.

- SRS, under Section 313 of EPCRA, has filed Toxic Chemical Release Inventory Reports annually since 1987. SRS calculates chemical releases to the environment and reports aggregate quantities for each regulated chemical that exceeds the set threshold limits. Reportable chemical releases from SRS have declined by over 95%, and we continue to improve our record in this area.

SRS encourages continuous improvement in its pollution prevention program for all our employees. Some key areas we addressed in FY99 and are continuing into FY00 and FY01 include:

- Continue to benchmark the best commercial industries for pollution prevention and waste minimization activities.

- Continue to identify and use non-hazardous substitutes for hazardous products previously used on site.

- Utilize Energy Savings Performance contracts to provide funding to install cost-effective energy conservation projects.

- Continue the retrofitting of administrative buildings with energy efficient lighting, occupancy sensors for lighting, and evaluation/upgrading of heating and ventilation systems for older buildings.

- Investigate and substitute recyclable and launderable products for those items which had previously been disposed.

- Continue the Presidential Closing the Circle Award-winning Chemical Commodity Management Center to control the purchase, distribution, and management of excess chemicals and chemical products.

- Procure cost-effective items made with recycled materials within the guidelines of the federal affirmative procurement practices to help in the development of the recyclables market and to preserve our natural resources.

- Maintain funding dedicated to implementing cost-effective P2 projects and operations' improvements.

- Strengthen SRS practices and procedures to integrate pollution prevention evaluations into major process modifications and new facility and process designs.

- Maintain heightened employee awareness through training programs, video presentations, news articles, and employee involvement.

- Support public awareness of pollution prevention practices through public displays at offsite events and support of in-school teaching enrichment programs.

These efforts, when coupled with management direction that is driven through strong performance incentives, help ensure a sustainable and continuously improving SRS P2 Program.

Chapter 3. Mixed Low-Level Waste Streams

This chapter discusses the wastes, waste groups and treatment options for the mixed low-level waste stream category. The wastes are categorized according to the proposed treatment. These proposed treatment options include the following:

3.1 Mixed Low-Level Waste with Treatment Capacity
3.2 Mixed Low-Level Waste Streams Requiring Technology Development
3.3 Mixed Low-Level Waste Streams for Which Further Characterization is Required
3.4 Mixed Low-Level Waste Streams Requiring Radionuclide Decay Prior to LDR Treatment

Refer to Table 1.1, Chapter 1, of Volume II of the STP for the user's guide. The user's guide identifies each mixed waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II of the STP.

3.1 Mixed Low-Level Waste Streams with Treatment Capacity

This section discusses the schedules and plans associated with treatment of SRS mixed waste with currently available treatment capacity. The sections of this chapter are divided into treatment categories as follows:

3.1.1 Onsite Treatment
3.1.2 Offsite Treatment
3.1.3 Preferred Treatment to be Determined

3.1.1 Onsite Treatment

SRS has several onsite treatment facilities available for treating mixed waste. These facilities include the Consolidated Incineration Facility (CIF) (currently in suspension of operations), the M-Area Vendor Treatment Facility (VTF) (currently in closure and not available for additional treatment), the F and H Effluent Treatment Facility (F/H ETF), and the Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks (MWST). Also included in this section are treatability variance petition submittals, recycling, and miscellaneous onsite treatments not otherwise mentioned.

3.1.1.1 Consolidated Incineration Facility (CIF)

The following types of wastes will be treated at the SRS CIF (CIF is currently in suspension of operations awaiting a decision in April 2002. At that time, alternate treatment will be selected or CIF will take steps to resume treatment operations):

3.1.1.1.A Organic Liquids Waste Group
3.1.1.1.B Organic Solids Waste Group
3.1.1.1.C Toxic Characteristic Solids Waste Group
3.1.1.1.D CIF Ash and Blowdown Waste Group
3.1.1.1.E Mixed Waste with Listed Contaminants Waste Group
3.1.1.1.F Reactive/Ignitable Waste Group

3.1.1.1.A Organic Liquids Waste Group

The preferred treatment option for the Organic Liquids Waste Group is Combustion in the CIF or treatment by commercial vendor.

General Information

This waste group is composed of the following waste streams:

SR-W001, Rad-Contaminated Solvents
SR-W022, DWPF Benzene
SR-W035, Mixed Waste Oil-Sitewide
SR-W045, Tri-Butyl Phosphate & n-Paraffin (PUREX)

SR-W001, Rad-Contaminated Solvents:

This waste stream is radioactively contaminated solvent and solvent mixtures such as solvents used for cleaning equipment in the Separations or Reactors Areas, degreasing solvents for depleted uranium fines used to assure unhindered adsorption of water in the tritium process, used or unused organic reagents and solutions used in bioassay and other laboratory analyses, and catalyst material for an incinerator that is no longer operational. The non-halogenated solvents in storage are wastes that used carbon (C^{14}) and tritium (H^3) labeled materials as tracers, or mixtures of waste scintillation counter calibration standards. The halogenated solvents are degreasing solvents contaminated with tritium and uranium. This waste stream is a consolidation of SR-W001, Rad-Contaminated Solvents; SR-W002, Rad-Contaminated Chlorofluorocarbons; SR-W010, Scintillation Solution; SR-W030, Spent Methanol Solution; and SR-W059, Tetrabutyl Titanate. Added to the waste stream will be solvent waste generated from CIF operations. This waste stream also includes liquids formerly in waste stream SR-W078, Hazardous Waste Awaiting Radiological Screening, which the initial results of radiological analysis have shown to be mixed waste, or are indeterminate.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic liquid

Waste Code

- D001A (ignitable high TOC)
- D002 (corrosive, nonwastewater
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009 (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP selenium)
- D018 (benzene)
- D019 (carbon tetrachloride)
- D022 (chloroform)
- F001, F002, F003, F005A (halogenated and nonhalogenated spent solvents)
- F006 (wastewater treatment sludges from electroplating operations)
- U002 (acetone)
- U003 (acetonitrite)
- U019 (benzene)
- U037 (chlorobenzene)
- U045 (methane, chloro-(I,T) methyl chloride)
- U080 (methylene chloride)
- U108 (1,4-Dioxane)
- U123 (formic acid)
- U127 (hexachlorobenzene)
- U131 (hexachloroehtane)
- U159 (methyl ethyl ketone)
- U165 (napthalene)
- U188 (phenol)
- U210 (tetrachloroethylene)
- U211 (carbon tetrachloride)

- U220 (toluene)
- U226 (1,1,1-trichloroethane)
- U228 (trichloroethylene)
- U239 (xylene)
- Nonwastewater

Since this waste stream will include wastes generated by CIF operations, additional waste codes may apply to this stream. Waste codes will depend on the specific generation episode at CIF. Potentially, any of the many waste codes included in the CIF RCRA Part B permit could apply.

LDR Treatment Standard

- D001 = specified technology = RORGS or CMBST
- D002 = specified technology = DEACT
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D010 = concentration based standard = 5.7 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg, UTS = 10 mg/kg
- D019 and D022 = concentration based standard = 6.0 mg/kg, UTS = 6.0 mg/kg
- F001 and F002 = concentration based standard = 6.0-30 mg/kg
- F003 = concentration based standard = 0.75 mg/l, TCLP - 160 mg/kg
- F005 = concentration based standard = 4.8 mg/l, TCLP-170 mg/kg except 2-Ethoxyethanol and 2-Nitropropane = CMBST
- F006 = concentration based standard = 0.11-11.0 mg/l TCLP
- U002 = concentration based standard = 160 mg/kg
- U003 = concentration based standard = 38 mg/kg or CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6.0 mg/kg
- U045 = concentration based standard = 30.0 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U108 = specified technology = CMBST
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U210 = concentration based standard = 6.0 mg/kg
- U211 = concentration based standard = 6.0mg/kg
- U220 = concentration based standard = 10.0mg/kg
- U226 = concentration based standard = 6.0mg/kg
- U228 = concentration based standard = 6.0 mg/kg
- U239 = concentration based standard = 30 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

The generation of wastes from CIF operations may result in additional waste codes with additional treatment standards.

Waste Characterization

- Process knowledge and sampling and analysis have been used to characterize waste streams.

- Confidence level is high based upon the known composition of the solvents used in the processes and of sample analyses for some of the organics.

Radiological Characterization

- Sampling and analysis results indicate tritium present up to 1700 µCi/ml.
- Beta/gamma emitters
- U^{238} alpha present is in solvent from the tritium facility and Reactor Materials Facilities.
- Alpha (U^{235}, U^{238}, Pu^{238}, Pu^{239}) emitters are present.
- Waste is contact handled.
- Mixed low-level waste

SR-W022, DWPF Benzene

A future waste stream may be generated from DWPF operations. Under the current recommended salt processing flowsheet (small tank precipitation), washed precipitate transferred to DWPF will contain cesium tetraphenylborate. DWPF will use a precipitate hydrolysis process to destroy the tetraphenylborate, as the tetraphenylborate cannot be processed in the melter. The precipitate hydrolysis process will yield a side stream normally referred to as benzene, although it contains other aromatic compounds and very low levels of radioactivity. The benzene will be steam-stripped in the Precipitate Reactor (PR), further decontaminated in the Organic Evaporator (OE), sampled in the Organic Evaporator Condensate Tank (OECT), and transferred outside the Vitrification building to the Organic Waste Storage Tank (OWST) via a welded, stainless steel overhead line.

This waste stream consists of essentially 100% organic substances, with only incidental carry-over of aqueous material. The organic stream, which is primarily benzene (80% -95%), also, is composed of biphenyl, diphenylamine, phenol, and diphenyl mercury (~5%-20% combined total). The benzene is contaminated with radioactive cesium and mercury. The primary radiological contaminant is cesium since cesium is a fairly volatile metal. (Note: This future waste stream may be eliminated if the Small Tank Precipitation process is not selected for HLW processing. Work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE’s selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.)

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic liquid

Waste Code

- D001A (ignitable high TOC)
- D009A (TCLP Hg)
- D018 (benzene)
- Nonwastewater

LDR Treatment Standard

- D001 = specified technology = RORGS or CMBST
- D009 = concentration based standard = 0.025 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high based on the availability of analysis on pilot feed stream.
- Typical contaminant levels are 15-120 mg/l Hg, benzene ≈ 80%-95% of organic waste stream.

Radiological Characterization

- Beta/gamma emitters (primarily Cs^{137}) are present.
- Waste is contact handled.
- Alpha emitters present.
- Mixed low-level waste

SR-W035, Mixed Waste Oil-Sitewide

Waste oil is generated from sitewide preventative maintenance programs such as changing refrigeration oil in the Separations Area chillers and waste oil from lubricating and hydraulic oil change-outs from CIF equipment. Routinely, this is a nonradioactive used oil that could be recycled for energy recovery. However, some drums may have detectable levels of radionuclides, thus preventing recycling. Hydraulic or lubricating oil used in chillers often becomes contaminated with Freon®, the refrigerant. Contaminants in the Freon® (D019, D039, D040) also have been determined to make the waste oil a mixed waste. This waste stream also includes moratorium/curtailment waste that radiological analysis has shown to be mixed waste, as well as liquids formerly in waste stream SR-W078, LDR Hazardous Waste Awaiting Radiological Screening.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic liquid

Waste Code

- D001A (ignitable high TOC)
- D002 (corrosive nonwastewater)
- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D019 (carbon tetrachloride)
- D022 (chloroform)
- D039 (tetrachloroethylene)
- D040 (trichloroethylene)
- U123 (formic acid)
- Nonwastewater

This waste stream is forecasted to include wastes generated by CIF operations. Accordingly, additional waste codes may apply to this stream. Those codes would depend on the specific generation episode at CIF; potentially, any of the many waste codes included in the CIF RCRA permit could apply.

LDR Treatment Standard

- D001A = specified technology = REORGS, CMBST or POLYM
- D002 = specified technology = DEACT
- D004 = concentration based standard = 5.0 mg/l TCLP
- D005 = concentration based standard = 21 mg/l TCLP
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D010 = concentration based standard = 5.7 mg/l TCLP
- D019, D022, D039, D040 = concentration based standard = 6.0 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet the Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

It is possible the lubricating and hydraulic waste oil generation from equipment maintenance at CIF could be declared mixed waste. Since this component of waste stream SR-W035 has not yet been generated, any change in waste codes or treatment standards from the list provided cannot be determined at this time. The number of waste codes treated at CIF is extensive. Therefore, it is possible that, if mixed waste oil is generated at CIF, additional waste codes and treatment standards will need to be added to those already listed.

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high because of TCLP results.
- TCLP has been run on nonradioactive Freon® 11 only.

Radiological Characterization

- Tritium is present in waste stream.
- Waste is contact handled.
- Mixed low-level waste

SR-W045, Tri-Butyl Phosphate & n-Paraffin (PUREX)

An organic solvent generated in the Plutonium/Uranium Extraction Process (PUREX) used in the Separations areas. SR-W044, Tri-Butyl-Phosphate and n-Paraffin TRU, have been combined with this waste stream.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic liquid

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)

- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D018 (benzene)
- D040 (trichloroethylene)
- Nonwastewater

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l TCLP
- D005 = concentration based standard = 21 mg/l TCLP
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D010 = concentration based standard = 5.7 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg
- D040 = concentration based standard = 6 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet the Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

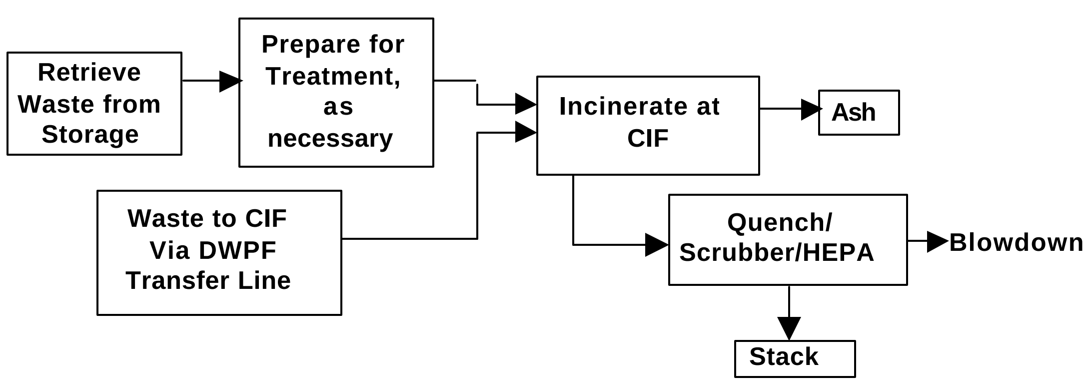
- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high because sampling and analysis is available.

Radiological Characterization

- Total activity is 120 nCi/g.
- Cm^{244}, Am^{241}, Pu^{239}, Eu^{154}, Ba^{137}, H^3, Pu^{241}, Sb^{125}, Cm^{243}, Pu^{240}, Tc^{99}, Pu^{238}, and Cs^{137}; lesser amounts of Zr^{95}, Th^{234}, Zn^{65}, Pr, Pr^{144}, Co^{60} , Ag^{110m}, C^{14}, Co^{57}, Eu^{155}, I^{129}, Na^{22}, Pa^{234m}, Pu^{242}, Se^{79}, Sr^{90}, U^{233}, U^{234}, U^{235}, U^{238}, and Y^{90}
- Waste is contact handled.
- Mixed low-level waste

The following information is applicable to all the waste streams in this waste group.

A process flowsheet for the treatment of this waste group by CIF is shown below. Process flowsheets for offsite commercial vendor treatment, if selected, will be described in future document revisions.



3.1.1.1.B Listed Organic Solids Waste Group

The preferred treatment option for this waste group is Combustion in the CIF.

General Information

This waste group is composed of the following waste streams:

SR-W003, Solvent Contaminated Debris (LLW)
SR-W018, Listed Incinerable Solids
SR-W042, Paints and Thinners
SR-W055, Job Control Waste Containing Solvent Contaminated Wipes
SR-W087, Bettis Atomic Power Laboratory Contaminated Soil (BT-W035, part of BT-W003)

SR-W003, Solvent Contaminated Debris (LLW)

The stream is a collection of similar debris whose LDR treatment standards can be met by combustion. The waste stream includes spent solvent contaminated rags and wipes generated sitewide in the clean up of interior spills and for decontamination. The waste codes indicate the components that may be present in the waste stream as a whole. Waste codes listed in the waste stream would vary depending on where the waste came from within SRS.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D012 (Endrin)
- D013 (Lindane)
- D014 (Methoxychlor)
- D015 (Toxaphene)
- D016 (2,4,-D)
- D017 (2, 4, 5-TP)
- D018 (Benzene)
- D019 (Carbon tetrachloride)
- D020 (Chlordane)
- D021 (Chlorobenzene)
- D022 (Chloroform)
- D023 (o-Cresol
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Total Cresols)
- D027 (p-Dichlorobenzene)
- D028 (1,2-Dichloroethane)
- D029 (1.1-Dichloroethylene)
- D030 (2,4-Dinitrotoluene)
- D031 (Heptachlor)
- D032 (Hexachlorobenzene)
- D033 (Hexachlorobutadiene
- D034 (Hexachloroethane)
- D035 (Methyl ethyl ketone)
- D036 (Nitrobenzene)
- D037 (Pentachlorophenol)
- D038 (Pyridine)
- D039 (Tetrachloroethylene)
- D040 (Trichloroethylene)
- D041 (2,4,5-trichlorophenol)
- D042 (2,4,6-Trichlorophenol)
- D043 (Vinyl chloride)
- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents)
- F003A (Spent nonhalogenated solvents)
- F005A (Halogenated and nonhalogenated spent solvents)
- F006 (wastewater treatment sludges from electroplating operations)
- U002 (acetone)
- U003 (acetonitrile)
- U019 (benzene)
- U037 (chlorobenzene)
- U080 (methylene chloride)
- U123 (formic acid)
- U127 (hexachlorobenzene)
- U131 (hexachloroethane)

- U159 (methyl ethyl ketone)
- U188 (phenol)
- U211 (carbon tetrachloride)
- U226 (1,1,1-trichloroethane)
- Nonwastewater
- U165 (naphthalene)
- U210 (tetrachloroethylene)
- U220 (toluene)
- U239 (xylene)

Since this waste stream could include solvent contaminated rags and wipes from spill clean-ups at CIF, waste codes could include any of the wastes CIF is permitted to treat. Refer to the waste code lists for SR-W046 and SR-W047 for all of the waste codes that can be fed to CIF.

For that portion of waste stream SR-W003 generated from other locations at SRS, waste codes include D004-D011 (TCLP Metals), D012-D043 (organic pesticides and characteristic organics), and F001, F002, F003A, and F005A (halogenated/non-halogenated spent solvents).

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D012 = concentration based standard = 0.13 mg/kg
- D013 & D031= concentration based standard = 0.066 mg/kg
- D014 = concentration based standard = 0.18 mg/kg
- D015 = concentration based standard = 2.6 mg/kg
- D016, D018, & D032 = concentration based standard = 10.0 mg/kg
- D017 = concentration based standard = 7.9 mg/kg
- D019, D021, D022, D027, D028, D029, D039, D040, & D043 = concentration based standard = 6.0 mg/kg
- D020 = concentration based standard = 0.26 mg/kg
- D023, D024, D025, & D033 = concentration based standard = 5.6 mg/kg
- D026 = concentration based standard = 11.2 mg/kg
- D030 = concentration based standard = 140 mg/kg
- D034 = concentration based standard = 30 mg/kg
- D035 = concentration based standard = 36 mg/kg
- D036 = concentration based standard = 14 mg/kg
- D037, D041, & D042 = concentration based standard = 7.4 mg/kg
- D038 = concentration based standard = 16 mg/kg
- F001 & F002= concentration based standard = 6.0-30 mg/kg
- F003 = concentration based standard = 0.75 mg/l TCLP-160 mg/kg
- F005 = concentration based standards = 4.8 mg/l, TCLP-170 mg/kg, except 2-Ethoxyethanol and 2-Nitropropane = CMBST
- F006 = concentration based standards = 0.11-11 mg/l TCLP
- U002 = concentration based standard = 160 mg/kg
- U003 = concentration based standard = 38 mg/kg or CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6.0 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg

- U210 = concentration based standard = 6.0 mg/kg
- U211 = concentration based standard = 6.0mg/kg
- U220 = concentration based standard = 10.0mg/kg
- U226 = concentration based standard = 6.0mg/kg
- U239 = concentration based standard = 30 mg/kg
- Alternate debris technology may be applied

- D001 through D043 nonwastewaters to be land disposed must be treated to meet the Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Since a portion of this waste stream includes wastes generated at CIF, LDR Treatment Standards are reflected in the waste fed to CIF. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1, proposed to be treated at CIF.

For other constituents of waste stream SR-W003, LDR Treatment Standards are concentration-based standards ranging from 0.066 mg/kg to 170 mg/kg or with a specified technology of combustion.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based upon known composition of the solvents used in the process generating this waste.

Radiological Characterization

- Alpha emitter, Pu^{238}
- Beta/gamma emitter, Cs^{137}
- Waste is contact handled.
- Mixed low-level waste

SR-W018, Listed Incinerable Solids

This waste stream consists of F006 job control waste, remediation waste from M-Area operations, process control waste from M-Area Vendor Treatment operations and remediation activities.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- F006 (metal plating line waste, without cyanide)
- Nonwastewater

LDR Treatment Standard

- F006 = concentration based standards = 0.11-11 mg/l TCLP

Waste Characterization

- Process knowledge and sampling and analysis are used to characterize the waste.
- Confidence level high due to availability of sample results and knowledge the process generates listed waste.
- Primary contaminant is Ni. Others included are Cd, Cr, Pb, and Ag, but these are below RCRA LDR concentration standards.

Radiological Characterization

- Typical activity is 5.0E-1 nCi/g
- Alpha emitters are U^{234}, U^{235}, U^{236}, and U^{238}
- Waste is contact handled.
- Mixed low-level waste

SR-W042, Paints and Thinners

This waste stream consists of radioactively contaminated, off-specification waste paint, spent paint solvents, and paint chips from paint removal activities.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic sludge/particulate

Waste Code

- D001C (ignitable low TOC nonwastewaters)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (benzene)
- D035 (methyl ethyl ketone)
- D038 (pyridine)
- F003A (xylene, acetone)
- F005A (halogenated and nonhalogenated spent solvents)
- Nonwastewater

LDR Treatment Standard

- D001 = specified technology = REORG or CMBST
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D018 = concentration based standard = 10 mg/kg, UTS = 10 mg/kg
- D035 = concentration based standard = 36 mg/kg, UTS = 36 mg/kg
- D038 = concentration based standard = 16 mg/kg, UTS = 16 mg/kg
- F003 = concentration based standards = 0.75 mg/l, TCLP - 160 mg/kg
- F005 = concentration based standards = 4.8 mg/l, TCLP - 170 mg/kg, except for 2 – Ethozyethanol, and 2 – Nitropropane = CMBST

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituent (UHC) that may be present.

- Future generation may include listed spent solvent codes F001, F002, F003, and /or F005.

Waste Characterization

- Confidence level is high because sample and analysis available.

Radiological Characterization

- Alpha and beta/gamma emitters

- Waste is contact handled
- Mixed low-level waste

SR-W055, Job Control Waste Containing Solvent Contaminated Wipes

This waste is sitewide operations generated job waste, including radiologically contaminated plastic huts, protective clothing, contaminated metal tools, glass, paper, and cardboard that is suspected to have been mixed with solvent contaminated wipes. Job waste has been declared mixed waste according to the Mixture Rule. Wastes in this stream were declared mixed waste January 25, 1990. SRS has modified procedures and practices regarding solvent contaminated wipes generation and management to eliminate or substantially reduce this type of waste.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents)
- F003A (Spent nonhalogenated solvents)
- F005A (Halogenated and nonhalogenated spent solvents)
- Nonwastewater

LDR Treatment Standard

- F001 & F002 = concentration based standards = 6.0-30 mg/kg
- F003 = concentration based standards = 0.75 mg/l TCLP-160 mg/kg
- F005 = concentration based standards = 4.8 mg/l TCLP-170 mg/kg, except for 2-Ethoxyethanol, and 2-Nitropropane = CMBST
- Alternate debris technology may be applied.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is medium based on the use of process knowledge to characterize waste. Also, other waste in the waste stream may not actually be contaminated with solvents but are characterized as such, according to the Mixture Rule.

Radiological Characterization

- Beta/gamma emitters are present.
- Waste is contact handled.
- Mixed low-level waste

SR-W087, Bettis Atomic Power Laboratory Contaminated Oil, (BT-W035 part of BT-W003)

This waste stream is composed of a nonflammable oil containing uranium and characteristically hazardous for cadmium and lead generated from an inactive grinder used to grind fuel pellets. The Bettis waste was approved by SCDHEC for shipment to SRS December 1998. Actual shipment approval was granted to Bettis by SRS in February 1999. SRS received the waste March 1999.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- D006 (TCLP Cd)
- D008A (TCLP Pb)
- Nonwastewater

LDR Treatment Standard

- D006 = concentration based standard = 0.11 mg/L TCLP
- D008A = concentration based standard = 0.75 mg/L TCLP

Waste Characterization

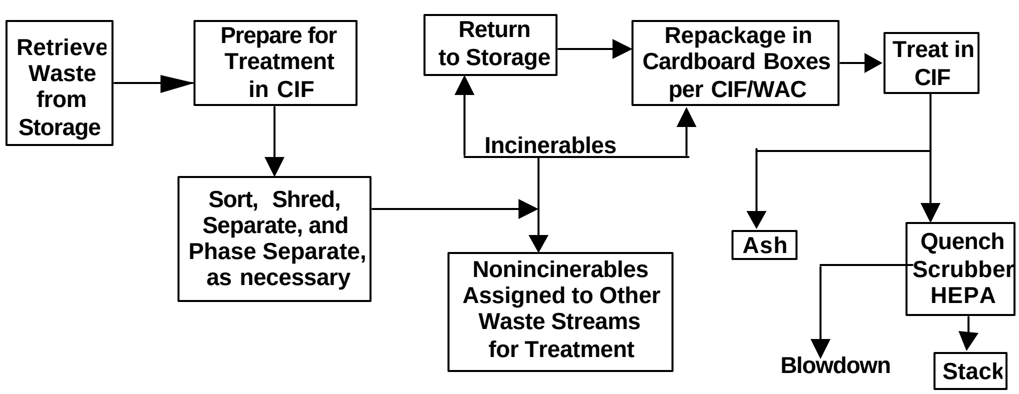
- Sample results
- Process knowledge

Radiological Characterization

- Beta/gamma emitters are present.
- Primary radionuclide constituent = U233
- Contact handled

The following information is applicable to all the waste streams in this waste group.

The process flowsheet for the preferred option is shown below. Process flowsheets for offsite commercial vendor treatment, if selected, will be described in future document revisions.



3.1.1.1.C Toxic Characteristic Solids Waste Group

The preferred treatment option for this waste group is Combustion in the CIF.

General Information

This waste group is composed of the following waste streams:

SR-W012, Toxic Characteristic Solids for Treatment in CIF
SR-W051, Spent Filter Cartridge and Carbon Filter Media
SR-W080, Charleston Naval Shipyard Waste (CN-W001, CN-W004)

SR-W012, Toxic Characteristic Solids for Treatment in CIF

This waste stream contains job control waste from In-Tank Precipitation (ITP) startup activities, CIF start up and operation, and various clean-up materials from other site generators such as rags, wipes, mopheads, gloves, etc., contaminated with toxic characteristic waste and radioactive materials. This waste stream also contains solid chemical oxidizers generated by site laboratories and other site activities. The waste stream is a collection of similar debris whose LDR treatment standards can be met by incineration. The list of waste codes indicates the components, which may be present in the waste. Waste from specific areas within SRS may not contain all the waste codes. Waste stream SR-W043, Lab Waste with Tetraphenyl Borate has been consolidated into this stream.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D018 (benzene)
- D035 (methyl ethyl ketone)
- Nonwastewater

Since this waste stream includes incinerable clean-up materials from CIF, waste codes could include any of the characteristic wastes CIF is permitted to treat. Refer to the waste code list for SR-W046 and SR-W047 for a list of all the waste codes that can be fed to CIF.

For that portion of waste stream SR-W012 generated from other locations at SRS, waste codes include D004 - D011, D018, and D035.

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l TCLP
- D005 = concentration based standard = 21 mg/l TCLP
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D010 = concentration based standard = 5.7 mg /l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg
- D035 = concentration based standard = 36 mg/kg
- Alternate debris technology may be applied.

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Since a portion of this waste stream includes wastes generated at CIF, LDR Treatment Standards are reflected in the characteristic wastes fed to CIF. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1 proposed for treatment at CIF. For other constituents of waste stream SR-W012, LDR Treatment Standards are concentration based ranging from 0.2 mg/L to 100 mg/L.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is medium based on knowledge of contaminates present in the waste or from knowledge of the components in spilled material. However, sampling and analysis have not validated the characterization.

Radiological Characterization

- Alpha (U^{235}, Pu^{238}, Pu^{239}) emitters are present.
- Beta/gamma (Cs^{137} and Sr^{90}) emitters may be present.
- Waste is contact handled.
- Mixed low-level waste

SR-W051, Spent Filter Cartridge and Carbon Filter Media

The waste stream consists of incinerable filters and filter media. Examples of this waste stream include filters in Naval Fuels used to remove particles contaminated with mercury salts and depleted uranium from the process flow stream. Also included in this waste are CIF feed tank and offgas HEPA filters.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Heterogeneous debris

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006 (TCLP Cd)
- D007 (TCLP Cr)
- D018 (benzene)
- D021 (chlorobenzene)
- D035 (methyl ethyl ketone)
- D040 (trichloroethylene)
- D009A (low TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D008A (TCLP Pb)
- D019 (carbon tetrachloride)
- D034 (hexachloroethane)
- D039 (tetrachloroethylene)
- Nonwastewater

Waste from CIF could contain all the listed waste codes that are fed to CIF and any characteristic waste codes determined by analysis. Refer to waste codes listed for SR-W046 and SR-W047 for a complete listing of all waste codes permitted for treatment in CIF.

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l TCLP
- D005 = concentration based standard = 21 mg/l TCLP
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D010 = concentration based standard = 5.7 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg

- D019 = concentration based standard = 6.0 mg/kg
- D021 = concentration based standard = 6.0 mg/kg
- D022 = concentration based standard = 6.0 mg/kg
- D032 = concentration based standard = 10 mg/kg
- D034 = concentration based standard = 30 mg/kg
- D039 = concentration based standard = 6.0 mg/kg
- D040 = concentration based standard = 6.0 mg/kg
- Alternative debris technology may be applied.

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

CIF waste will have treatment standards that are reflected in the latest waste fed to CIF and any applicable characteristic waste. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1, proposed to be treated at CIF.

Waste Characterization

- Process knowledge and sample analysis are used to characterize the waste stream.
- Confidence level is high-based sample analysis.

Radiological Characterization

- Beta/gamma emitters are present.
- Alpha emitters (U^{233}, U^{234}, and U^{238}) are present.
- Waste is contact handled.
- Mixed low-level waste

SR-W080, Charleston Naval Shipyard Waste (CN-W001, CN-W004)

This waste stream is composed of flammable or incinerable solids and debris containing potassium chromate and/or contaminated with chromium and/or lead generated from ship overhaul, decommissioning, and routine shipyard maintenance. Charleston Naval Shipyard waste was shipped to SRS and placed in RCRA permitted storage, as concurred by SCDHEC, in December 1995 prior to the closure of the Charleston Naval Shipyard in April 1996. The Approved Site Treatment Plan had three waste streams listed for the CNS waste. However, upon shipment, only two waste streams were received at SRS for storage. The third waste stream, Flammable Organic Debris (CN-W007), was never generated by the Naval Yard.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Codes

- D007 (TCLP Cr)
- D008A (TCLP Pb)
- Nonwastewater

LDR Treatment Standard

- D007 = Concentration Based Standard = 0.60 mg/1 TCLP
- D008 = Concentration Based Standard = 0.75 mg/1 TCLP

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

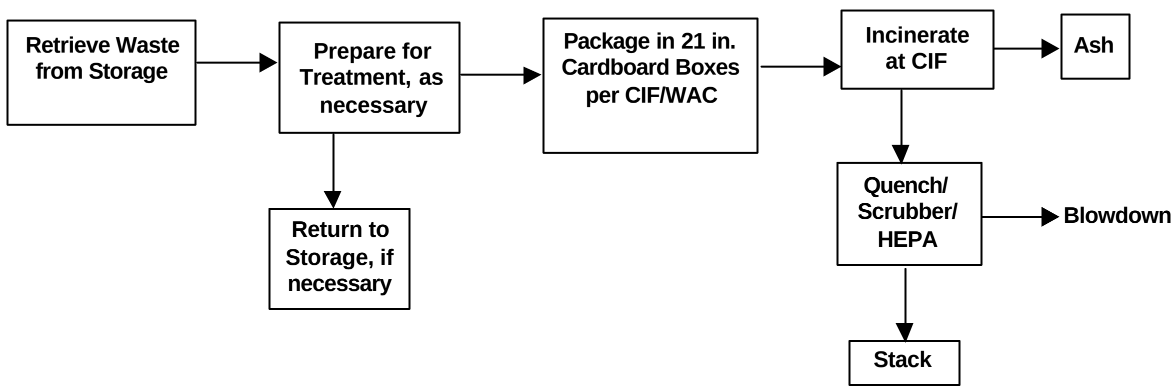
- Process knowledge

Radiological Characterization

- Beta/gamma emitters are present.
- Primary radionuclide constituent = Co^{60}
- Contact handled

The following information is applicable to all the waste streams in this waste group.

The process flowsheet for the preferred option is shown below. Process flowsheets for offsite commercial vendor treatment, if selected, will be described in future document revisions.



3.1.1.1.D CIF Ash and Blowdown Waste Group

The preferred treatment option for this waste group is Stabilization in the CIF Ashcrete Process. (The alternative of performing no stabilization on ash that meets LDR has been discussed with SCDHEC; alternative treatment for CIF blowdown, such as wastewater treatment at onsite or offsite facilities, has been approved by SCDHEC.)

General Information

These waste streams are a waste composed of ash from incineration of mixed waste in the CIF and scrubber blowdown wastewater and filtercake generated from the CIF offgas emission control system during the treatment of mixed waste.

This waste group is composed of waste streams identified under the following codes and labels:

SR-W046, Consolidated Incineration Facility (CIF) Ash
SR-W047, Consolidated Incineration Facility (CIF) Blowdown

The following information is applicable to both the waste streams in this waste group.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- SR-W046 - Inorganic sludge/particulate
- SR-W047 - Aqueous liquid and solids

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D012 (Endrin)
- D013 (Lindane)
- D014 (Methoxyclor)
- D015 (Toxaphene)
- D016 (2,4-D)
- D017 (2,4,5-TP/Silvex)
- D018 (Benzene)
- D019 (Carbon Tetrachloride)
- D020 (Chlordane)
- D021 (Chlorobenzene)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresol – total)
- D027 (1,4-Dichlorobenzene)
- D028 (1,2-Dichloroethane)
- D029 (1,2-Dichloroethylene)
- D030 (2,4-Dinitrotoluene)
- D031 (Heptachlor)
- D032 (Hexachlorobenzene)
- D033 (Hexachlorobutadiene)
- D034 (Hexachloroethane)
- D035 (Methyl Ethyl Ketone)
- D036 (Nitrobenzene)
- D037 (Pentachlorophenol)
- D038 (Pyridine)
- D039 (Tetrachloroethylene)
- D040 (Trichloroethylene)
- D041 (2,4,5-Trichlorophenol)
- D042 (2,4,6-Trichlorophenol)
- D043 (Vinyl Chloride)
- F001 (Unspecified solvents)
- F002 (Unspecified solvents)
- F003X (Unspecified solvents)
- F004X (Unspecified solvents
- F005X (Unspecified solvents)
- F006 (Metal plating waste without cyanide)
- U001 (Acetaldehyde)
- U002 (Acetone)
- U003 (Acetonitrile)
- U004 (Acetophenone)
- U006 (Acetyl chloride)
- U007 (Acrylamide)
- U008 (Acrylic Acid)
- U009 (Acrylonitrile)
- U011 (Amitrole)
- U108 (1,4-Dioxane)
- U109 (1,2-Diphenylhydrazine)
- U110 (Dipropylamine)
- U112 (Ethyl acetate)
- U115 (Ethylene oxide)
- U116 (Ethylene thiourea)
- U117 (Ethyl ether)
- U121 (Trichloromonofluoromethane)
- U122 (Formaldehyde)
- U123 (Formic acid)
- U124 (Furan)
- U125 (Furfural)
- U127 (Hexachlorobenzene)
- U128 (Hexachlorobutadiene)
- U129 (Lindane)
- U130 (Hexachlorocyclopentadiene)
- U131 (Hexachloroethane)
- U132 (Hexachlorophene)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U136 (Cacodylic acid)
- U138 (Iodomethane)
- U140 (Isobutyl alcohol)
- U142 (Kepone)
- U144 (Lead acetate)
- U146 (Lead subacetate)
- U147 (Maleic anhydride)
- U151 (Mercury wastewaters)
- U154 (Methanol)
- U157 (3-Methylcholanthrene)
- U158 (4,4'-Methylene bis(2-chloroaniline)
- U159 (Methyl ethyl ketone)
- U161 (Methyl isobutyl ketone)
- U162 (Methyl methacrylate)
- U165 (Naphthalene)
- U166 (1,4-Naphthoquinone)
- U167 (1-Naphthylamine)
- U169 (Nitrobenzene)
- U170 (p-Nitrophenol)
- U171 (2-Nitropropane)
- U182 (Paraldehyde)
- U183 (Pentachlorobenzene)
- U184 (Pentachloroethane)
- U185 (Pentachloronitrobenzene)
- U187 (Phenacetin)
- U188 (Phenol)
- U190 (Phthalic anhydride)
- U196 (Pyridine)
- U197 (p-Benzoquinone)
- U201 (Resorcinol)
- U204 (Selenium dioxide)
- U207 (1,2,4,5-Tetrachlorobenzene)
- U208 (1,1,1,2-Tetrachloroethane)
- U209 (1,1,2,2-Tetrachloroethane)
- U210 (Tetrachloroethylene)

- U012 (Aniline)
- U014 (Auramine)
- U017 (Benzal chloride)
- U019 (Benzene)
- U021 (Benzidine)
- U022 (Benzo(a)pyrene)
- U023 (Benzotrichloride)
- U025 (bis(2-Chloroethoxy)methane)
- U027 (bix(2-Chloroisopropyl)ether)
- U028 (bis(2-Ethylhexyl) phthalate)
- U031 (n-Butyl alcohol)
- U032 (Calcium chromate)
- U034 (Trichloroacetaldehyde)
- U036 (Chlordane)
- U037 (Chlorobenzene)
- U041 (Epichlorohydrin)
- U043 (Vinyl chloride)
- U044 (Chloroform)
- U045 (Methyl chloride)
- U046 (Chloromethyl methyl ether)
- U047 (2-Chloronaphthalene)
- U048 (2-Chlorophenol)
- U050 (Chrysene)
- U051 (Creosote)
- U052 (Creosols)
- U053 (Crotonaldehyde)
- U055 (Cumene)
- U056 (Cyclohexane)
- U057 (Cyclohexanone)
- U060 (DDD)
- U061 (DDT)
- U063 (Dibenz(a,h)anthracene)
- U067 (Etheylene dibromide)
- U069 (Di-n-buthyl phthalate)
- U070 (o-Dichlorobenzene)
- U071 (m-Dichlorobenzene)
- U072 (p-Dichlorobenzene)
- U073 (3,3'-Dechlorobenzidine)
- U074 (1,4-Dichloro-2-butene)
- U075 (Dichlorodifluoromethane)
- U076 (1,1-Dichloroethane)
- U077 (1,2-Dichloroethane)
- U078 (1,1-Dichloroethylene)
- U079 (1,2-Dichloroethylene)
- U080 (Methylene chloride)
- U081 (2,4-Dichlorophenol)
- U082 (2,6-Dichlorophenol)
- U083 (1,2-Dichloroproane)
- U084 (1,3-Dichloropropylene)
- U088 (Diethyl phthalate)
- U091 (3,3-Dimethoxybenzidine)
- U092 (Dimethylamine)
- U095 (3,3'-Dimethylbenzidine)
- U102 (Dimethyl phthalate)
- U103 (Dimethyl sulfate)
- U105 (2,4-Dinitrotoluene)
- U106 (2,6-Dinitrotoluene)
- U211 (Carbon Tetrachloride)
- U213 (Tetrahydrofuran)
- U215 (Thallium (I) carbonate)
- U216 (Thallium (I) chloride)
- U218 (Thioacetamide)
- U219 (Thiourea)
- U220 (Toluene)
- U223 (Toluene diisocyanate)
- U225 (Bromoform)
- U226 (1,1,1-Trichloroethane)
- U227 (1,1,2-Trichloroethane)
- U228 (Trichloroethylene)
- U234 (1,3,5-Trinitrobenzene)
- U236 (Trypan Blue)
- U239 (Xylenes)
- U247 (Methyoxyclor)
- U328 (o-Toluidine)
- U359 (2-Ethoxyethanol)
- P005 (Allyl alcohol)
- P009 (Ammonium picrate)
- P011 (Arsenic pentoxide)
- P012 (Arsenic trioxide)
- P016 (Dichloromethyl ether)
- P017 (Bromoacetone)
- P018 (Brucine)
- P022 (Carbon disulfide)
- P023 (Chloroacetaldehyde)
- P024 (p-Chloroaniline)
- P028 (Benzyl chloride)
- P037 (Dieldrin)
- P045 (Thiofanox)
- P048 (2,4-Dinitrophenol)
- P051 (Endrin)
- P054 (Aziridine)
- P059 (Heptaclor)
- P060 (Isodrin)
- P063 (Hydrogen cyanide)
- P064 (Isocyanic acid, ethyl ester)
- P068 (Methyl hydrrazine)
- P069 (2-Methyllactonitrile)
- P070 (Aldicarb)
- P077 (p-Nitroaniline)
- P089 (Parathion)
- P093 (Phenylthiourea)
- P095 (Phosgene)
- P098 (Potassium cyanide)
- P102 (Propargyl alcohol)
- P104 (Silver cyanide)
- P105 (Sodium azide)
- P106 (Sodium cyanide)
- P108 (Strychnine and salts)
- P112 (Tetranitromethane)
- P113 (Thallic oxide)
- P116 (Thiosemicarbazide)
- P119 (Ammonium vanadate)
- P120 (Vanadium pentoxide)
- P123 (Toxaphene)

- The waste codes describing the CIF ash and blowdown waste streams depend on the feed stream into CIF. The Blowdown waste stream will contain all of the listed waste codes that are fed into the CIF when CIF is processing listed waste streams.

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D012 = concentration based standard = 0.13 mg/kg
- D013 = concentration based standard = 0.0166 mg/kg
- D014 = concentration based standard = 0.18 mg/kg
- D015 = concentration based standard = 2.6 mg/kg
- D016 = concentration based standard = 10 mg/kg
- D017 = concentration based standard = 7.9 mg/kg
- D018 = concentration based standard = 10 mg/kg
- D019, D039, & D040 = concentration based standard = 6.0 mg/kg
- D020 = concentration based standard = 0.26 mg/kg
- D021 & D022 = concentration based standard = 6.0 mg/kg
- D023, D024 & D025 = concentration based standard = 5.6 mg/kg
- D026 = concentration based standard = 11.2 mg/kg
- D027, D028, D029, & D043 = concentration based standard = 6.0 mg/kg
- D030 = concentration based standard =140 mg/kg
- D031 = concentration based standard = 0.066 mg/kg
- D032 = concentration based standard = 10 mg/kg
- D033 = concentration based standard = 5.6 mg/kg
- D034 = concentration based standard = 30 mg/kg
- D035 = concentration based standard = 36 mg/kg
- D036 = concentration based standard = 14 mg/kg
- D037, D041, & D042 = concentration based standard = 7.4 mg/kg
- D038 = concentration based standard = 16 mg/kg
- F001 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 6-30 mg/kg
- F003 = concentration based standard = 2.6 - 60 mg/kg
- F005 = concentration based standard = 10 - 170 mg/kg
- F006 = concentration based standard = 0.19 – 5.0 mg/l, TCLP
- U001, U006, U007, & U008 = specified technology = CMBST
- U002 = concentration based standard = 160 mg/kg
- U003, U011, U014, & U017 = specified technology = CMBST
- U004 = concentration based standard = 9.7 mg/kg
- U009 = concentration based standard = 84 mg/kg
- U012 = concentration based standard = 14 mg/kg
- U019 = concentration based standard = 10 mg/kg
- U021, U034, U041, & U046 = specified technology = CMBST
- U022 = concentration based standard = 3.4 mg/kg
- U023, U103, & U109 = specified technology = CHOXD; CHRED; or CMBST
- U025, U070, U071, & U072 = concentration based standard = 6.0 mg/kg
- U027 = concentration based standard = 7.2 mg/kg
- U028 = concentration based standard = 28 mg/kg
- U031 = concentration based standard = 2.6 mg/kg

- U032 = concentration based standard = 0.60 mg/L, TCLP
- U036 = concentration based standard = 0.26 mg/kg
- U037, U043, & U044 = concentration based standard = 6.0 mg/kg
- U045 = concentration based standard = 30 mg/kg
- U047 = concentration based standard = 5.6 mg/kg
- U048 = concentration based standard = 5.7 mg/kg
- U050 = concentration based standard = 3.4 mg/kg
- U051 = concentration based standard = 5.6 – 30 mg/kg
- U052 = concentration based standard = 5.6 – 11.2 mg/kg
- U053, U055, & U056= specified technology = CMBST
- U057 & U154 = specified technology = CMBST; or for nonwastewaters - 0.75 mg/L, TCLP
- U060 & D061 = concentration based standard = 0.0087 mg/kg
- U063 = concentration based standard = 8.2 mg/kg
- U067 = concentration based standard = 15 mg/kg
- U069, U088, U102, & U106= concentration based standard = 28 mg/kg
- U073 & U074 = specified technology = CMBST
- U075 = concentration based standard = 7.2 mg/kg
- U076, U077, & U078 = concentration based standard = 6.0 mg/kg
- U079 & U080 = concentration based standard = 30 mg/kg
- U081 & U082 = concentration based standard = 14 mg/kg
- U083 & U084 = concentration based standard = 18 mg/kg
- U091, U092, U095, & U108 = specified technology = CMBST
- U105 = concentration based standard =140 mg/kg
- U110, U116, & U122 = specified technology = CMBST
- U112 = concentration based standard = 33 mg/kg
- U115 = specified technology = CHOXD; or CMBST
- U117 = concentration based standard = 160 mg/kg
- U121 & U131 = concentration based standard = 30 mg/kg
- U123, U124, U125, & U132 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U128 = concentration based standard = 5.6 mg/kg
- U129 = concentration based standard = 0.066 mg/kg
- U130 = concentration based standard = 2.4 mg/kg
- U133 = specified technology = CHOXD; CHRED; or CMBST
- U134 = specified technology = ADGAS fb NEUTR; or NEUTR
- U136 = concentration based standard = 5.0 mg/L, TCLP
- U138 = concentration based standard = 65 mg/kg
- U140 = concentration based standard = 170 mg/kg
- U142 = concentration based standard = 0.13 mg/kg
- U144 & U146 = concentration based standard = 0.75 mg/L, TCLP
- U147, U166, U167, & U171 = specified technology = CMBST
- U151 = specified technology = RMERC
- U157 = concentration based standard = 15 mg/kg
- U158 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U161 = concentration based standard = 33 mg/kg
- U162 = concentration based standard = 160 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U169, U207 = concentration based standard = 14 mg/kg
- U170 = concentration based standard = 29 mg/kg
- U182, U197, U201, & U213 = specified technology = CMBST
- U183 = concentration based standard = 10 mg/kg
- U184 = specified technology = CMBST; or 6.0 mg/kg
- U185 = concentration based standard = 4.8 mg/kg
- U187, U196 = concentration based standard = 16 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U190 = concentration based standard = 28 mg/kg

- U204 = concentration based standard = 5.7 mg/L, TCLP
- U208, U209, U210, & U211= concentration based standard = 6.0 mg/kg
- U215 & U216 = specified technology = RTHRM; or STABL
- U218, U219, U223, U234, & U236 = specified technology = CMBST
- U220 = concentration based standard = 10 mg/kg
- U225 = concentration based standard = 15 mg/kg
- U226, U227, & U228 = concentration based standard = 6.0 mg/kg
- U239 = concentration based standard = 30 mg/kg
- U247 = concentration based standard = 0.18 mg/kg
- U328 & U359= specified technology = CMBST
- P005, P016, P017, & P018 = specified technology = CMBST
- P009, P068, P105, & P112 = specified technology = CHOXD; CHRED; or CMBST
- P011 & P012= concentration based standard = 5.0 mg/L, TCLP
- P022 = specified technology = CMBST; or for nonwastewaters – 4.8 mg/L, TCLP
- P023, P028, P045, & P054 = specified technology = CMBST
- P024 = concentration based standard = 16 mg/kg
- P037 = concentration based standard = 0.13 mg/kg
- P048 = concentration based standard = 160 mg/kg
- P051 = concentration based standard = 0.13 mg/kg
- P059, P060= concentration based standard = 0.066 mg/kg
- P063, P098, & P106= concentration based standard = 30 – 590 mg/kg
- P064, P069, P070, & P093 = specified technology = CMBST
- P077 = concentration based standard = 28 mg/kg
- P089 = concentration based standard = 4.6 mg/kg
- P095, P102, P108, & P116 = specified technology = CMBST
- P104 = concentration based standard = 30 – 590 mg/kg for cyanides; 0.14 mg/L, TCLP for silver
- P113 = specified technology = RTHRM; or STABL
- P119 & P120= specified technology = STABL
- P123 = concentration based standard = 2.6 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.
- LDR treatment standards are determined by the waste fed to CIF.

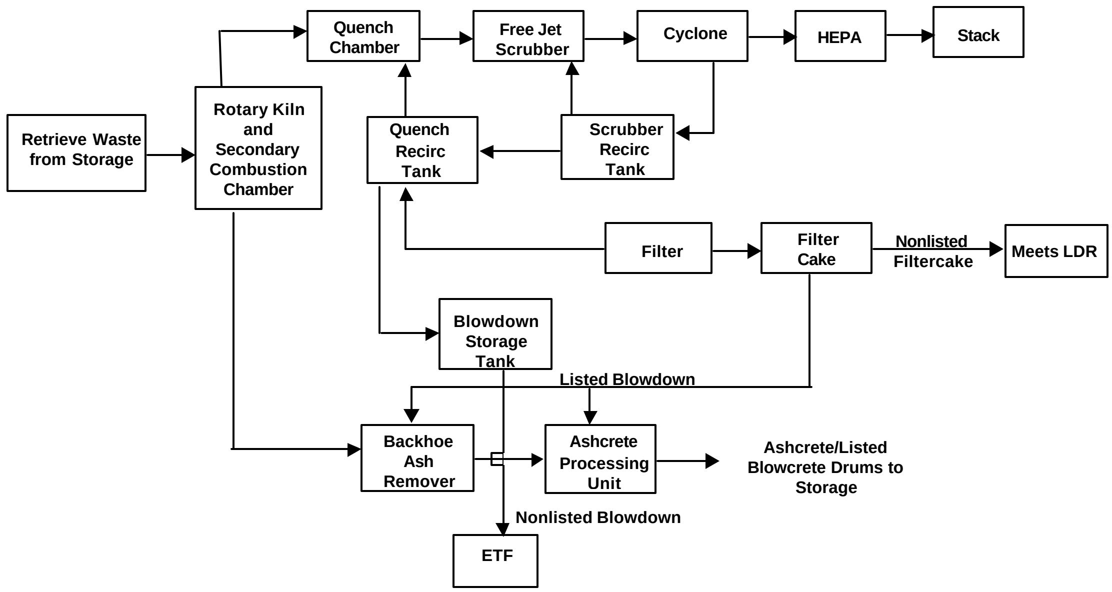
Waste Characterization

- Analytical data is used to characterize these waste streams.
- Confidence level is high based on analytical data.

Radiological Characterization

- Tritium is present.
- Alpha and beta/gamma emitters are present.
- Waste is contact handled.
- Mixed low-level waste

The process flowsheet for the preferred option is shown below.



3.1.1.1.E Mixed Waste with Listed Contaminants Waste Group

The preferred treatment option for liquid waste with Listed Contaminants Waste Group is Combustion in the CIF.

This waste group is composed of the following waste streams:

SR-W070, Mixed Waste from Laboratory Samples
SR-W071, Wastewater Suitable for Treatment at CIF

General Information

SR-W070, Mixed Waste from Laboratory Samples

This waste stream consists of incinerable lab waste from the analytical testing of groundwater samples taken from the site and processed at onsite or commercial, offsite laboratories. It includes sample residues, unused samples, and related laboratory wastes. In addition, this waste stream may include used and unused laboratory reagents. Wastes included in this stream may consist of both liquid and solid (e.g. soil) matrices. Radiological levels and hazardous constituent levels will depend upon the source location.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Liquids
- Solids

Waste Code

- D001C (ignitable, low TOC)
- D002 (corrosive, nonwastewater)
- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- U002 (acetone)
- U003 (acetonitrile)
- U019 (benzene)
- U037 (chlorobenzene)
- U045 (chloromethane)
- U080 (methylene chloride)
- U123 (formic acid)

- D011 (TCLP Ag)
- D018 (TCLP Benzene)
- D019 (carbon tetrachloride)
- D038 (pyridine)
- D039 (tetrachloroethylene)
- D040 (trichloroethylene)
- F001 (unspecified)
- F002 (methylene chloride)
- F003A (ethyl ether)
- F004X (unspecified solvents)
- F005 (spent non-hologenated solvents)
- F006 (metal plating waste without cyanide)
- U127 (hexachlorobenzene)
- U131 (hexachloroethane)
- U159 (methylethyl ketone)
- U188 (phenol)
- U165 (naphthalene)
- U210 (tetrachloroethylene)
- U211 (carbon tetrachloride)
- U220 (toluene)
- U226 (1,1,1-trichloroethane)
- U228 (trichloroethyene)
- U239 (xylenes)
- Nonwastewater

LDR Treatment Standard

- D001 = specified technology = DEACT, or RORGS or CMBST
- D002 = specified technology = DEACT
- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D018 = concentration based standard = 10 mg/kg
- D019 = concentration based standard = 6.0 mg/kg
- D038 = concentration based standard = 16 mg/kg
- D039 = concentration based standard = 6.0 mg/kg
- D040 = concentration based standard = 6.0 mg/kg
- F001 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 30 mg/kg
- F003 = concentration based standard = 160 mg/kg
- F004 = concentration based standard = 6-160 mk/kg
- F005 = concentration based standard = 4.8 mg/L, TCLP through 170 mg/kg; except 2 – Ethoxyethanol, 2 Nitropropane = CMBST
- F006 = concentration based standard = 0.19 – 5.0 mg/l, TCLP
- U002 = concentration based standard = 160 mg/kg
- U003 = specified technology = CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6 mg/kg
- U045 = concentration based standard = 30 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U210 = concentration based standard = 6 mg/kg
- U211 = concentration based standard = 6 mg/kg
- U220 = concentration based standard = 10 mg/kg
- U226 = concentration based standard = 6 mg/kg
- U228 = concentration based standard = 6.0 mg/kg
- U239 = concentration based standard = 30 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high because waste has been characterized by sampling and analysis.

Radiological Characterization

- H^3, Am^{241}, Cs^{137}, Pu^{238}, Pu^{239}, Sr^{90}, U^{234}, U^{235}, U^{236}, and U^{234}
- <100 nCi/g
- Contact handled

SR-W071, Wastewater Suitable for Treatment at CIF

This waste stream consists of future-generated wastewaters that are suitable for treatment at CIF. These wastewaters include aqueous wastes with listed organic constituents that can be treated in CIF in compliance with LDR requirements. Examples include wastewater collected from CIF sumps and aqueous solutions with organic contaminants such as a small volume of outdated ethyl ether in water stored in an analytical laboratory satellite accumulation area. It is anticipated that other wastes of a similar nature could be generated in the future.

Previously, this waste stream included rainwater that was removed from TRU waste 55-gallon drums. The reported inventory of this rainwater has been treated at CIF, and there is currently no rainwater remaining to be treated.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous liquid

Waste Code

- D002 (corrosive, wastewater)
- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents)
- F003A (Spent nonhalogenated solvents)
- F005A (Halogenated and nonhalogenated solvents)
- Nonwastewater
- Wastewater

LDR Treatment Standard

- D002 = specified technology = DEACT and meet UTS
- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- F001 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 6-30 mg/kg
- F003 = concentration based standard = 0.75 mg/l, TCLP through 60 mg/kg
- F005 = concentration based standard = 4.8 mg/l, TCLP through 170 mg/kg; except 2-Ethoxyethanol, 2-Nitropropane = CMBST

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituent (UHC) that may be present.

Waste from CIF could contain any or all of the listed waste codes that are fed to CIF. The CIF RCRA Part B permit should be consulted for the complete list. Waste from CIF will have treatment standards that reflected in the listed waste fed to CIF. Specific information on treatment standards can be acquired by looking at specific wastes that have proposed treatment in CIF and are in Volume II, Section 3.1.1.1.

Waste Characterization

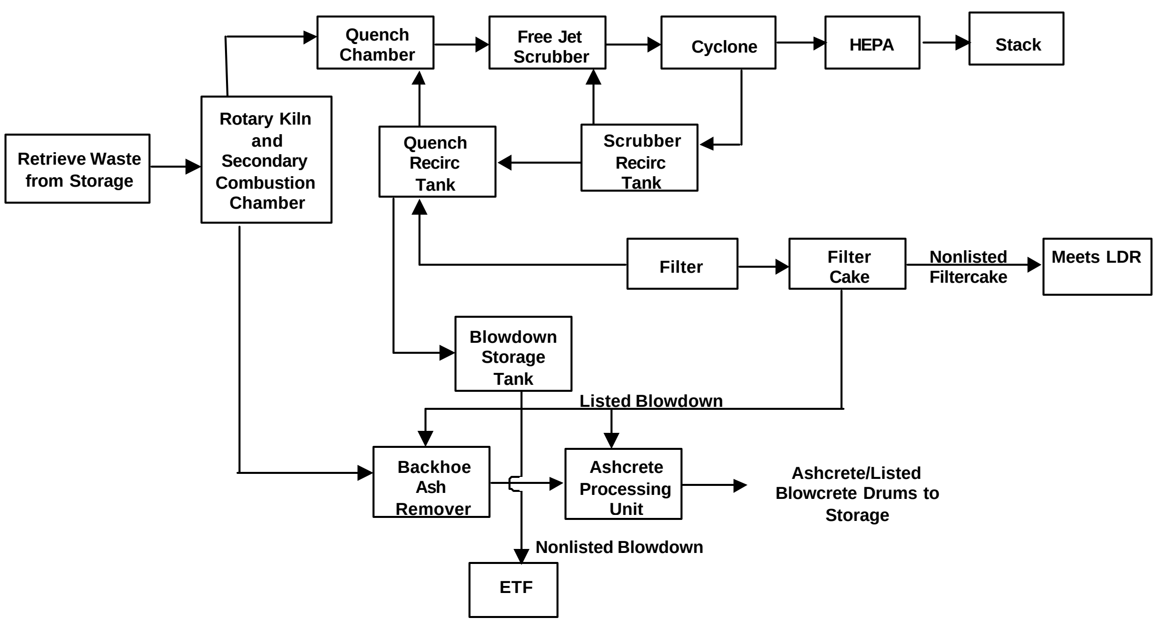
- Radiological and chemical analysis will be performed on wastes that are included in this waste stream.
- Confidence level is high because sampling and analysis has been performed.

Radiological Characterization

- Contact handled
- Mixed low-level waste
- Radiological characterization of future waste streams such as CIF wastewater cannot be determined at this time. Both alpha and beta/gamma emitters are expected.

The following information is applicable to both the waste streams in this waste group.

The process flowsheet for the preferred treatment option is shown below. Process flowsheets for offsite commercial vendor treatment, if selected, will be described in future document revisions.



3.1.1.1.F Reactive/Ignitable Waste Group

The preferred treatment option for the Reactive/Ignitable Waste Group is Combustion in CIF or treatment by commercial vendor after deactivation.

At the present time, the sole representative of this waste group:

SR-W081, Reactive/Ignitable Waste

General Information

SR-W081, Reactive/Ignitable Waste

This waste stream is currently composed of SRTC laboratory wastes generated as a result of preparing metal specimens for examination in the transmission electron microscope. Metal disks were electropolished using a solution of perchloric acid, butycellosolve, and methanol. Because of its reactivity, the spent perchloric acid solution is deactivated with distilled water in the storage area.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous liquid

Waste Codes

- D001A (ignitable high TOC)
- D003E (other reactive)

LDR Treatment Standard

- D001 = specified technology = RORGS or CMBST
- D003 = specified technology = DEACT

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituent (UHC) that may be present.

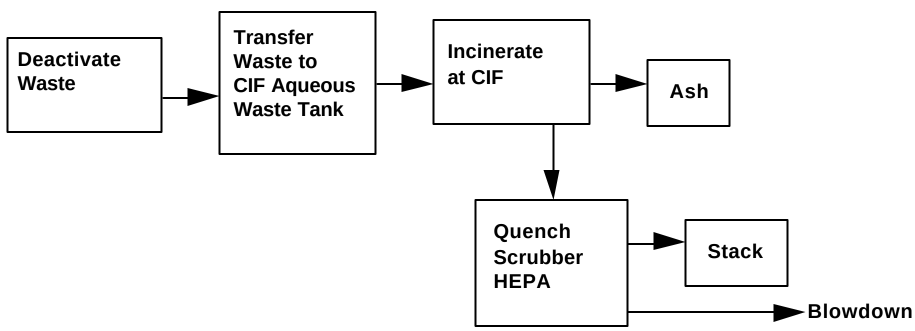
Waste Characterization

- Process knowledge
- Confidence level is high based upon the known composition and quantity of chemicals used to formulate the perchloric acid polishing solution.

Radiological Characterization

- Radionuclide constituent - Co^{60}, H^3, Pu^{239}, Pu^{238}
- Contact handled

The process flowsheet for the preferred treatment option is shown below. Process flowsheets for offsite commercial vendor treatment, if selected, will be described in future document revisions.



The following information is applicable for all waste treated in CIF.

Technology and Capacity Needs

Waste streams to be treated in CIF include wastes that served as a design basis for CIF as well as waste components that were determined by in-depth technical treatment option analysis to be suitable for treatment in CIF. Spare capacity is available in CIF to treat additional wastes because the SRS mission has changed reducing the expected quantity of design basis waste feeds.

The capacity limiting subsystem for the entire CIF is the ashcrete unit.

Treatment Option Information

Thermal destruction of these wastes in CIF provides a treatment that is capable of meeting the treatment standards for wastes codes represented in the wastes proposed to be treated in CIF. Since these wastes are highly organic, initial incineration provides organic contaminant destruction and proper volume reduction to meet LDR treatment standards for the waste. It also serves to meet alternative debris technology for treatment of mercury-contaminated debris.

Some of the sources of waste to be treated in CIF lend themselves to waste reduction through proper minimization practices. Continuing action has been taken to reduce the volume of these wastes through the use of nondisposable, recyclable applicators and the use of nonhazardous solvent substitutes.

This waste group includes waste sources that served as design basis for the CIF. However, the CIF Mission Need and Design Capacity Review (July 7, 1993) and the supporting Alternative Treatment Technologies for SRS Hazardous, Mixed, and Job Control Wastes (SWE-CIF-93020, July 29, 1993) re-evaluated the treatment of certain existing and future SRS wastes in the CIF. The review was structured to reexamine the appropriateness of each Functional Performance Requirement (FPR) design basis waste group. The FPR is an initial engineering design document that defines the scope of the design project and serves as a baseline for subsequent project design work. The review included additional mixed waste groups that were not listed in the FPR but are chemically and physically similar to FPR (nonradioactive) waste groups that were addressed in the FPR. The review compared the incineration of each waste group to treatment by other candidate technologies using comparison criteria such as waste volume and toxicity reduction, treatment and disposal costs, and RCRA LDR requirements. The review program concluded that the waste streams originally designated for CIF and the additional mixed waste streams are most effectively treated by incineration.

Facility Status

CIF construction, operational testing, and trial burn are complete. Mixed waste operations began April 24, 1997. The facility is currently in suspension of operations.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. National Emission Standards for Hazardous Air Pollutants (NESHAP) for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

CIF received its RCRA Part B Permit; the effective date is November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992, with an effective date of December 10, 1992. The air permit was revised on November 22, 1995. Also, an Air Quality Construction Permit was issued on September 12, 1994, to cover emissions from the CIF ashcrete process and the H-Area Air Quality Permit was revised on May 30, 1995, to include the CIF fuel oil tank.

The NESHAP construction permit for radionuclides was received on June 14, 1989. The NESHAP exemption for benzene emissions was received on August 18, 1989. In correspondence dated May 10, 1995, EPA determined that the CIF NESHAP exemption for benzene is not applicable. SRS requested that SCDHEC evaluate the benzene NESHAP exemption issue. SCDHEC responded that CIF is not exempt from the benzene NESHAP emissions requirement. SRS has determined that information submitted for compliance with RCRA Subpart BB should also meet the requirements for benzene emissions under the NESHAP regulation. Further evaluation is taking place.

Under the NEPA process, an Environmental Assessment (EA) was prepared for the CIF, and a 60-day public comment period was held for the proposed Finding of No Significant Impact (FONSI). The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register. An investigation of mixed waste treatment at CIF has also been performed as a part of the Waste Management Environmental Impact Statement (WMEIS). The Record of Decision (ROD) on the final WMEIS was issued in September 1995.

SRS proposed to perform a shredding operation for specific waste streams with a shredder located in the Experimental Transuranic Waste Assay Facility (ETWAF) to prepare these waste components for treatment in CIF. ETWAF was chosen because it was already covered under RCRA Part A Interim Status for hazardous or mixed waste storage. This regulatory coverage was necessary because the waste to be shredded had already been stored in permitted storage sites. In addition, a determination was made that preparation for treatment by shredding required additional regulatory coverage. To provide the additional coverage, it was agreed that SRS would submit to SCDHEC a request for Temporary Authorization (TA) per SCHWMR R.61-79.270.42(e). The TA request was submitted to SCDHEC on June 6, 1995. The TA was issued by SCDHEC with an effective date of July 24, 1995. The TA was effective for 180 days and expired on January 20, 1996. Since the TA was issued initially to cover only the shredding of Filter Paper Take-Up Rolls, the shredding of additional wastes required that the TA be modified. A request for an amendment to the TA was submitted by SRS on October 13, 1995. The TA amendment was approved by SCDHEC on November 3, 1995. The TA amendment allowed SRS to shred waste streams SR-W003, Solvent Contaminated Debris; SR-W012, Toxic Characteristic Solids; SR-W051, Spent Filter Cartridges and Carbon Filter Media; and SR-W055, Job Control Waste Containing Solvent Contaminated Wipes. In April 1996, SRS requested a new TA for a portion of waste stream SR-W025, Solvent/TRU Job Control Waste <100 nCi/g, that could be treated in CIF and, therefore, needed to be shredded. SCDHEC granted the new TA effective on July 1, 1996. The new TA expired on December 28, 1996. Materials in the waste streams that are not incinerable have been reclassified or placed in another waste stream such as SR-W062A, Normal Low-Level Contaminated Debris or SR-W062B, Difficult-to-Treat Low-Level Contaminated Debris.

Analysis performed for waste stream SR-W070, Mixed Waste from Laboratory Samples, has shown that there are no TCLP metal concentrations, or other waste codes listed in Appendix XI of 40 CFR 268 or equivalent state hazardous waste regulations, above the LDR treatment standard. As a result, there is no violation of the LDR Phase III rule addressing prohibition of dilution by combustion for this waste stream to be treated by combustion in CIF. Analysis has further shown that the waste contains significant organics (greater than 1%). In addition, the waste is characterized as D001, due to a flash point of less than 140° F. Therefore, treatment by combustion is appropriate for this waste stream.

Analysis performed for waste stream SR-W071, Wastewater Suitable for Treatment in CIF, indicated that some drums of this waste contain concentrations of lead and chromium above TCLP limits. In addition, analysis reflected TOCs at greater than 1% and the presence of listed organic at levels above the Universal Treatment Standards. Verification of the level of organics did allow the waste to be treated by combustion because at least one of the six qualifying criteria allowing treatment by Combustion for wastes containing TCLP metals was met.

Preparation for Operation

For the organic liquid components of waste to be treated in CIF, no preparation for treatment is required with the exception of phase separation. Waste is transferred to the liquid hazardous waste blend tanks prior to introduction into CIF. Benzene generated from DWPF operations (DWPF Benzene, SR-W022) may be fed directly to CIF from the Organic Waste Storage Tank (OWST). The Tri-butyl Phosphate & n-Paraffin (PUREX) waste stream, SR-W045, will require a blending program for its introduction into CIF to reduce the radionuclide content to meet the CIF waste acceptance criteria.

The CIF waste acceptance criteria requires that solid waste must be repackaged into 21-inch cardboard boxes. This activity must be performed in a permitted storage location since the waste in inventory has been stored in permitted locations. To maintain minimum worker exposure to radiological contaminants and make the repackaging process more convenient, much of the solid portions of this waste stream were shredded. The shredding of waste components was completed under the Temporary Authorization issued on July 24, 1995, for Filter Paper Take Up Rolls, SR-W018, and modified to include additional waste streams on November 3, 1995. Some components of the CIF waste streams had been shredded by November 27, 1995. However, shredding continued under an additional TA requested by SRS and made effective by SCDHEC on July 1, 1996. The shredding of Job Control Waste Containing Solvent Contaminated Wipes, SR-W055, was completed before the new TA expired on December 28, 1996. The shredding process encountered material such as tools, which could not be incinerated. Waste found to be non-incinerable was segregated and placed in waste stream SR-W062A, Normal Low-Level Contaminated Debris, which will be treated by Macroencapsulation.

Source separation of waste stream SR-W042, Paints and Thinners, was completed in February 1998. Other waste streams, such as Rad-Contaminated Solvents, SR-W001 and Mixed Waste Oil-Sitewide, SR-W035, may require liquid decanting and development of a sludge transfer method. These simple pre-treatment steps will be performed in a RCRA-regulated unit.

Not all the waste requires a treatment preparation step. However, repackaging from storage containers into the 21-inch cardboard boxes is required for solid waste streams to be treated in CIF. Assurance must be provided that waste will be repackaged in a manner that meets the CIF waste acceptance criteria.

Treatment Option Status and Uncertainties

Budget Status

Budget requests have been prepared with cost estimates that include processing of the constituent, design basis and nondesign basis waste streams, and the stabilization of the resulting ash and blowdown. It should be noted that the mixed wastes proposed for treatment in CIF compose only 10% of the total CIF design basis feed volume.

There is cost incurred to blend the nondesign basis waste Tri-butyl phosphate & N-paraffin, SR-W045, prior to treatment at CIF. Blending is required to allow treatment of this waste within the radiological and chemical limits of CIF.

Several nondesign basis wastes, along with certain design basis waste streams, will incur a cost to prepare waste streams to meet the CIF/WAC. These include SR-W018, Filter Paper Take-Up Rolls; SR-W028, Mark 15 Filter Paper; SR-W051, Spent Filter Cartridges and Carbon Filter Media; and SR-W055, Job Control Waste Containing Solvent Contaminated Wipes. Preparation involves shredding waste or source separation followed by repackaging in 21-inch cubic cardboard boxes.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.,) are identified or anticipated for this waste group at this time. However, the character of some components of this waste group (such as Spent Filter Cartridges) in relation to the CIF waste acceptance criteria (WAC) has not been fully analyzed. It is possible that final determination may conclude that some components are not suitable for treatment in CIF because of the difficulty in meeting WAC requirements.

3.1.1.2 F- and H-Area Effluent Treatment Facility (F/H ETF)

Treatment of the nonlisted portions of waste stream SR-W047, Consolidated Incineration Facility Blowdown, has been approved by SCDHEC. Refer to Section 3.1.1.1.D of this volume for details. An additional volume of waste stream SR-W077, Aqueous Characteristic Wastewater, (Ferric Chloride Solution) has been included for treatment at F/H ETF.

3.1.1.3 Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks

Waste streams in this category are in compliance with RCRA regulations and are found in Chapter 1, Table 1.1 of Volume II.

3.1.1.4 Onsite Treatment via Treatability Variance Petition

Treatability variance petitions will be submitted for each different waste stream in this group. Each waste stream may have a different preferred treatment option, but all waste streams in this group will require a treatability variance approved prior to treatment.

3.1.1.4.A Pretreatment/Macroencapsulation Waste Group

The preferred treatment option for the Pretreatment/Macroencapsulation Waste Group is in situ treatment using an Acid Wash technology followed by placement in engineered stainless steel boxes under a treatability variance.

General Information

At the present time, the sole representative of this waste group is:

SR-W020, Salt Processing Filters

Under the current recommended salt processing flowsheet (small tank precipitation) these waste filters will be a future debris waste stream. The filters are used in the treatment and separation of salt solution in preparation for processing in the Defense Waste Processing Facility (DWPF) and Saltstone Facility. The salt solution is treated with tetraphenyl borate to precipitate radioactive cesium and sodium titanate to adsorb strontium and plutonium. This precipitate is expected to eventually foul the filters, requiring their removal, treatment, and disposal.

(Note: This future waste stream may be eliminated or changed if the Small Tank Precipitation process is not selected for HLW processing. Work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE's selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.)

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Inorganic debris

Waste Code

- D009A (TCLP Hg)
- D018 (benzene)
- D036 (nitrobenzene)
- Nonwastewater

LDR Treatment Standard

- D009 = concentration based standard = 0.025 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg
- D036 = concentration based standard = 14 mg/kg
- Alternate debris technology may be applied.

- D001 through D043 nonwastewaters to be land disposed must be treated to meet the Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is medium since this waste stream has not yet been generated.
- Typical expected concentration is 236 g Hg and 5000 g benzene per filter. This is estimated by calculation.

Radiological Characterization

- Total activity is estimated to be 64-3400 Ci/filter.
- Beta/gamma emitters are Cs^{137}, Cs^{134}, Sr^{90}, Tc^{99}, Ru^{106}, Sb^{125}, and I^{129}.
- Waste is remote handled.
- Mixed low-level waste

Technology and Capacity Needs

Since the Salt Processing Facility has not begun operation, failure rate of the filters is not yet known. However, it has been estimated that one filter may fail every two years in the course of routine operation. The filters are highly radioactive and will require remote handling to protect against worker exposure to radiation.

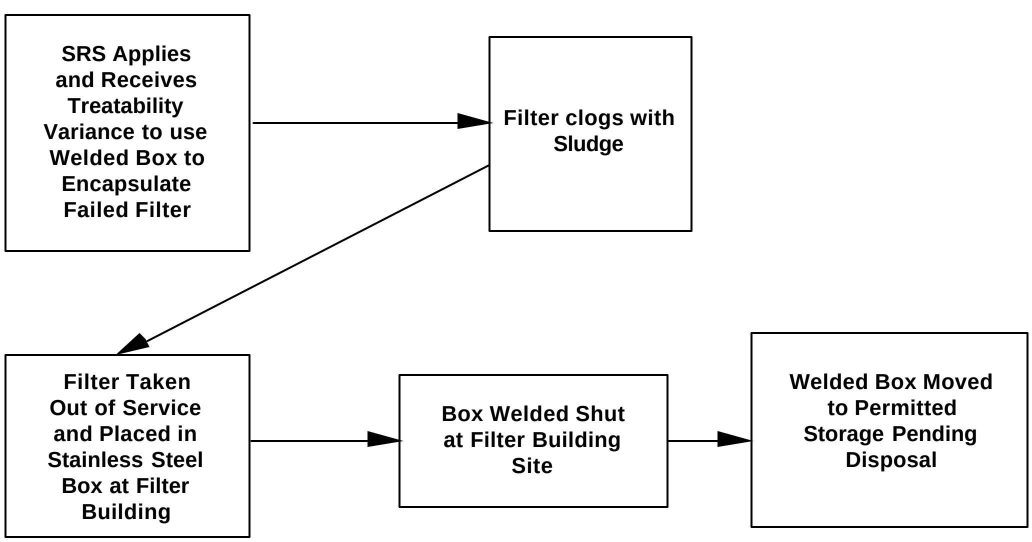
Treatment Option Information

The EPA-approved treatment process for the filters includes; (1) acid leaching prior to encapsulation, to reduce the concentration of mercury and benzene, and (2) placement in an engineered box to protect against radiation exposure and contain the hazardous constituents. The box has been designed to include filters to absorb benzene and mercury vapors, in addition to a vent design to keep benzene vapors below the lower explosive limit. A treatability variance request to establish a treatment standard specific to this waste was filed with the EPA Region IV in January 1992. SRS received final approval for the variance on October 1, 1993. A revision to the ITP Treatability Variance to include Late Wash (LW) filters was submitted to the EPA on September 28, 1995, approved on August 22, 1996, and a copy was provided to SCDHEC.

Since the treatability variance was granted in October 1993, new information, based on simulant testing, has shown the waste to potentially fail TCLP for nitrobenzene (D036). The data also suggests that mercury, while present in total constituent analysis, will not fail the TCLP. However, SRS will continue to indicate that mercury could be present (i.e., carry the D009 code). In late 1994 a request to amend the variance approval to include nitrobenzene was submitted and approved by the EPA. Similarly, a general revision was made to the variance to include filters from the Late Wash Facility. Approval to include nitrobenzene in the treatability variance was granted by EPA on September 15, 1995. The amendment to include the Late Wash Filters in the ITP filters treatability variance was approved on August 22, 1996.

A flow diagram illustrating the treatment train for this waste stream is shown below:

Note: Process flow diagram may change depending upon the selected salt processing technology. See "Uncertainty Issues" below for more information.



Treatment Option Status and Uncertainties

The filters are a possible future waste stream. The frequency of generation of the filters as waste is not certain. However, one engineered container has been constructed for handling the first failed filter.

Budget Status

Refer to “Uncertainty Issues”.

Uncertainty Issues

Technical uncertainty exists because work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE’s selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

3.1.1.4.B Macroencapsulation

The preferred treatment option for this waste group is Macroencapsulation in a steel box at one of the existing regulated storage facilities by means of a treatability variance.

General Information

The following waste streams are included in this waste group:

SR-W009, Silver Coated Packing Material
SR-W060, Tritiated Water with Mercury

Background Information

SR-W009, Silver Coated Packing Material
This material is ceramic packing material coated with silver nitrate (silver-coated Berl saddles) that is used in the offgas systems in the F-Canyon and H-Canyon dissolver operations to bond radioactive iodine129 and iodine131 emissions to the packing material as silver iodide. Spent packing material is changed out from the process when pluggage occurs or when the iodine level measured at the stack elevates such that levels start to approach the emission limit. Material is too small to meet the 60-mm minimum particle size standard for debris.

Volume

- Volume data for this waste stream can be found in Chapter 11. The volume in Chapter 11 is reported as net volume. However, volume figures may be converted to gross in future annual updates once treatment is performed.

Waste Stream Composition

- Uncategorized inorganic particulate

Waste Code

- D011 (TCLP Ag)
- D008C (Radioactive lead solids subcategory)
- D009A (TCLP Hg)
- Nonwastewater

LDR Treatment Standard

- D008 = specified technology = Macroencapsulation
- D009 = concentration based standard = 0.025 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- No analysis was performed due to ALARA concerns, but silver value was calculated.
- Process knowledge is used to characterize waste stream.
- Confidence level for silver concentration is high due to manufacturer specifications of silver content on the saddles. Confidence level for mercury concentration is low; presence is suspected, but not proven.

Radiological Characterization

- Beta/gamma emitters are present.
- Volatile radionuclides I^{129} and I^{131} (I^{131} is a short lived isotope) are present.
- Typical rad levels include:
  I^{129} = 62.2 nCi/g
  Cs^{137} = 3080 nCi/g
- Alpha emitters (U^{235}, U^{236}, U^{238}, Pu^{239}, and Pu^{240}) are present.
- Waste is remote handled.
- Mixed low-level waste

SR-W060, Tritiated Water with Mercury

This waste is highly tritiated heavy water with a small amount of mercury that has been adsorbed on silica gel. The waste was created by a spill incident resulting from a weld failure in a retired thermal diffusion column. The spill consisted of 17 liters of highly tritiated water and 3 or 4 milliliters of elemental mercury. The spill was absorbed with 50 kilograms of silica gel. The waste is contained in a welded stainless steel container, known colloquially as a "fat boy." There are no free liquids in this container.

Volume

- Data on the volume of this waste stream can be found in Chapter 11.

Waste Stream Composition

- Inorganic particulate

Waste Code

- D009A (TCLP Hg)
- Nonwastewater

LDR Treatment Standard

- D009 = concentration based standard = 0.025 mg/l TCLP

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is medium.

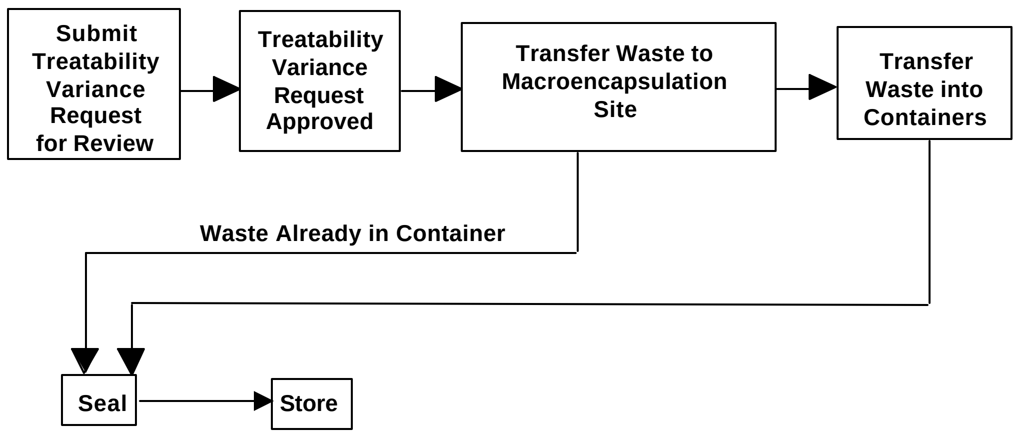
Radiological Characterization

- 7,800 Ci of tritium

Technology and Capacity Needs

The following information applies to all waste streams.

The process flowsheet for the preferred option for these waste streams is shown below.



The preferred option selection includes the need for a treatability variance. Because of the radioactive contamination, it is not practical to handle these waste streams directly. Approval of a treatability variance will allow immobilization of this highly radioactive waste to meet the RCRA LDR treatment requirements.

Waste stream SR-W060, Tritiated Water with Mercury, is highly radioactive. Therefore, a TCLP was not run on the waste at the time of generation. Heating to desorb the water for wastewater treatment or mercury separation techniques are not practical due to the high level of tritium that would be released, once the container is opened.

Furthermore, there is no current technology available to release tritium from the waste and recapture it without the high risk of a tritium release to the atmosphere. Tritium has a half-life of 12 years and, given the initially high tritium level of 7,800 curies, will take almost 60 years to have the tritium decay to fewer than 50 curies. It has been determined that approval of a treatability variance request by the EPA will be required.

Treatment Option Information

The treatability variance requests approval to treat the Silver Coated Packing Material, SR-W009, as “debris like” and to apply the alternate debris technology of macroencapsulation.

With approval of a treatability variance, macroencapsulation could be performed at a regulated storage facility at SRS where appropriate equipment is available to perform macroencapsulation in a steel container under conditions for maximum worker safety. Under these conditions, drums with silver saddles can be containerized or casks sealed without opening, avoiding the risk of exposure to the highly radioactive waste.

This treatment option was selected as the preferred option even though it did not have the highest score from the IDOA. The SRS technical analysis team determined through engineering assessment that the identified preferred treatment option represented the most feasible treatment alternative for the waste stream at this time based upon the considerations summarized below.

Option Support Justification-IDOA Performed (applicable to all waste streams)

- The preferred option represents simple, effective treatment technology that creates no secondary waste, no emissions, requires little equipment, and does not require a permit if macroencapsulation can be performed at a regulated storage location.

- The final wasteform is suitable for transport and disposal without additional treatment. Waste is highly radioactive and requires remote handling. The ability to directly macroencapsulate without removing waste from its drums increases safety through reduced exposure.

Facility Status

There are a number of regulated storage facilities where macroencapsulation can be performed. Safety concerns and accessibility of proper equipment to a building must be addressed and may limit possible locations where macroencapsulation could occur.

For Tritiated Water with Mercury, SR-W060, the waste presently meets macroencapsulation. No other treatment is required if the SRS treatability variance for this waste is approved.

Technology

Macroencapsulating in a steel container is a simple function that can be performed at a regulated storage facility.

Regulatory Status

A treatability variance has been submitted to petition EPA that Silver-Coated Packing Material, SR-W009, is “debris-like”, although it doesn't meet the size criteria. The best treatment alternative for its radiological characterization is to be immobilized and disposed in a long-lived isotope facility. Since the waste stream already requires immobilization, it is neither cost nor safety effective to perform an LDR treatment to render the waste RCRA non-hazardous when encapsulation will meet the Atomic Energy Act (AEA) requirements for the radioactive iodine and cesium. A solution is to declare the waste stream “debris-like” so the debris technology of macroencapsulation may be applied, thus meeting both RCRA and AEA treatment requirements. The treatability variance request must include lead since it had been declared waste prior to its inclusion with the Silver Coated Packing Material as shielding. To meet the applicable treatment standard, the lead should be removed and the individual pieces treated. Since this cannot be done safely, the lead must also be included in the treatability variance.

In order for macroencapsulation to be accomplished at a storage facility, certain requirements must be met in regard to safety and accessibility for equipment.

For the Tritiated Water with Mercury, SR-W060, options analysis was performed by evaluating roasting and retorting and amalgamation. Both showed high risk to personnel and high costs in handling the material due to the tritium content. SRS believes that the waste in its present condition (i.e., seal welded in a stainless steel container) meets the definition of macroencapsulation and represents a suitable treatment alternative for the Tritiated Water with Mercury waste. Under this condition, the waste is suitably isolated from the environment and appropriate measures have been taken to prevent mercury migration and protect human health and the environment. SRS has developed a treatability variance request for macroencapsulating the current package in place of the concentration-based standard of 0.025 mg/l for the mercury. The request was submitted to the EPA for review and approval per the schedule in Volume I of the STP, with a copy of the request supplied to SCDHEC on September 18, 1997.

Preparation for Operation

If the treatability variance is approved, macroencapsulation of the Silver Coated Packing Material, SR-W009, will involve either repackaging in an appropriate container or properly sealing existing containers of already encapsulated waste. It may be necessary to transport containers to the identified location where macroencapsulation will occur.

No additional work will be required for the Tritiated Water with Mercury, SR-W060, once the treatability variance is approved.

Treatment Option Status and Uncertainties

Budget Status

There is current funding allocation in FY01 for the treatment of the Silver-Coated Packing Material, SR-W009, contingent on the approval of the treatability variance.

Preparation of the treatability variance request for the Tritiated Water with Mercury, SR-W060, was funded through the Defense Program division operating budget.

Uncertainty Issues

These wastes do not have a straightforward technology for treatment due to the waste's level of radioactivity and its requirement to be remote-handled. Approval of the treatability variance represents an uncertainty for these waste streams. This is the responsibility of the EPA, but SCDHEC must agree in order for the treatment option to be incorporated into the Site Treatment Plan. Denial of a treatability variance will have a significant impact on the preferred option, budget, and schedule for the treatment of these wastes.

Uncertainty exists regarding the location for macroencapsulation of the Silver Coated Packing Material, SR-W009, should the treatability variance be approved. If it is not possible to locate a regulated storage facility that meets the criteria required for macroencapsulation, the treatment schedule and cost to treat the Packing Material could be seriously impacted.

Exemptions to DOE Orders 6430.1A and 4700 on a case-by-case basis would significantly decrease the cost to treat the Silver Coated Packing Material in an existing building.

3.1.1.5 Recycling

Currently, there are no waste streams in this category.

3.1.1.6 M-Area Vendor

This section discusses the three waste groups with in the M-Area Vendor treatment category. These waste groups include the Design Basis Waste Group, the Liquid Waste Group, and the Solids Waste Group.

3.1.1.6.A Design Basis Waste Group

Currently, no waste streams remain in this category.

3.1.1.6.B Liquid Waste Group

Currently, no waste streams remain in this waste group.

3.1.1.6.C Solids Waste Group

Currently, no waste streams remain in this category.

3.1.1.7 Miscellaneous Onsite Treatment

This section covers the miscellaneous onsite treatment options that have been proposed for treatment of mixed wastes. These options include onsite vendor macroencapsulation, waste streams that currently meet the LDR treatment standards, and waste streams that are to be treated in 90-Day Staging Areas or Containment Buildings.

3.1.1.7.A SRS Macroencapsulation

Refer to Section 3.1.1.4, Onsite Treatment via Treatability Variance Petition, for information regarding macroencapsulation at SRS.

3.1.1.7.B Onsite Vendor Macroencapsulation

The preferred treatment option for this waste group is Macroencapsulation by a Vendor in a SRS building. Waste that falls into this waste group would consist of difficult-to-treat waste, which cannot be treated offsite using a commercial vendor.

Waste streams in this waste group include but are not limited to:

SR-W062B, Difficult-to-Treat Low-Level Contaminated Debris
SR-W069B, Low-Level Waste (LLW) Lead-to be Macroencapsulated Onsite

General Information

SR-W062B, Difficult-to-Treat Low-Level Contaminated Debris

This waste stream consists of difficult-to-treat non-combustible debris (metal, floor tiles, fluorescent light bulbs, broken thermometers, instruments, and other equipment including non-incinerable debris generated from operations at CIF and machinery used in the remediation of various contamination sites that could not be decontaminated) contaminated with TCLP metals and radionuclides. Note this is a different stream from SR-W015, Mercury/Tritium Contaminated Equipment). This waste requires a permitted TSD for treatment since it has been in permitted storage.

Also included in this waste stream are tools and other non-incinerable items found in waste stream SR-W055, Job Control Waste Containing Solvent Contaminated Wipes, SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g, and other waste streams shredded in preparation for treatment by combustion. The volume of waste reclassified or transferred from SR-W055 and SR-W025 to SR-W062 is reflected in the Volume Summary Information in Chapter 11 of Volume II.

In addition to the non-combustible CIF debris, this waste stream also consists of filters and other equipment or debris from the M-Area Vendor Treatment Facility, the tank farms, and other site locations.

Volume

- Volume data on this waste stream can be found in Chapter 11.

Waste Stream Composition

- Inorganic debris

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D039 (Tetrachloroethylene)
- F001 (Unspecified solvents)
- F002 (Unspecified solvents)
- F003X (Unspecified solvents)
- F005X (Unspecified solvents)
- F006 (Metal plating waste without cyanide)
- U002 (Acetone)
- U003 (Acetonitrile)
- U019 (Benzene)
- U037 (Chlorobenzene)
- U080 (Methylene Chloride)
- U0123 (Formic Acid)
- U0127 (Hexachlorobenzene)
- U0131 (Hexachloroethane)
- U0159 (Methyl Ethyl Ketone)
- U165 (Naphthalene)
- U188 (Phenol)
- U210 (Tetrachloroethylene)
- U211 (Carbon Tetrachloride)
- U220 (Toluene)
- U226 (1,1,1-Trichloroethane
- U239 (Xylenes)
- Nonwastewater

Specific waste codes will vary depending upon where the waste was generated. Waste from CIF should contain any or all of the waste codes that are fed to CIF. The F-listed solvents listed reflect the inclusion of non-incinerable items found in waste streams SR-W025 and SR-W055. Items from SR-W025 and SR-W055 may contain other P- and U-listed codes.

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D039 = concentration based standard = 0.14 mg/l, TCLP
- F001 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 6-30 mg/kg
- F003 = concentration based standard = 2.6 - 60 mg/kg
- F005 = concentration based standard = 10 - 170 mg/kg
- F006 = concentration based standard = 0.19 – 5.0 mg/l, TCLP
- U002 = concentration based standard = 160 mg/kg
- U003 = specified technology = CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U210 = concentration based standard = 6 mg/kg
- U211 = concentration based standard = 6 mg/kg
- U220 = concentration based standard = 10 mg/kg
- U226 = concentration based standard = 6 mg/kg
- U239 = concentration based standard = 30 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituent (UHC) that may be present.

Waste debris from CIF will have treatment standards that are reflected in the waste fed to CIF. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1, proposed for treatment in CIF.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on knowing process history of the waste.

Radiological Characterization

- Radioactivity will vary depending on the generation source and location.
- Waste is contact handled.
- Mixed low-level waste

SR-W069B, Low-Level Waste (LLW) Lead-to be Macroencapsulated Onsite

This waste stream consists of difficult-to-treat low-level waste lead and lead compounds that are inseparably mixed with non-lead components. Examples of this waste stream are lead-lined gloves and aprons and equipment containing lead solder. A small portion of the waste consists of lead acid batteries.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Elemental lead
- Non-elemental lead

Waste Code

- D008A (TCLP Pb)
- D008C (elemental Pb)
- Nonwastewater

LDR Treatment Standard

- D008 = concentration based technology = 0.75 mg/l TCLP; or specified technology = MACRO for radioactive elemental lead; RLEAD for lead acid batteries

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on the fact that waste is easily identified as containing lead.

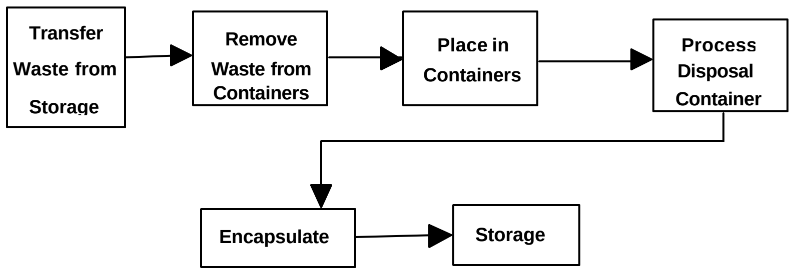
Radiological Characterization

- Beta/gamma emitters (Cs^{137} and Sr^{90}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, and U^{235}) are present.
- Waste is contact handled.
- Mixed low-level waste

The following information applies to all waste streams in this waste group.

Technology and Capacity Needs

The process flowsheet for the preferred option is shown below.



These wastes qualify as debris under the land disposal regulations because their particle size is larger than 60 mm, and the wastes are manufactured objects. The preferred option of Macroencapsulation meets the Debris Rule LDR treatment standard.

The lead in waste stream SR-W069B, Low-Level Waste Lead-to be Macroencapsulated Onsite, has been used for protective purposes. However, this lead waste is in the form of lead-lined gloves and aprons in which the lead is combined with other materials. The lead waste code still has the same specified technology by which it must be treated to meet the LDR standard as if the lead were in an uncombined state. The specified technology for this waste code is Macroencapsulation with a surface coating or jacket of inert materials. Less than 1% of this waste stream's volume consists of drained lead acid batteries that were generated in RMMAs. The specified technology for this portion of the waste stream is recovery of lead. Due to the potential contamination of the batteries, it is uncertain that the recovery of the lead from the batteries is a viable option. SRS will seek approval to macroencapsulate the lead acid batteries along with the other waste lead in this waste stream by means of the submittal of a treatability variance to EPA.

The preferred option is to treat the waste lead in compliance with the LDR treatment standard through the utilization of macroencapsulation, and to obtain EPA approval to macroencapsulate the small quantity of drained lead acid batteries rather than threating the batteries by the specified technology.

Treatment Option and Support Data

The treatment option treats the constituents of concern, toxic characteristic metals in debris, by encapsulating the contaminated waste in a corrosion-resistant box. These wastes will be encapsulated with polymer within the container.

It has been determined that the most effective management of the waste streams proposed for vendor treatment will be through the use of a containment building. Treatment of these waste streams in an onsite containment building requires compliance with 40 CFR Part 264 or 265 Subpart DD of the RCRA regulations.

This option is preferred for the difficult-to-treat waste because:

- Few or no secondary wastes are generated.
- Macroencapsulation, permitted by the debris rule, immobilizes the constituent of concern.
- Process is very flexible and can handle a wide variety of wasteforms.
- Process will comply with regulations without requiring a variance.

SRS proposes to treat any difficult-to-treat waste in a containment building that complies with 40 CFR Part 264 or 265 Subpart DD of the RCRA regulations. SRS anticipates treatment and/or storage for macroencapsulation of this waste stream will be covered by a RCRA Part B permit. The containment building will be a refurbished existing structure already permitted for RCRA storage.

NOTE: It was determined that participation in the polymer encapsulation demonstration project at Envirocare of Utah, as reported in the 1996 STP Annual Update, will not occur for this waste stream.

Facility Status

For waste in permitted storage, the required permits must be granted and the refurbishments specified.

Technology

Macroencapsulation is a mature technology in use by both the DOE Complex and the commercial world.

Regulatory Status

A RCRA permit will be needed for the treatment of this waste stream. Whether the acquisition of the permit is the responsibility of the vendor or SRS must be determined and will depend on the manner in which the Macroencapsulation treatment is done and the contractual arrangement. It is possible the vendor already may have the required permits.

Preparation for Operation

Besides the conditions listed under Facility Status, an appropriate training program, inspection records, and a contingency plan would have to be developed and maintained.

Treatment Option Status and Uncertainties

Budget Status

Cost to treat this waste is variable depending on the requirements for refurbishment and cost to obtain a RCRA treatment permit. Refurbishment of an existing building as a containment site could be less expensive than construction of a new structure. Also, vendor costs are unknown at this time. Budget requirements for treatment are in preliminary development stages.

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

SRS will request EPA approval for the proposed option to macroencapsulate the lead acid batteries in SR-W069B, Low Level Waste Lead to be Macroencapsulated Onsite. Budget and scheduling uncertainties may arise regarding regulatory activities until final approval from EPA is received.

Future wastes, similar to this stream, are anticipated to be generated as a result of Environmental Restoration, Transition, and D&D activities.

3.1.1.7.C Onsite Decontamination

The preferred treatment option for this waste group is Decontamination in an existing onsite facility.

General Information

At the present time, the sole representative for this waste group is:

SR-W013, Low-Level Waste (LLW) Lead-to be Decontaminated Onsite

This waste stream consists of elemental lead that can be decontaminated and reused. The waste in waste group SR-W013 will be decontaminated in an existing onsite facility. If the onsite decontamination group, during receipt inspection, identifies a quantity of lead suitable for decontamination by a technology other than those available onsite, the lead will be returned to SWD permitted storage for further evaluation. (Note: Waste Stream SR-W013B, Low-Level Waste (LLW) Lead-to be decontaminated offsite, was combined with SR-W013A, Low-Level Waste (LLW) Lead-to be decontaminated onsite, to become waste stream SR-W013.)

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Elemental lead

Waste Code

- D008C (radioactive lead solids)
- Nonwastewater

LDR Treatment Standard

- D008 = specified technology = MACRO

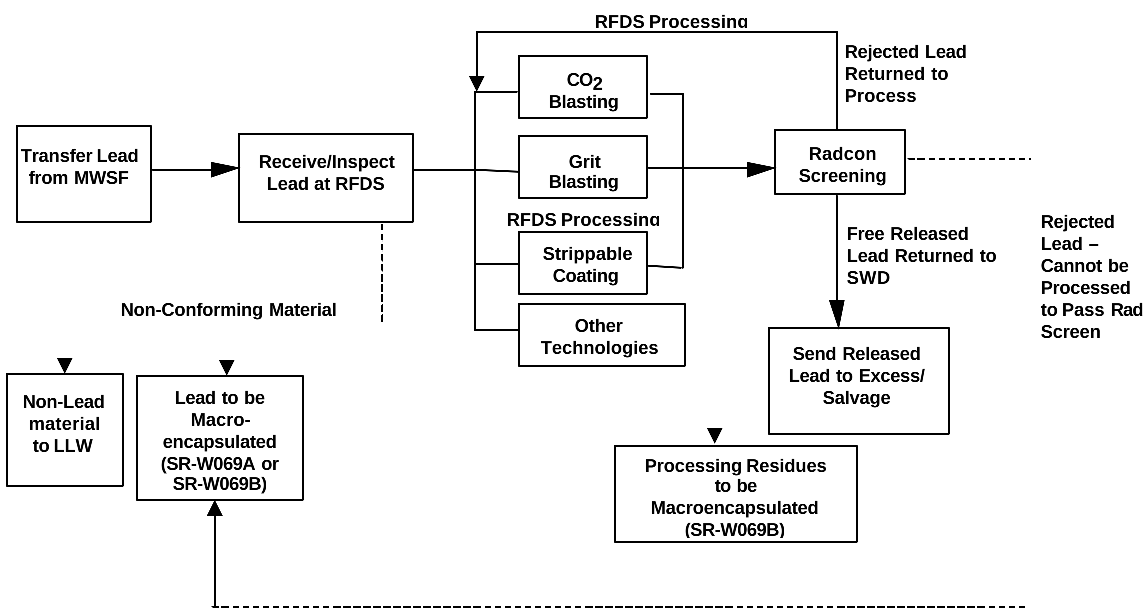
Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on the fact that waste is easily identified as containing lead.

Radiological Characterization

- Beta/gamma emitters (Cs^{137} and Sr^{90}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, and U^{235}) are present.
- Waste is contact handled.
- Mixed low-level waste

Technology and Capacity Needs



The estimated process flowsheet for the preferred option is shown above. The lead waste code has a specified technology by which it must be treated to meet the LDR standard, if discarded. Most of the mixed waste lead in this waste stream is elemental lead that has been used for shielding or in other ways that has caused it to become radioactively contaminated. The specified technology for this waste code is Macroencapsulation with a surface coating or jacket of inert material. Waste minimization philosophy would dictate that a thorough investigation be made into recycling as much of this lead waste as possible.

Treatment Option Information

This waste stream is radioactively contaminated on the surface only. Technologies are available to remove surface contamination. These technologies include abrasion by CO_2 or grit, strippable coatings and other methods. Some technologies remove a thin surface layer, leaving uncontaminated lead suitable for reuse or recycle. The volume of treatment residues (radioactively contaminated lead fines, grit, stripped coatings, etc.) is projected to be very small. These residues will be transferred to waste stream, SR-W069B, Low-Level Waste (LLW) Lead–to be Macroencapsulated Onsite.

Option Support Justification-IDOA Performed

- Treatment option is highly supportive of waste minimization and resource recovery.
- Large volume reduction. Only material not capable of being decontaminated is returned to SWD for further disposition. Remainder can be reused.
- Treatment option utilizes onsite treatment at existing facility. Decontamination processes are proven technologies.
- No permit development is required by SRS.

Facility Status

The Reactor Facilities Deactivation Section (RFDS) facility has been in operation since 1997.

Technology

Lead decontamination using CO_2 blasting or other methods to remove the surface activated lead is a proven technology.

Treatment Option Status and Uncertainties

Budget Status

Funds have been allocated for onsite decontamination services. No funds have been allocated for offsite decontamination, which is contingent upon quality of lead identified.

Uncertainty Issues

These technologies are standard for the removal of surface decontamination. Some uncertainty exists regarding the ability of the RFDS, the onsite processor, to decontaminate all eligible waste lead to free release levels. No uncertainty exists regarding the offsite selling of lead that has been decontaminated and released.

3.1.1.7.D Onsite Vendor Stabilization

Currently, there are no waste streams remaining in this category.

3.1.1.7.E Waste Streams Meeting the Treatment Standard

All waste streams in this category are discussed in Chapter 1, Table 1.1 of Volume II.

3.1.1.7.F Waste Streams Treated in 90-Day Staging Areas or Containment Buildings

All the waste streams in this category are discussed in Chapter 1, Table 1.1 of Volume II.

3.1.2 Offsite Treatment

For those waste streams that cannot be accommodated by SRS treatment facilities, various treatment technologies available at offsite facilities have been determined to be the preferred treatment option. This section discusses the treatment options that are available for offsite treatment. These include offsite vendor treatment and offsite treatment at other DOE facilities.

3.1.2.1 Offsite Vendor Decontamination

Currently, there are no waste streams remaining in this category. (NOTE: Waste stream SR-W013B, Low-Level Waste (LLW) Lead-to be decontaminated offsite, was combined with SR-W013A, Low-Level Waste (LLW) Lead-to be decontaminated onsite to become SR-W013, Low-Level Waste (LLW) Lead-to be decontaminated onsite. It was determined that no waste fitting the description of SR-W013B exists at SRS.

3.1.2.2 Offsite Vendor Macroencapsulation

The preferred treatment option for this waste group is Macroencapsulation by a Vendor in the vendor's offsite facility. This waste group consists of wastes that are normal mixed wastes that meet the acceptance criteria of a commercial vendor or can be readily handled by a commercial vendor under special procedures.

Waste streams in this waste group include but are not limited to:

SR-W062A, Normal Low-Level Contaminated Debris
SR-W069A, Low-Level Waste (LLW) Lead-to be Macroencapsulated Offsite
SR-W073, Cadmium-Containing Raschig Rings

General Information

SR-W062A, Normal Low-Level Contaminated Debris

This waste stream consists of debris (metal, floor tiles, fluorescent light bulbs, broken thermometers, instruments, and other equipment including debris generated from operations at CIF and machinery used in the remediation of various contamination sites that could not be decontaminated) contaminated with TCLP metals and radionuclides. (NOTE: this is a different stream from SR-W015, Mercury/Tritium Contaminated Equipment). This waste requires a permitted TSD for treatment since it has been in permitted storage.

Also included in this waste stream are tools and other non-incinerable items found in waste stream SR-W055, Job Control Waste Containing Solvent Contaminated Wipes and PPE, SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g; SR-W042, Paints and Thinners; and other waste streams shredded in preparation for treatment by combustion.

In addition to the CIF debris, this waste stream also consists of filters, job control waste from the segregation and decontamination of lead in Building 105-C, and other equipment or debris from the M-Area Vendor Treatment Facility, the tank farms, and other site locations.

Volume

- Volume data on this waste stream can be found in Chapter 11.

Waste Stream Composition

- Inorganic debris

Waste Code

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D039 (Tetrachloroethylene)
- U003 (Acetonitrile)
- U019 (Benzene)
- U037 (Chlorobenzene)
- U080 (Methylene Chloride)
- U0123 (Formic Acid)
- U0127 (Hexachlorobenzene)
- U0131 (Hexachloroethane)
- U0159 (Methyl Ethyl Ketone)
- U165 (Naphthalene)

- F001 (Unspecified solvents)
- F002 (Unspecified solvents)
- F003X (Unspecified solvents)
- F004X (Unspecified solvents)
- F005X (Unspecified solvents)
- F006 (Metal plating waste without cyanide)
- U002 (Acetone)
- U188 (Phenol)
- U210 (Tetrachloroethylene)
- U211 (Carbon Tetrachloride)
- U220 (Toluene)
- U226 (1,1,1-Trichloroethane)
- U239 (Xylenes)
- Nonwastewater

Specific waste codes will vary depending upon where the waste was generated. Waste from CIF could contain any or all of the waste codes that are fed to CIF. The F-listed solvents listed reflect the inclusion of non-incinerable items found in waste streams SR-W025 and SR-W055. Items from SR-W025 and SR-W055 may contain other P- and U-listed codes.

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006 = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008 = concentration based standard = 0.75 mg/l, TCLP
- D009 = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D039 = concentration based standard = 0.14 mg/l, TCLP
- F001 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 6-30 mg/kg
- F003 = concentration based standard = 2.6 - 60 mg/kg
- F004 = concentration based standard = 6 - 160 mg/kg
- F005 = concentration based standard = 10 - 170 mg/kg
- F006 = concentration based standard = 0.19 – 5.0 mg/l, TCLP
- U002 = concentration based standard = 160 mg/kg
- U003 = specified technology = CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U159 = concentration based standard = 36 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U210 = concentration based standard = 6 mg/kg
- U211 = concentration based standard = 6 mg/kg
- U220 = concentration based standard = 10 mg/kg
- U226 = concentration based standard = 6 mg/kg
- U239 = concentration based standard = 30 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste debris from CIF will have treatment standards that are reflected in the waste fed to CIF. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1, proposed for treatment in CIF.

Waste Characterization

- Process knowledge is used to characterize the waste stream.

- Confidence level is high based on knowing process history of the waste.

Radiological Characterization

- Radioactivity will vary depending on the generation source and location.
- Waste is contact handled.
- Mixed low-level waste

SR-W069A, Low-Level Waste (LLW) Lead-to be Macroencapsulated Offsite

This waste stream consists of low-level waste lead and lead compounds that are inseparably mixed with non-lead components. Examples of this waste stream are lead-lined gloves, aprons and equipment containing lead solder, and radioactive lead acid batteries.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Elemental lead
- Non-elemental lead

Waste Code

- D002 (corrosive)
- D004 (TCLP As)
- D006 (TCLP Cd)
- D008A (TCLP Pb)
- D008B (lead acid batteries and radioactive lead solids)
- D008C (elemental Pb)
- Nonwastewater

LDR Treatment Standard

- D004
- D006
- D008 = concentration based technology = 0.75 mg/l TCLP; or specified technology = MACRO for radioactive elemental lead

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on the fact that waste is easily identified as containing lead.

Radiological Characterization

- Beta/gamma emitters (Cs^{137} and Sr^{90}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, and U^{235}) are present.
- Waste is contact handled.
- Mixed low-level waste

SR-W073, Cadmium-Containing Raschig Rings

This waste stream is composed of approximately 60% rubbery-plastic material, 20% lead, and 20% cadmium (by volume). These Raschig Rings were used as a criticality prevention measure in certain sumps in the Separations H-Area facility. Waste size is less than the 60 mm minimum particle standard for debris, but a treatability variance has been prepared and submitted to treat this waste as a debris.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Other organic particulates

Waste Codes

- D006A (TCLP Cd)
- Nonwastewater

LDR Treatment Standard

- D006 = concentration based standard = 0.11 mg/l TCLP

Waste Characterization

- TCLP tests were performed to verify hazardous characteristic.

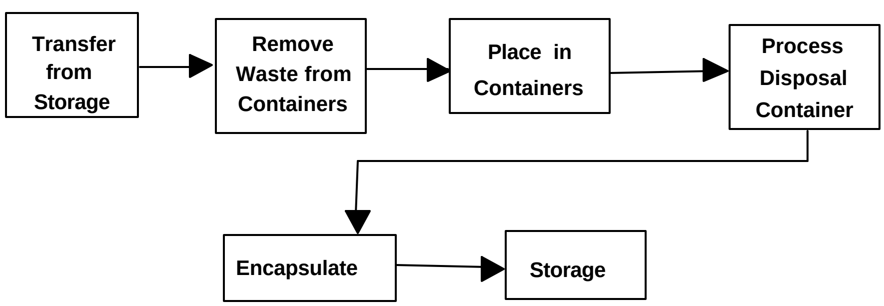
Radiological Characterization

- Radioactive contamination for alpha and beta/gamma was detected in analysis.
- Material was generated in a contamination area.

The following information applies to all waste streams in this waste group.

Technology and Capacity Needs

The process flowsheet for the preferred option is shown below.



These wastes qualify as debris under the land disposal regulations because their particle size is larger than 60 mm, and the wastes are manufactured objects. The preferred option of Macroencapsulation meets the Debris Rule LDR treatment standard.

The lead in waste stream SR-W069A, Low-Level Waste Lead-to be Macroencapsulated Offsite, has been used for protective purposes. However, this lead waste is in the form of lead-lined gloves and aprons in which the lead is combined with other materials. The lead waste code still has the same specified technology by which it must be treated to meet the LDR standard as if the lead were in an uncombined state. The specified technology for this waste code is Macroencapsulation with a surface coating or jacket of inert materials.

Waste stream SR-W073, Cadmium-Containing Raschig Rings, was determined to be radioactive. After review it was determined that the preferred treatment method is to macroencapsulate this waste. A treatability variance was submitted to EPA September 7, 1999, to treat this waste by macroencapsulation.

The preferred option is to treat the waste lead in compliance with the LDR treatment standard through the utilization of macroencapsulation.

Treatment Option and Support Data

The treatment option treats the constituents of concern, toxic characteristic metals in debris, by encapsulating the contaminated waste in a corrosion-resistant box. These wastes will be encapsulated with polymer within the container.

It has been determined that the most cost-effective management of the majority of these waste streams proposed for vendor treatment will be through the use of a offsite vendor. Two vendors were awarded a DOE Complex-wide treatment contract in FY98 to treat these types of wastes. Although one or both of these vendors are expected to treat the majority of this waste, it is expected that a very small portion of the waste may not meet the offsite vendor's radiological acceptance criteria. The waste that does not meet the offsite vendor's radiological acceptance criteria will then be treated onsite. A discussion pertaining to onsite treatment of portions of these waste streams is provided in Section 3.1.1.7.B.

This option is preferred because:

- Few or no secondary wastes are generated.
- Macroencapsulation, permitted by the debris rule, immobilizes the constituent of concern.
- Process is very flexible and can handle a wide variety of wasteforms.
- For waste streams SR-W062A and SR-W069A, the process will comply with regulations without requiring a variance.
- Treatment is cost-effective.

SRS proposes to send these wastes offsite for treatment. The offsite vendor will perform this treatment in compliance with 40 CFR 264 and 265 of the RCRA regulations.

NOTE: It was determined that participation in the polymer encapsulation demonstration project at Envirocare of Utah, as reported in the 1996 STP Annual Update, will not occur for this waste stream.

Facility Status

For waste in permitted storage, capabilities must be provided at SRS to sort, segregate, confirm radiological characterization, and repackage the waste to meet offsite vendor's radiological waste acceptance criteria. These activities will be conducted inside a building currently covered under an interim status or existing RCRA Part B permit for storage. Since these activities do not constitute treatment, a RCRA treatment permit is not required.

Several offsite vendors have been contracted by DOE to treat these wastes at their facility. Both of these venders are available to treat these wastes.

Technology

Macroencapsulation is a mature technology in use by both the DOE Complex and the commercial world.

Regulatory Status

The offsite vendor will treat these wastes under their own approved RCRA Part B permit.

Preparation for Operation

Since the treatment will occur offsite, no additional preparation for treatment operations is required at SRS other than what is specified in "Facility Status."

Treatment Option Status and Uncertainties

Budget Status

The estimated rate to treat these wastes is approximately $6.08/kg of waste for volumes equal to or greater than 6000 kg.

Uncertainty Issues

Future wastes, similar to these waste streams, are anticipated to be generated as a result of Environmental Restoration, Transition, and D&D activities.

3.1.2.3 Offsite DOE and Commercial Facilities

Some existing treatment technologies at other DOE and commercial facilities have been proposed for specific SRS mixed waste streams. This section details the SRS waste streams and the existing treatment technologies at other DOE or commercial facilities.

3.1.2.3.1 Commercial Treatment

Roasting/retorting (RMERC) followed by amalgamation or stabilization technologies are currently available for treatment of elemental mercury. This section discusses those waste streams for which amalgamation or stabilization have been chosen as the preferred treatments.

3.1.2.3.1.A Offsite Vendor Roast/Retorting followed by Amalgamation

The preferred treatment option for the Amalgamation Waste Group is Amalgamation by an offsite DOE Complex-wide Broad Spectrum Contractor.

This waste group is composed of the following waste streams:

SR-W014, Tritium-Contaminated Mercury
SR-W068, Elemental (Liquid) Mercury-Sitewide
SR-W086, Characteristically Hazardous Non-Incinerable Solids

General Information

SR-W014, Tritium-Contaminated Mercury

This waste stream is elemental mercury used as a pumping fluid in diffusion pumps for the transfer of tritium gas. The mercury waste is generated from pump maintenance or pump failure due to mercury oxide fouling. The waste contains floating slag or an oxidized layer from the erosion/leaching of stainless steel pump housings and pipes. Most of the tritium contamination is in the floating mercury oxide layer.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Elemental mercury

Waste Code

- D009D (elemental mercury)
- Nonwastewater

LDR Treatment Standard

- D009 = specified technology = AMLGM

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on the fact waste is elemental mercury with a small oxide layer.

Radiological Characterization

- Total activity is 350 nCi/g with tritium present.
- Waste is contact handled.
- Mixed low-level waste

SR-W068, Elemental (Liquid) Mercury - Sitewide

This waste stream is elemental mercury generated at different SRS facilities, primarily at DWPF and HLW Tank Farms. At DWPF, elemental mercury is recovered during the vitrification of high-level waste. Elemental mercury is recovered during the evaporation of high-level waste in the HLW Tank Farms. Currently, H-Canyon and F-Canyon Dissolving Operations will re-use a portion of the mercury generated by DWPF and HLW Tank Farms. The re-use will continue until the dissolving operations cease. After beneficial re-use ends, any mercury generated will be managed as waste stream SR-W068.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Elemental mercury

Waste Code

- D009D (elemental mercury)
- Nonwastewater

LDR Treatment Standard

- D009D = specified technology = AMLGM

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is high based on the waste composition.

Radiological Characterization

- Radioactivity will vary depending on the generation source and location.
- Waste is contact handled.
- Mixed low-level waste

SR-W086, Characteristically Hazardous Non-Incinerable Solids

This waste stream is filters, swipes and other cleanup material that contains high mercury concentrations greater than 260 mg/Kg. The waste generated from mercury spill cleanup, broken thermometers and guages and filtering activities.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Heterogeneous organic debris

Waste Code

- D007 TCLP (chromium)
- D009C High mercury (inorganic)
- D009D Elemental mercury
- D008 TCLP (lead)

LDR Treatment Standard

- RMERC

Waste Characterization

- Sampling and analysis were used to characterize this waste stream
- Confidence is high

Radiological Characterization

- Average total activity is 50 nCi/g with depleted uranium
- Waste is contact handled
- Mixed low-level waste

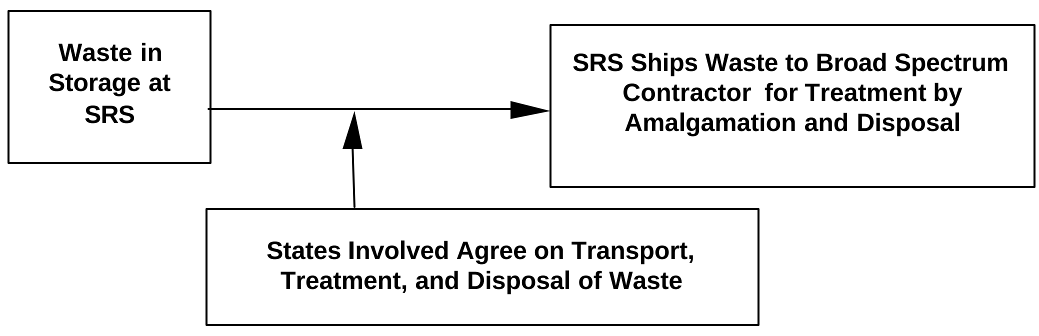
The following information is applicable to all waste streams in this waste group.

Technology and Capacity Needs

Treatment capacity for mercury amalgamation is available.

Treatment Option Information

A flowsheet illustrating the possible management of the Elemental Mercury waste streams by SRS is shown below:



The SRS technical analysis team determined through engineering assessment, that the identified preferred treatment option represented the most feasible treatment alternative for these waste streams at this time.

Option Support Justification-IDOA Performed

Utilization of the offsite DOE Complex-wide Broad Spectrum Contractor would be a cost-effective strategy for SRS as well as serving to treat this waste stream in a more timely manner.

Facility Status

A DOE Complex-wide contract was awarded in FY98. The vendor is operational.

Technology

Amalgamation of these waste streams containing elemental mercury is the specified technology to meet the LDR treatment standard.

Regulatory Status

Unknown to SRS at this time.

Preparation for Operation

Operational

Treatment Option Status and Uncertainties

Budget Status

Cost would be incurred in preparing these waste streams for shipment and transporting to the offsite contractor. Funding will need to be requested to support proper containerization and transportation.

Uncertainty Issues

This technology is the specified technology for treating mercury. However, the waste's level of tritium in relation to the contractor's waste acceptance criteria has not been fully analyzed. Also, transportation of these waste streams to the contractor for treatment raises uncertainties regarding Department of Transportation requirements for the shipment of radioactive liquids, as well as approval by affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

There is uncertainty about an offsite option selection until completion of negotiations, administrative procedures, and verification of appropriate treatment is finalized.

Applicability of additional evaluation under NEPA may create uncertainties related to budget and schedule for this treatment option.

3.1.2.3.1.B Stabilization Waste Group

Currently, there are no waste streams in this category. The single waste stream previously assigned to this category, SR-W049, Tank E-3-1 Clean Out Material, was relocated to Section 3.1.1.7.D when it was determined that this waste stream could be stabilized by an onsite vendor.

3.1.2.3.2 DOE Mobile Treatment Facilities

At the present time there are no waste streams in this category.

3.1.2.3.3 East Tennessee Technology Park (ETTP) Toxic Substances Control Act (TSCA) Incinerator

Polychlorinated Biphenyl (PCB) Mixed Waste Group

The preferred option for the Polychlorinated Biphenyl (PCB) Mixed Waste Group is shipment to Oak Ridge for incineration in the ETTP TSCA Incinerator at Oak Ridge, Tennessee.

General Information

Currently, the sole representative of this waste group is:

SR-W079, Polychlorinated Biphenyl (PCB) Mixed Waste

This waste stream has been reserved for all PCB-contaminated mixed waste for which treatment to destroy the PCBs is required under the Toxic Substances Control Act (TSCA). This waste stream includes waste from laboratory analyses, paint chips, debris from the demolition of excess site facilities, and PCB spill clean-up waste.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- PCB contaminated, organic liquid, miscellaneous solids

Waste Code

- D001B (Ignitable, high TOC nonwastewater)
- D002B (corrosive, nonwastewater)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- F001 and F002 (Spent halogenated solvents)
- Nonwastewater

LDR Treatment Standard

- D001 = specified technology = DEACT
- D002 = specified technology = DEACT
- D005 = concentration based standard = 21 mg/L TCLP
- D006 = concentration based standard = 0.11 mg/L TCLP
- D007 = concentration based standard = 0.60 mg/L TCLP
- D008 = concentration based standard = 0.75 mg/L TCLP
- D009 = concentration based standard = 0.025 mg/L TCLP
- F001 and F002 = concentration based standard = 6-30 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sampling and analysis are used to characterize this waste stream.
- Confidence level is high because sampling and analysis has been performed.

Radiological Characterization

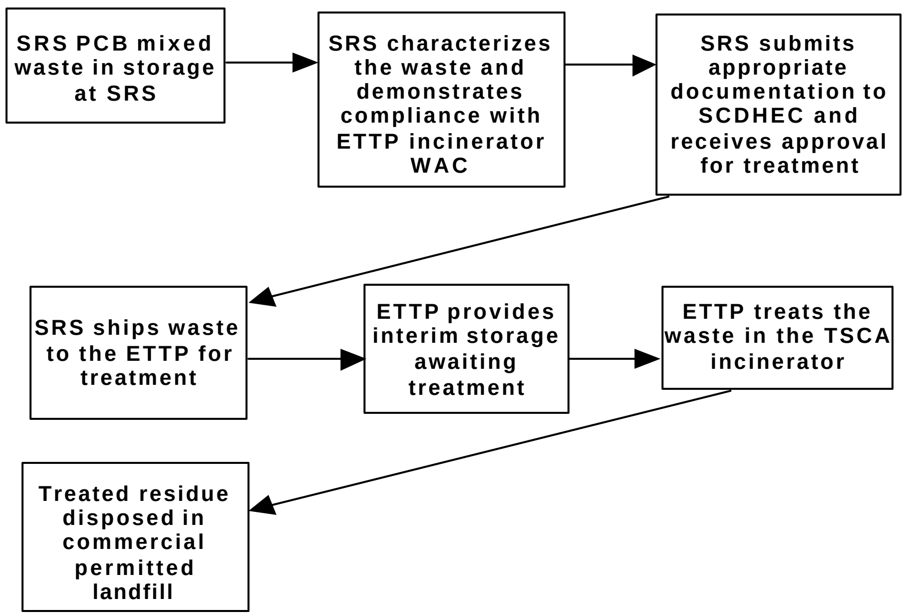
- Beta/gamma emitters are present (Cs^{137}, Sr^{90}, and others).
- Alpha emitters are present (U^{235}, U^{238}, Pu^{239}, Pu^{240}, and others).
- Contact handled
- Mixed low-level waste

Technology and Capacity

Because of the multi-faceted contamination of this waste stream, it is necessary to find treatment in a facility that can meet the treatment standards for the hazardous waste components as well as the polychlorinated biphenyls (PCB) and, also be able to satisfactorily manage the radioactive aspect of the waste. At the present time, the only operating facility capable of treating both the contaminant regulated under TSCA and the hazardous constituents while controlling the radiological contaminants is the ETTP TSCA incinerator in Oak Ridge, Tennessee.

The ETTP TSCA Incinerator is an operating facility with the capability of treating the SRS PCB Mixed Waste stream to meet applicable treatment standards. This facility has been operational for eight years and has been processing the onsite backlog of waste since it became operational. Efforts are underway to schedule the waste stored at SRS for treatment. Since the ETTP TSCA incinerator will not accept metals, SRS will investigate alternative decontamination/destruction technologies for these mixed PCB wastes.

The process flow sheet for the treatment of the PCB Mixed Waste at the ETTP TSCA Incinerator is listed below.



Treatment Option Information

Facility Status

The ETTP TSCA Incinerator is an operational facility. Guidance documentation is in place to provide offsite generators with information on characterization and waste acceptance requirements for the TSCA Incinerator. In order to meet all criteria for approval to send waste to the TSCA Incinerator, generators must meet the characterization and waste acceptance criteria requirements and may be subject to an audit to ensure that all requirements have been met. Discussion has taken place regarding the potential for treatment of this waste stream at the TSCA Incinerator. Agreement has been reached to accept the waste at the ETTP incinerator for treatment provided it can meet the characterization requirements and the facility waste acceptance criteria.

Technology

Incineration is a proven technology for treatment of both the PCB contaminants and the RCRA waste components identified for this waste stream.

Regulatory Status

All appropriate permits for the treatment of TSCA and RCRA wastes are in place for this facility. A TSCA permit for the destruction of PCBs was issued by the EPA, Region IV for this facility in March 1989. The ETTP TSCA incinerator submitted its RCRA Part B application for the treatment of hazardous waste in September 1987. The ETTP Approved Site Treatment Plan states that its facilities can accept offsite waste limited to a specified percentage of its treatment capacity. The approval process for acceptance includes approval by the state of Tennessee for the treatment of the waste by the TSCA Incinerator and agreement by the waste generator state that mixed waste can be shipped to the ETTP for treatment.

Because the PCB Mixed Waste is a new waste stream identified after the effective date of the STP Consent Order and will be treated at an offsite DOE facility, documentation of the treatment strategy has been submitted, and approval of the treatment strategy must be obtained from SCDHEC.

Preparation for Operation

Characterization data must be submitted and approved by the ETTP to show that the PCB Mixed Waste can meet the TSCA Incinerator waste acceptance criteria before it can be agreed to send the waste from SRS for treatment. In addition, scheduling must be completed on shipment dates to avoid storage backlogs at the ETTP.

Treatment Option Status and Uncertainties

Budget Status

Costs will be incurred in preparing the waste to meet the TSCA Incinerator waste acceptance criteria and for shipment. Transportation costs will be encountered in shipping the waste to the ETTP.

Uncertainty Issues

Issues involving approval by SCDHEC for shipping this waste to the ETTP, mixed waste equity issues involving the State of Tennessee, or issues affecting the fate of treatment residues are unknown at this time and could be obstacles to the treatment of this waste stream.

Before treatment can occur, the waste acceptance criteria for the incinerator must be met.

3.1.3 Preferred Treatment to be Determined

The waste stream SR-W083, Mercury- and Chromium-Contaminated Residues, previously included in this section, has been determined to be non-hazardous. Currently, there are no additional waste streams with preferred treatment pending.

3.2 Mixed Low-Level Waste Streams Requiring Technology Development

Due to the complexity of some waste streams, technologies have not been developed that can adequately treat the waste. Therefore treatment strategies for some waste streams have not been selected. This section addresses those mixed low-level waste streams that require technology development for the treatment of the waste stream.

3.2.1 Development of Mobile Unit Technology

Currently, there are no waste streams in this category.

3.2.2 Development of Characterization Technology

The waste stream, SR-W056, Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes, previously included in this section has been determined to be nonhazardous. Currently, there are no additional waste streams requiring development of chemical characterization technology.

3.3 Mixed Low-Level Waste Streams for Which Further Characterization is Required

This section discusses the schedules for those specific waste streams that require further chemical or radiological characterization prior to the selection of a preferred treatment option. The categories in this section are divided into waste streams to be further characterized and hazardous wastes awaiting radiological screening.

3.3.1 Waste Streams to be Further Characterized

Currently, there are no waste streams in this category. The waste streams previously assigned to this category, SR-W025, Solvent/TRU Job Control Waste <100 nCi/g and SR-W033, Thirds/TRU Job Control Waste <100 nCi/g, have been relocated to Section 4.2.2 of Chapter 4 of this Volume.

3.3.2 Hazardous Wastes Awaiting Radiological Screening

The preferred option for the waste streams in this waste group is the development of sampling protocols to verify that SRS has not introduced radiological contamination or analytical techniques to properly characterize the radiological constituents in the waste. Afterward, waste can be appropriately classified as mixed or hazardous only, and the proper management can be identified. Waste characterized as mixed will undergo technical analysis for treatment option identification or be placed into an existing waste treatment category.

General Information

At the present time, the sole representative for this waste group is:

SR-W078, LDR Hazardous Waste Awaiting Radiological Screening

The waste stream is composed of dark liquids, thick organic liquids, and heterogeneous solids generated site-wide in areas where radiological contamination is possible but uncertain. The physical makeup of the remainder of this waste stream has prevented adequate radiological characterization to date because the waste is either heterogeneous, requiring development of special, recognized sampling protocols to satisfactorily sample the waste for characterization; or, is opaque, requiring specialized analytical methods to quantify and qualify radiological waste constituents.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream composition

- Heterogeneous solids, dark liquids, and thick organic liquids

Waste Codes

- D001A (ignitable high TOC)
- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D040 (trichloroethylene)
- F001 (spent halogenated degreasing solvents)
- F002 (spent halogenated solvents)
- F003 (spent nonhalogenated solvents)

- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D012 (Endrin)
- D013 (Lindane)
- D014 (Methoxychlor)
- D015 (Toxaphene)
- D016 (2,4-D)
- D017 (2, 4, 5-TP [Silvex])
- D018 (Benzene)
- D020 (Chlordane)
- D035 (Methylethyl ketone)
- F005 (spent nonhalogenated solvents)
- F027 (Dioxin-containing waste)
- P051 (Endrin)
- P123 (Toxaphene)
- U045 (Methyl chloride)
- U061 (DDT)
- U108 (1,4-Dioxane)
- U129 (Lindane)
- U210 (Tetrachloroethylene)
- U226 (1,1,1 trichloroethane)
- U228 (Trichloroethylene)
- U247 (Methoxychlor)
- Nonwastewater

LDR Treatment Standards

- D001 = specified technology = RORGS or CMBST
- D004 = concentration based standard = 5.0 mg/l TCLP
- D005 = concentration based standard = 21 mg/l TCLP
- D006 = concentration based standard = 0.11 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D012 = concentration based standard = 0.13 mg/kg
- D013 = concentration based standard = 0.066 mg/kg
- D014 = concentration based standard = 0.18 mg/kg
- D015 = concentration based standard = 2.6 mg/kg
- D016 = concentration based standard = 10 mg/kg
- D017 = concentration based standard = 7.9 mg/kg
- D018 = concentration based standard = 10 mg/kg
- D020 = concentration based standard = 0.26 mg/kg
- D035 = concentration based standard = 36 mg/kg
- D040 = concentration based standard = 6.0 mg/kg
- F001 & F002 = concentration based standard = 6.0-30 mg/kg
- F003 = concentration based standard = 0.75 mg/l, TCLP-160 mg/kg
- F005 = concentration based standard = 4.8 mg/l TCLP-170 mg/kg, except 2-Ethoxyethanol, 2-Nitropropane = CMBST
- F027 = concentration based standard = 10 - 28 mg/kg (depends on specific chemical)
- P051 = concentration based standard = 0.13 mg/kg
- P123 = concentration based standard = 2.6 mg/kg
- U045 = concentration based standard = 30 mg/kg
- U061 = concentration based standard = 0.087 mg/kg
- U108 = specified technology = CMBST; or = concentration based standard = 170 mg/kg
- U129 = concentration based standard = 0.066 mg/kg
- U210 = concentration based standard = 6.0 mg/kg
- U226 = concentration based standard = 6.0 mg/kg
- U228 = concentration based standard = 6.0 mg/kg
- U247 = concentration based standard = 0.18 mg/kg

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge and sampling and analysis were used to characterize the waste stream.

- Confidence level is high because there is extensive process knowledge and because sampling and analysis has been performed on portions of the waste stream.

Radiological Characterization

- Unknown at this time. Awaiting characterization. Level of radiological contamination very low, if present.

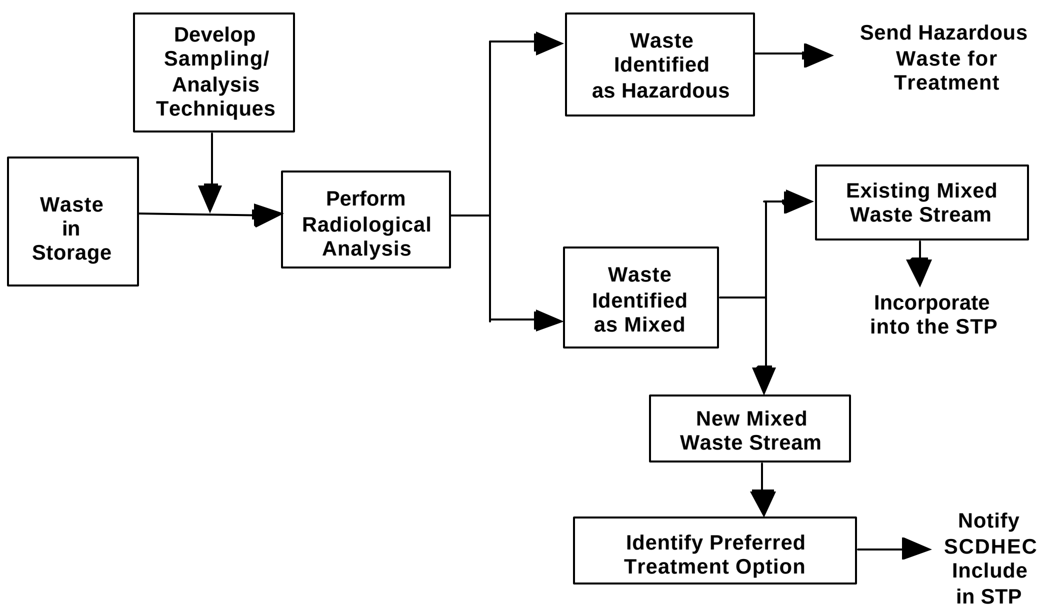
The following applies to both waste streams in this waste group.

Characterization Plan

Approximately 50% of the total volume of the Hazardous Waste Awaiting Radiological Screening has been characterized and identified as hazardous waste to be shipped offsite for treatment or incorporated into the STP as mixed waste. For the remainder of the waste stream, SRS is in the process of identifying radiological screening processes and methods to determine the presence of SRS introduced radiological contamination. These processes will include methods to address interference caused by highly colored sample material and protocols for sampling heterogeneous waste stream components. The radionuclide characterization of the remaining SR-W078 waste is scheduled to be completed by 4QFY01. During the radiological screening process, any mixed waste that has been identified within waste stream SR-W078, for which a treatment path already exists, will be incorporated into the STP in accordance with provisions of Volume I of the STP. If a new mixed waste stream is identified during characterization that cannot be placed into an existing mixed waste stream already described in the STP, SRS will submit a proposed treatment path description to SCDHEC for this new mixed waste stream.

Treatment Option Status and Uncertainties

A flowsheet illustrating the management plan for the Waste Awaiting Radiological Screening is shown below:



It is anticipated that most of the volume of the Hazardous Waste Awaiting Radiological Screening will be verified as not containing introduced radionuclides. Upon substantiation that radionuclide contamination is not present, wastes will fall out of the STP and be managed as hazardous only. Waste verified as mixed will be subject to a technical evaluation and be placed into an existing STP waste stream based on its physical/chemical matrix and capability for treatment. If the waste cannot be placed in an existing waste stream, it will be identified as a new mixed waste, assigned a new identification number, and undergo a technical options analysis to identify an appropriate treatment option. Notification will be provided to SCDHEC for determination of new mixed waste streams that result from characterization and treatment option analysis of any of the waste in this waste group that are determined to be rad contaminated and for which an existing treatment is not applicable.

Budget Status

EPA is currently sponsoring a committee for the development of additional sampling protocols for heterogeneous wastes. Representatives of SRS are serving on the EPA sample development committee. SRS will fund those portions of sampling and analytical process development not funded by EPA under operating budget funds.

Uncertainty Issues

Technical issues surrounding the ability to develop and initiate approved sampling and analytical programs to characterize the waste in this waste group remain uncertain.

Should funding requirements for the development of protocols or analytical techniques require expansion of budgets beyond the operational budget scope, the source of that funding is uncertain at this time.

3.4 Mixed Low-Level Waste Streams Requiring Radionuclide Decay Prior to LDR Treatment

Radioactive Decay Waste Group

The preferred treatment option for Radioactive Decay Waste Group is treatment by aging in a regulated storage facility followed by combustion in a facility equivalent to the CIF.

General Information

At the present time, the sole representative of this waste group is:

SR-W036, Tritiated Oil with Mercury

This waste stream consists of used oil from pumps and compressors operated in the tritium facilities. The oil is contaminated with tritium and mercury. Reliable characterization is hindered because of concerns about exposure of laboratory personnel to the high levels of radiation in the oil. Moreover, the radiation has the potential to cause scintillation counting interferences. The possibility of mercury contamination has been established, but the concentration has not been quantified.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Other inorganic particulates

Waste Code

- D009E (hydraulic oil contaminated with Hg and radioactive materials)
- Nonwastewater

LDR Treatment Standard

- D009 = Specified Technology = IMERC

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is low. High tritium levels prevent analysis.

Radiological Characterization

- Tritium contamination variable (background to ~ 185 Ci/l).
- Waste is contact handled.
- Mixed low-level waste

Technology and Capacity Needs

The original treatment option described for this waste stream in the approved STP was treatment in the DOE Mobile Packed Bed Reactor. However, technology development has not occurred to enable the DOE Mobile Packed Bed Reactor to adequately treat the tritiated oil with mercury waste. As presently designed, the Packed Bed Reactor offgas treatment system consists of a water stripper followed by a Zeolite© filter. A portion of the tritium and mercury vapor released from the reactor would most likely be captured in the scrubber water. However, a certain portion of tritium and mercury vapor would escape into the atmosphere. It is uncertain that the design of the packed bed reactor will meet NESHAP standards for the release of mercury and tritium into the environment. An additional issue is the problem of proper management of the tritium/mercury-contaminated scrubber water. This waste would poses the same ALARA concern of worker contact as the contaminated oil presently posses. The level of mercury contamination in the scrubber water could make this waste hazardous. There is presently no technology available that can separate tritium contamination in water. Therefore the risk of exposure to high levels of radiation would continue to exist in characterizing the mercury-contaminated scrubber water or treating the water to stabilize the mercury that may be released from the oil into the scrubber water. The introduction of the tritiated oil with mercury into the packed bed reactor would not treat the waste but would merely change its form.

No other technology capable of separating the tritium contamination from the oil or capturing tritium released from treating the oil exists at this time. Since the waste stream has a specified technology, IMERC, other treatment methods cannot be used without approval of a treatability variance. Therefore, the only viable option to manage this waste in a manner that is protective of human health and the environment is to continue to store the waste until the tritium has decayed to a level that allows safe management. The half-life of tritium is 12 years. Based on the waste acceptance criteria for the CIF, it would be desirable to maintain tritiated oil in containers in storage for 65 years to allow for reduction of tritium content so the waste could be fed to CIF at a reasonable rate. Of course, by the time the waste has sufficiently aged to facilitate combustion, the operational life of CIF will have passed. However, since there will continue to be waste generation at SRS due to continued operation, particularly from environmental restoration and decontamination and decommissioning activities, treatment capacity of a similar nature to CIF that is capable of treating the tritiated oil will undoubtedly exist. Technologies for removing the tritium from the oil are likely to have been developed as well. SRS will continue to review developing technology as well as continue with its own research and development programs involved in tritium capture and separation. Should technology become available with the capability to safely handle tritium separation, SRS will study its application to the Tritiated Oil with Mercury waste stream.

Treatment Option Information

The Tritiated Oil with Mercury is stored in galvanized and stainless steel drums, overpacks, and boxes in the Mixed Waste Storage Building, 643-29E, and in satellite locations in H Area. The waste is subject to regular inspections to note the condition of the containers and the presence of leaks. It will be necessary to repackage or overpack containers as time passes during the aging process to protect against leaks as containers reach the end of their service life.

Facility Status

Satellite accumulation areas and storage locations offer appropriate protection from the elements to allow the longest possible container life. Regular inspections are required by regulation to ensure that action will be taken to properly manage waste in deteriorating containers and promptly detect and clean up leaks or spills.

Regulatory Status

Storage sites for this waste stream are appropriately regulated under RCRA.

Treatment Option Status and Certainties

Budget Status

The cost for this waste stream will be incurred in the continued storage during the treatment phase of aging for tritium decay followed by final treatment by combustion, or equivalent treatment.

Treatment costs are uncertain and will vary depending on the characterization, preparation, transportation, and handling requirements.

The cost for waste presently in storage is budgeted through operating funds at the storage facility.

Uncertainties

Since the aging process will last beyond the operational life of CIF, the presence of treatment at SRS for this waste is uncertain. The Specified Technology requirement of incineration for this waste stream limits the treatment options that may be available. It may be necessary to treat this waste offsite once the aging process is complete. It is also possible that treatment standards will change during the aging process to allow treatment by another technology.

Appendix

This appendix contains descriptive information on waste streams which do not appear in the Compliance Plan Volume preferred option discussion because they meet the Land Disposal Restrictions (LDR) Treatment Standard, meet the LDR standard when they are generated, or are recycled (includes scrap metal).

SR-W007, SRL (SRTC) Low Activity Waste

Since 1952, slightly acidic, dilute sodium nitrate waste typically originating in laboratories located in Building 773-A of the Savannah River Technology Center (SRTC) has been discharged to the SRL (SRTC) Low-Activity Mixed Waste Storage Tanks (MWST). The SRL (SRTC) Low Activity waste may be hazardous depending primarily on its pH and mercury content. Lead, chromium, and benzene concentrations in the waste stream may also potentially exceed regulatory levels. This waste stream is generated by laboratory research, development, and analytical programs. While the waste stream is low-level, it is also subdivided into two categories; (1) low-activity waste - which drains to the SRTC MWST from laboratory sink drain located in RCAs and has total activity of less than 1,000 d/m/ml and, (2) high-activity waste - which typically drains to the SRTC MWST from cupsinks in regulated hoods or gloveboxes and has total activity of greater than 1,000 d/m/ml.

For this report the Low Activity and the High Activity wastes are considered to be two separate wastestreams.

The SRL (SRTC) Low Activity waste is stored in four (4) 5900-gallon stainless steel tanks in Building 776-2A.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous Liquid

Waste Code

- D002 (corrosive, wastewater)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D018 (benzene)

LDR Treatment Standard

- D002 = Render non-hazardous (and ultimately manage in a CWA facility)
- D007 = Render non-hazardous (and ultimately manage in a CWA facility)
- D008A = Render non-hazardous (and ultimately manage in a CWA facility)
- D009 = Render non-hazardous (and ultimately manage in a CWA facility)
- D018 = Render non-hazardous (and ultimately manage in a CWA facility)

Waste Characterization

- Sample results

Radiological Characterization

- Alpha and beta/gamma emitters present. Tritium present.

SR-W008, SRL (SRTC) High Activity Waste

Since 1952, slightly acidic, dilute sodium nitrate waste typically originating in laboratories located in Building 773-A of the Savannah River Technology Center (SRTC) has been discharged to the SRL (SRTC) Low-Activity Mixed Waste Storage Tanks (MWST). The SRL (SRTC) Low Activity waste may be hazardous depending primarily on its pH and mercury content. Lead, chromium, and benzene concentrations in the waste stream may also potentially exceed regulatory levels. This waste stream is generated by laboratory research, development, and analytical programs. While the waste stream is low-level, it is also subdivided into two categories; (1) low-activity waste - which drains to the SRTC MWST from laboratory sink drain located in RCAs and has total activity of less than 1,000 d/m/ml and, (2) high-activity waste - which typically drains to the SRTC MWST from cupsinks in regulated hoods or gloveboxes and has total activity of greater than 1,000 d/m/ml.

For this report the Low Activity and the High Activity wastes are considered to be two separate wastestreams.

The SRL (SRTC) High Activity waste is stored in two (2) 5900-gallon and four (4) 3670-gallon stainless steel tanks in Building 776-2A.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous liquid

Waste Code

- D002 (corrosive, wastewater)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D018 (benzene)

LDR Treatment Standard

- D002 = Render non-hazardous (and ultimately manage in a CWA facility)
- D007 = Render non-hazardous (and ultimately manage in a CWA facility)
- D008A = Render non-hazardous (and ultimately manage in a CWA facility)
- D009 = Render non-hazardous (and ultimately manage in a CWA facility)
- D018 = Render non-hazardous (and ultimately manage in a CWA facility)

Waste Characterization

- Sample Results

Radiological Characterization

- Alpha and beta/gamma emitters present. Tritium present.

SR-W011, Cadmium-Coated HEPA Filters

This waste stream consists of HEPA filter frames used to filter ventilation air from the reactors. This material is exempt from RCRA under the scrap metal exclusion (Part 261.6(a)(3)0. The scrap metal has been recycled by a vendor. The filter frames are hazardous due to cadmium plating on the metal frames. Replacement units are stainless steel framed filters.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Cadmium-containing metal debris

Waste Code

- D006A (TCLP Cd) nonwastewater

LDR Treatment Standard

- N/A – Scrap Metal Exclusion

Waste Characterization

- Sample Results

Radiological Characterization

- Tritium is present

SR-W015, Mercury/Tritium Contaminated Equipment

Retired process equipment (mostly pumps) contaminated with tritium, sometimes mercury (HWI #002), sometimes lead (HWI #033), and sometimes silver (HWI #0057).

Retired equipment has both adsorbed and matrix-diffused tritium contamination and wetted-surface mercury residues from direct contact with process gases. Lead is present in some of the equipment (fuel cells, solder and lead collars).

Volume

- Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Predominantly metal debris

Waste Code

- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)

LDR Treatment Standard

- D008A = concentration based standard = 0.75 mg/l TCLP
- D009A = concentration based standard = 0.025 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP

Waste Characterization

- Process Knowledge

Radiological Characterization

- U^{238} and Tritium present

SR-W023, Cadmium Safety/Control Rods

The safety/control rods are steel encapsulated, cadmium containing rods used to control neutron flux in the reactors. The rods are approximately 22 feet long, one inch in diameter.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Cadmium-containing metal debris

Waste Code

- D006A (TCLP Cd)

LDR Treatment Standard

- D006A = concentration based standard = 0.11 mg/l TCLP

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sample Results

Radiological Characterization

- Beta/gamma emitters present

SR-W024, Mercury/Tritium Gold Traps

Elemental mercury has been amalgamated on gold foil. A typical trap consists of a stainless steel cylindrical housing that is 38 inches high and 2 inches in diameter that contains gold foil on 16 evenly spaced trays. Each trap contains ~125 g of elemental gold. Contamination is variable, depending on use and changeout frequency. Retired traps typically show surface amalgamation on ~1/4 of the gold, and contain 0.6 g of bound mercury. The estimated tritium contamination is 200 Ci per trap and is deemed conservative.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Metal debris

Waste Code

- D009A (TCLP Hg)

LDR Treatment Standard

- D009A = concentration based standard = 0.025 mg/l TCLP

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge

Radiological Characterization

- Tritium is present

SR-W032B, Mercury-Contaminated Heavy Water Residues

Heavy Water Operations laboratory in D area generated waste stream SR-W032A, "Mercury-Contaminated Heavy Water" during analytical testing using mercuric chloride. The flush water from this analysis was collected and managed as hazardous waste. That waste stream is no longer generated due to a change in analysis procedures. The mercury content is now below toxic limits. SR-W032B is the residues from treatment of SR-W032A.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Nonwastewater

Waste Code

- D009A (TCLP Hg)

LDR Treatment Standard

- D009A = concentration based standard = 0.025 mg/l TCLP

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sample results

Radiological Characterization

- Tritium is present

SR-W040, Listed Stabilized Sludge/Listed LDR-Compliant Debris

This waste is a stabilized sludge generated from the treatment of nickel plating line waste water and is stored in the M-Area pad. Also includes equipment, associated with the vitrification treatment process, which meet LDR. This includes an approximately 90,000 lb (gross weight) melter (14.3 m3) full of treated F006 waste and small amounts of debris/spill material which meets the LDR standards. The stream will also include debris items, meeting LDR, that were generated by CIF operations.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Stabilized sludge and miscellaneous debris

Waste Code

- F001–F003, F005 (halogenated and non-halogenated spent solvents)
- F006 (wastewater treatment sludges from electroplating operations)
- F028 (residues from incineration of F020, F021, F026, and F027 wastes)
- U002 (Acetone)
- U003 (Acetonitrile)
- U019 (Benzene)
- U037 (Chlorobenzene)
- U080 (Methylene chloride)
- U123 (Formic acid)
- U127 (Hexachlorobenzene)
- U131 (Hexachloroethane)
- U159 (Methyl ethyl ketone)
- U165 (Napthalene)
- U188 (Phenol)
- U210 (Tetrachloroethylene)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (1,1,1-Trichloroethane)
- U228 (Trichloroethylene)
- U239 (Xylenes)

LDR Treatment Standard

- F001 and F002 = concentration based standard = 6.0 – 30 mg/kg
- F003 = concentration based standard = 0.75 mg/l, TCLP – 160 mg/kg
- F005 = concentration based standard = 4.8 mg/l, TCLP – 170 mg/kg except 2-Ethoxyethanol and 2-Nitropropane = CMBST
- F006 = concentration based standard = 0.11 – 11 mg/l TCLP
- F028 = = concentration based standard = = 0.001 to 7.4 mg/kg
- U002 = concentration based standard = 160 mg/kg
- U003 = concentration based standard = 38 mg/kg or CMBST
- U019 = concentration based standard = 10 mg/kg
- U037 = concentration based standard = 6.0 mg/kg
- U080 = concentration based standard = 30 mg/kg
- U123 = specified technology = CMBST
- U127 = concentration based standard = 10 mg/kg
- U131 = concentration based standard = 30 mg/kg
- U165 = concentration based standard = 5.6 mg/kg
- U188 = concentration based standard = 6.2 mg/kg
- U210 = concentration based standard = 6.0 mg/kg
- U211 = concentration based standard = 6.0 mg/kg
- U220 = concentration based standard = 10.0 mg/kg
- U226 = concentration based standard = 6.0 mg/kg
- U228 = concentration based standard = 6.0 mg/kg

- U239 = concentration based standard = 30 mg/kg

Waste Characterization

- Sample results

Radiological Characterization

- Alpha and beta/gamma emitters present

SR-W041, Aqueous Mercury and Lead

Six small (e.g., 2 liters, 4 liters, etc.) containers of aqueous waste with lead and mercury overpacked in a poly-lined 55gal. drum. An additional 55 gallon drum in this waste stream is rinsate from the rinsing of Tank E-3-1 which contains low levels of mercury.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous Liquid

Waste Code

- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D009C (high Hg contains inorganics) wastewater

LDR Treatment Standard

- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.20 mg/l TCLP; or RMERC

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sample Results

Radiological Characterization

- Alpha emitters, beta/gamma emitters, and tritium are present.

SR-W050, Mixed Waste to support High-Level Waste (HLW) Processing Demonstrations

The waste will be generated by laboratory research, development, and analytical programs at 773-A to support the operations of the Defense Waste Processing Facility (DWPF), In-Tank Precipitation (ITP) and studies conducted by SRTC's Interim Waste Technology (IWT) group.

This waste stream will be generated by shielded cell operations during projects for the glass technology group and will come from demonstrations of the DWPF and IWT processes on actual HLW samples.

The liquid waste will most likely contain mercury and chromium. The chromium will most likely be at low levels, below TCLP.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous slurry

Waste Code

- D007 (Chromium)
- D009A (TCLP Hg)
- D018 (Benzene)

LDR Treatment Standard

- D007 = concentration based standard = 0.60 mg/l TCLP
- D009 = concentration based standard = 0.20 mg/l TCLP; or RMERC
- D018 = concentration based standard = 10 mg/kg

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sample results and process knowledge

Radiological Characterization

- Beta/gamma emitters are present.

SR-W058, Mixed Sludge Waste with Mercury from DWPF Treatability Studies

This waste stream consisted of small amounts of high-level waste supernate, sludge, and salt samples from the tank farm and mercury contamination generated during DWPF treatability studies. The waste mercury sludge dried and caked onto eight centrifuge tubes and a glass bottle.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris - glass

Waste Code

- D009A (TCLP Hg) nonwastewater

LDR Treatment Standard

- D009A = concentration based standard = 0.20 mg/l TCLP; or RMERC

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Sample results

Radiological Characterization

- Beta/gamma emitters present

SR-W063, Macroencapsulated Toxic Characteristic (TC) Waste

This waste consists of a wide variety of miscellaneous macroencapsulated lead items contaminated with radioactive materials. The majority of the lead is encapsulated in Stainless Steel. The lead items include lead counterweighted jumpers (lead welded in pipe for balancing jumpers), cesium removal columns (CRC) (lead sandwiched between stainless steel for shielding purposes), draw-off valves, flush valves, and discarded equipment (same description as CRC configuration). These wastes generally are used as shields from radioactivity (e.g., around pipes in tank farms), as counterweights, or serve as parts of other devices. The majority of the radioactive contamination is surface contamination. The waste is generated in reactor areas, and fuel and target and separation areas, and laboratories. Future generation rates are dependent upon Site decommissioning activities.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Macroencapsulated inorganic debris

Waste Code

- D004 (Arsenic)
- D005 (Barium)
- D006A (TCLP Cd)
- D007 (Chromium)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (Selenium)
- D011 (Silver)

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l, TCLP
- D005 = concentration based standard = 21 mg/l, TCLP
- D006A = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008A = concentration based standard = 0.75 mg/l, TCLP
- D009A = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge

Radiological Characterization

- Alpha and beta/gamma emitters are present.

SR-W072,Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations

This waste consists of a wide variety of equipment/metal debris and other items contaminated with radioactive materials and characteristically hazardous waste. The waste is derived from contacting High Level Waste. The majority of the contamination is surface contamination. Future generation rates are dependent upon construction operations, maintenance activities, and site decommissioning activities.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Inorganic debris

Waste Code

- D005 (Barium)
- D006A (TCLP Cd)
- D007 (Chromium)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (Selenium)
- D011 (Silver)
- D018 (Benzene)

LDR Treatment Standard

- D005 = concentration based standard = 21 mg/l, TCLP
- D006A = concentration based standard = 0.11 mg/l, TCLP
- D007 = concentration based standard = 0.60 mg/l, TCLP
- D008A = concentration based standard = 0.75 mg/l, TCLP
- D009A = concentration based standard = 0.025 mg/l, TCLP
- D010 = concentration based standard = 5.7 mg/l, TCLP
- D011 = concentration based standard = 0.14 mg/l, TCLP
- D018 = concentration based standard = 10 mg/kg

D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge

Radiological Characterization

- Alpha and beta/gamma emitters are present

SR-W077, Aqueous Characteristic Waste Water

This waste stream consists of certain aqueous sample residues and unused samples, particularly from groundwater monitoring wells, that have been returned from on-site or off-site laboratories. Laboratory waste in this stream also may include aqueous laboratory standards from onsite laboratories that are characteristically hazardous. Also included is purge water from wells at the Mixed Waste Management Facility. A variety of other wastewaters from various facilities may contribute to this stream from time to time, e.g., wastewater collected from CIF sumps and found through analysis to be characteristically hazardous.

Volume

- Volume Data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous wastewater

Waste Code

- D002A (Corrosive wastewater)
- D005 (Barium)
- D006A (TCLP Cd)
- D007 (Chromium)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (Selenium)
- D011 (Silver)
- D018 (Benzene)
- D038 (Pyridine)
- D039 (Tetrachloroethylene)
- D040 (Trichloroethylene)

LDR Treatment Standard

- D002A = DEACT
- D005 = concentration based standard = 1.2 mg/l
- D006A = concentration based standard = 0.69 mg/l
- D007 = concentration based standard = 2.77 mg/l
- D008 = concentration based standard = 0.69 mg/l
- D009A = concentration based standard = 0.15 mg/l
- D010 = concentration based standard = 0.82 mg/l
- D011 = concentration based standard = 0.43 mg/l
- D018 = concentration based standard = 0.14 mg/l
- D038 = concentration based standard = 0.14 mg/l
- D039 = concentration based standard = 0.056 mg/l
- D040 = concentration based standard = 0.054 mg/l

D002A and D005-D011 wastewaters must also meet Universal Treatment Standards (UTS) for underlying hazardous constituents (UHCs) unless they are rendered non-hazardous and subsequently managed in a CWA treatment facility. D038, D039, and D040 wastewaters must also meet UTS for UHCs unless they are rendered non-hazardous and subsequently injected in a Class I SDWA well.

Waste Characterization

- Process knowledge and sample results

Radiological Characterization

- Alpha and beta/gamma emitters are present

Chapter 4. Mixed Transuranic Waste (MTRU)

The current DOE strategy for management of MTRU waste is to maintain the MTRU wastes in safe interim storage; to characterize, certify, process if necessary, and package the wastes to meet the Waste Acceptance Criteria (WAC) of the Waste Isolation Pilot Plant (WIPP); and to permanently dispose of applicable MTRU waste in WIPP. The Defense Authorization Bill for federal FY 97, which contained amendments to the 1992 WIPP Land Withdrawal Act, was signed by the President on September 22, 1996, and the Secretary of Energy declared WIPP open and ready to receive waste in May 1998.

The amendments also exempt DOE from the requirement to obtain a RCRA no-migration determination from EPA. EPA agrees that the no-migration determination is redundant to the more stringent radioactive waste disposal standard, and that the exemption will not jeopardize the environment. WIPP has obtained a RCRA Part B Permit from the State of New Mexico to receive mixed TRU waste for disposal.

Site-specific information is included in the following section to outline activities being performed at the Savannah River Site to maintain safe compliant storage, waste characterization activities, and other activities planned to support the ultimate goal of shipment to and disposal at WIPP.

This chapter reviews the project activity schedules that have been planned for the treatment of MTRU waste in accordance with Section 2.2 of this volume. Section 4.1 discusses the site's MTRU waste management approach and section 4.2 details the MTRU waste streams that are proposed to be shipped to WIPP for treatment. Refer to Table 1.1, Chapter 1, of Volume II of the STP for the user's guide. The user's guide identifies each mixed waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II of the STP.

4.1 Site MTRU Waste Management Approach

TRU waste is defined in DOE Order 435.1 as waste contaminated with alpha-emitting transuranic radionuclides (radionuclides with atomic numbers greater than 92) with half-lives greater than twenty (20) years and radionuclide concentrations greater than 100 nanocuries per gram (nCi/g). TRU waste at SRS that includes hazardous constituents as identified in 40 CFR 261 and SCHWMR R61-79.261 is managed in accordance with DOE orders and SCHWMR, and is referred to as mixed TRU waste (MTRU).

MTRU waste streams are, and have been, generated primarily by Plutonium Separations Facilities and the Analytical Laboratories. Other past generators of significantly smaller volumes include Naval Fuels Facility, the Reactor Facility, the Fuel Fabrication Facility, the High-Level Waste Tank Farms, and the Solid Waste Management Facility. In the 1970's, SRS received a large volume of MTRU waste from offsite generators including the Los Alamos National Laboratory, Knolls Atomic Power Laboratory, and the DOE Mound Site. MTRU waste shipments are expected from the DOE Mound Site in the future (see Vol. II, Sec. 4.2.2).

MTRU waste generated at SRS is primarily job control waste, which includes combinations of the following: plastic, paper, rubber, glassware, metal items, lead-lined gloves, filters, used equipment, and other contaminated materials from routine operations.

Due to the variety of container types, MTRU waste is generally described by its container: drums, polyethylene boxes, concrete casks, large steel black boxes, and other odd-sized containers. The type of container also dictates the storage configuration, for example, drums are either stored in culverts, which are stored on uncovered pads exposed to the weather or stored directly on covered pads.

Currently, four MTRU waste streams and two mixed low-level waste (MLLW) streams are managed as MTRU waste. The actual amount of waste will depend on assay and treatment technologies available during processing and the final WIPP WAC review.

The waste streams identified in the Mixed Waste Inventory Report (MWIR) are:

Waste Stream No.	Description	Current Inventory Volume (Cubic Meters)
SR-W006	CH Mixed TRU/Liquids	<0.1
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	3560
SR-W026	CH Mixed TRU/Thirds	143
SR-W027	CH Mixed TRU/F-Listed Solvents	3355
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	9.0
SR-W053	Rocky Flats Ash*	<0.1

*Also known as CH Mixed TRU/Residues.

Waste streams SR-W025 and SR-W033 are categorized as ≤100 nCi/g but are managed as TRU waste. These two streams potentially fit into one or more waste classifications. These waste streams will be further characterized and the portion that is MTRU (>100 nCi/g) will be sent to WIPP. The remaining mixed low-level component will be used to blend high activity MTRU wastes down to meet the transportation and packaging limits for transportation to WIPP for disposal. Estimates indicate that the largest fraction of these two waste streams will fall into the mixed low-level waste category.

Options Analysis

SRS has developed a strategy for the storage, characterization, and treatment of MTRU waste to meet the WIPP WAC. To develop this strategy, the following factors were evaluated: technical/technology barriers, dependence on site baseline actions, system implementability, initial investment, potential schedule gains, permit/NEPA issues, stakeholder acceptance, life-cycle costs, inter-site/equity issues, and programmatic risk. SRS has developed an In-Depth Option Analysis (IDOA) for the less than or equal to 100 nCi/g mixed low-level waste streams. A new set of more appropriate criteria was developed for the MTRU IDOA model, and each option was evaluated from a life-cycle cost perspective using a validated cost model and a set of assumptions concerning the disposition of the waste stream *(ref. Solid Waste Division 2001 System Plan*). The IDOA model generated both a technical and a total weighted scores for each treatment option. The application of the IDOA model assures a certain level of consistency and completeness in performing the in-depth analysis of the potential treatment and disposal options associated with each waste treatability group.

SRS Solid Waste Management Strategy

The SRS solid waste management strategy supports and is in alignment with the National MTRU Program Initiatives. The MTRU waste program has historically focused on acceptance and maintenance of safe storage. However, in preparation for the shipping to WIPP, MTRU waste operations at SRS is characterizing containers for recertification and packaging for shipping to WIPP for final disposal. WIPP opened for acceptance of the DOE-Complex MTRU waste December 1999, and SRS is scheduled to begin shipments of its non-mixed TRU waste FY01.

Plan Assumptions

The MTRU waste plan is based on the following key assumptions:

- Funding is available to support the plan.
- Negotiations with WIPP, the Nuclear Regulatory Commission (NRC), and other environmental agencies to revise the restrictive transportation limits of the TRUPACT II are successful.
- WIPP does not close prior to 2035.
- A high-activity MTRU Waste Facility will be constructed and be operational from 2015 until 2035 to process higher activity MTRU Waste in preparation for shipment to WIPP.

- Assay techniques for Pu^{238} contaminated wastes and larger containers will be pursued and implemented at SRS using onsite and offsite technology to meet the requirement of the WIPP WAC and WIPP Quality Assurance Program.
- A low-activity MTRU waste facility, utilizing the Handling and Segregating System for 55-Gallon Drums (HANDSS-55) Technology and a compactor will be constructed and be operational from 2004-2015 to process the lower activity MTRU waste for shipment to WIPP.

Plan Activities

The SRS solid waste management strategy addresses the following activities and provides a path forward for resolution:

- Interim storage
- TRU Waste Certification
- TRU Waste Processing
- Outyear Schedule

Interim Storage

Delays in the certification of SRS by WIPP make it necessary to provide interim storage capability so SRS can continue safe storage and monitoring of MTRU waste. Recent activities completed in the MTRU waste area include the retrieval of containers stored in the 1970's and early 1980's on storage pads covered with dirt for protection from the environment. Drums stored on these pads have been retrieved and vents installed to allow the release of potential hydrogen gas build-up. Retrieved containers have been evaluated for integrity; some have been overpacked to ensure worker safety until the container can be repackaged for disposal in WIPP. Retrieval operations began January 1997 and were completed 3Q99.

MTRU Waste Certification/Characterization

Activities in the MTRU waste area involve extensive preparation for the certification of containers to meet the WIPP waste acceptance criteria. The WIPP certification program requires characterization of the waste matrix through radionuclide assay, radiography, and headspace gas sampling for all waste containers. In addition, a representative number of containers must be opened for visual examination to confirm the characterization information. SRS has designated a portion of TRU pad 6 for the visual examination (VE) facility.

SRS will begin utilizing a Mobile Vendor to augment current inspection/characterization capability and to increase the TRU Waste shipped from SRS to WIPP. The Mobile Vendor will mobilize to SRS 2QFY01 and is expected to begin characterization operations in 3QFY01. The Mobile Vendor is expected to process and ship waste from SRS to WIPP through FY02. The Mobile Vendor will provide this additional characterization and shipping capability through the use of four mobile systems. The first is a real time radiography trailer that will be used to x-ray TRU drums to determine drum contents and waste attributes. Following x-ray the drums will be processed through the non-destructive assay trailer. This system uses an integrated gamma and imaging passive/active neutron/gamma energy analysis (IPAN/GEA) mobile waste assay trailer. The IPAN/GEA will provide information to determine the isotopic composition of each TRU waste drum. After assay the drums will be placed into heated sealand storage containers for 72 hours prior to head space gas sampling. The third mobile system is the drum headspace gas sampling system. This system utilizes a gas chromatograph (GC) and mass spectrometer (MS) to analyze the constituents of the TRU drum headspace gases. The drums will then be moved to the final system which is the mobile loading unit. This system contains the adjustable center gravity lift fixture, shrink wrap machine and equipment necessary to configure and load TRU drums into TRUPACT-II containers for transport to WIPP for disposal. These systems will be set-up on existing TRU waste storage Pads #4 and #3. This process will be supported by existing SRS infrastructure to include the Visual Examination Facility on TRU Pad #6.

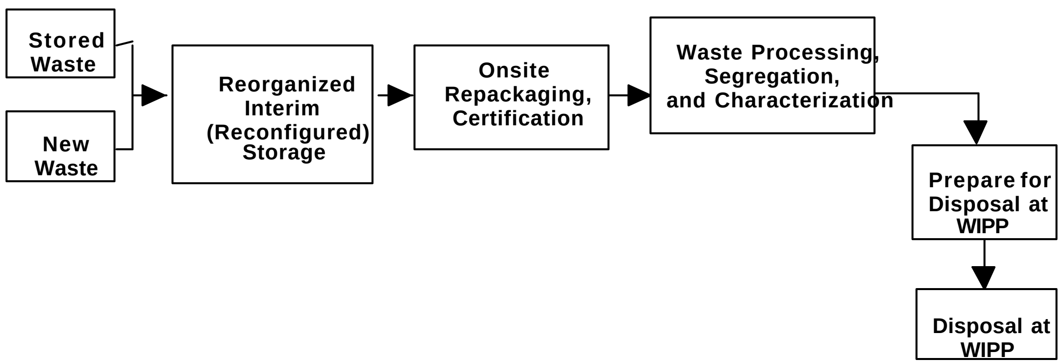
MTRU Waste Processing

Two waste treatment processes are planned. The first is a hazard category III facility that will sort and segregate TRU waste using the HANDSS-55 Technology, under development by EM-50. It will repackage waste, sample waste, and size-reduce some waste to meet transportation limits for shipment to WIPP for disposal.

The second waste treatment process is a hazard category II line item facility that will treat solids, liquids, sludges, and soil wastes contaminated with alpha-emitting transuranic radionuclides for disposal. This includes, at a minimum, repackaging, sorting, size reduction, and disposal at WIPP using the current NRC-licensed type B TRUPACTII shipping container. This process uses equipment that has been demonstrated on similar activities or the technology development is in progress to support the facility's equipment needs.

TRU Plan Flow Chart

A flow chart has been developed that outlines waste activities identified in the SRS solid waste management strategy. The following flow chart depicts the key activities for the planned MTRU waste activities:



In addition:

- SRS will construct and operate MTRU waste processing facilities to characterize and certify MTRU waste to meet the WIPP WAC, including transportation requirements.
- Studies will be done to identify treatment options for stabilizing the MTRU isotopes that may be required for waste shipments to WIPP.

4.2 MTRU Waste Streams Proposed for Shipment to WIPP

MTRU waste is divided into waste groupings based primarily on the containers that hold the waste. The amount of detailed information on the contents of each waste container is limited. The container type, generator, and radionuclide data provide information that allows the inventory of MTRU waste to be placed into waste groupings that support planning for future processing to meet the requirement of the WIPP WAC. This section discusses the waste streams that are proposed to be shipped to WIPP for disposal. Refer to Table 1.3, Chapter 1, Volume II for EPA Hazardous Waste Code Subcategories.

4.2.1 MTRU Waste Requiring Certification/Characterization for WIPP

This section describes MTRU waste streams, which require certification and characterization prior to acceptance for disposal at WIPP. The section is divided into two subsections for waste stream categories as follows:

4.2.1.1 Defense-Related TRU Job Control Waste Group
4.2.1.2 TRU Job Control Waste Group

4.2.1.1 Defense-Related TRU Job Control Waste Group

The preferred option for the TRU Job Control Waste Group is to assay, sort, size-reduce, and characterize the waste material in the TRU Waste Facility, followed by preparation for shipment and disposal at WIPP.

Waste streams within this waste group include the following:

SR-W026, CH Mixed TRU /Thirds
SR-W027, CH Mixed TRU /F-Listed Solvents

General Information

SR-W026, CH Mixed TRU /Thirds

This waste stream is a defense-related job control waste and is composed primarily of organic solids such as booties, lab coats, floor sweepings, rags, labware, and other job control waste generated primarily through separation activities. A small percentage (<5%) of this waste stream includes sludges, resins, filters, and miscellaneous waste. The sludges are caustic evaporated residues that have been neutralized and absorbed.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- D001C (Low TOC Ignitable)
- D003D (Water Reactive)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (Benzene)
- D019 (Carbon tetrachloride)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresols)
- P012 (Arsenic trioxide)
- P015 (Beryllium powder)
- Nonwastewater
- P048 (2, 4–Dinitrophenol)
- P113 (Thallic oxide)
- P120 (Vanadium pentoxide)
- U002 (Acetone)
- U032 (Calcium chromate)
- U052 (Creosols–mixed)
- U080 (Methylene chloride)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U144 (Lead acetate)
- U151C (Low Mercury)
- U154 (Methanol)
- U161 (Methyl isobutyl ketone)
- U209 (1, 1, 2, 2–Tetrachloroethane)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (1, 1, 1–Trichloroethane)
- U239 (Xylenes)

LDR Treatment Standard

- Manage at the WIPP.

The preferred option is to process the waste in the processing facilities utilizing HANDSS-55 to sort and segregate and other waste handling technologies to characterize, repackage, and certify the waste to meet type B TRUPACT II shipping requirements for disposal at WIPP.

Processing will include removing non-compliant items found from the waste. This option is preferred because it has the lowest cost and has the lowest risk for delays due to permitting, technical barriers, and system implementability. It uses equipment that has been demonstrated on similar activities or the technology development is in progress to support the facilities equipment needs.

Waste Characterization

- Sampling and analysis will be used to characterize the waste stream (NDE, NDA, and headspace sampling).
- Confidence level is medium based on the varying composition of the job waste and the exact contents of specific containers.

Radiological Characterization

- Total activity is >100 nCi/g.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{244}) are present.
- Waste is primarily contact handled with a small volume of remote handled (<200 mR/hr).

SR-W027, CH Mixed TRU /F-Listed Solvents

This waste stream is a defense-related job control waste composed primarily of solids such as booties, lab coats, floor sweepings, rags, labware, and other job control waste generated primarily from separation activities for plutonium production. This waste differs from SR-W026 because solvent rags are suspected to be present. A conservative interpretation of the mixture rule causes contents of containers to be characterized with listed solvent waste codes due to the presence of solvent rags.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Codes

- D001C (Low TOC Ignitable)
- D003D (Water Reactive)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (Benzene)
- D019 (Carbon tetrachloride)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresol)
- F001 (Spent halogenated degreasing solvents)
- P012 (Arsenic trioxide)
- P015 (Beryllium dust)
- P048 (2, 4–Dinitrophenol)
- P113 (Thallic oxide)
- P120 (Vanadium pentoxide)
- U002 (Acetone)
- U032 (Calcium chromate)
- U052 (Cresols–mixed)
- U080 (Methylene chloride)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U144 (Lead acetate)
- U151C (Low Mercury)
- U154 (Methanol)
- U161 (Methyl isobutyl ketone)
- U209 (1, 1, 2, 2-Tetrachloroethane)

- F002 (Spent halogenated solvents)
- F003 (Spent nonhalogenated solvents)
- F005A (Spent nonhalogenated solvents)
- Nonwastewater
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (l, 1, 1–Trichloroethane)
- U239 (Xylenes)

LDR Treatment Standard

- Manage at the WIPP.

The preferred option is to process this waste in the processing facilities utilizing HANDSS-55 to sort and segregate and other waste handling technologies to characterize, repackage and certify waste to meet the type B TRUPACT II shipping requirements for disposal at WIPP.

Processing will include removing non-compliant items found from the waste. This option is preferred because it has the lowest cost and has the lowest risk for delays due to permitting, technical barriers, and system implementability. It uses equipment that has been demonstrated on similar activities or the technology development is in progress to support the facilities equipment needs.

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is medium based on the varying composition of the job waste and the exact contents of specific waste containers.

Radiological Characterization

- Total activity is >100 nCi/g.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{244}) are present.
- Waste is primarily contact handled with a small volume of remote handled (<200 mR/hr).

The following information is applicable to all the waste streams in the TRU Job Control Waste Group.

Technology and Capacity Needs

For information on the management of these waste streams, see the SRS solid waste management strategy in Section 4.1 of this chapter.

The total volume of MTRU waste at SRS is substantial, and therefore, the need for appropriate storage while SRS awaits certification of compliance with the WIPP-WAC is significant. After approval, this waste will require further processing utilizing HANDSS-55 to sort and segregate the waste.

HANDSS-55 is currently being designed and built by three separate robotics laboratories as part of a DOE technology development initiative. The project is expected to be complete in FY04.

Treatment Option Information

The preferred option is to process this waste utilizing HANDSS-55 to sort and segregate. An alternative option would be to pursue non-thermal treatment that is currently under development. As a parallel option, additional waste processing and blending with other waste groups to meet the TRUPACT II shipping limits could be pursued.

Treatment Option Status and Uncertainties

Budget Status

The entire MTRU program cost is currently estimated at more than $1.3 billion. This is primarily based on the number of shipments to WIPP per calendar year, and both fixed and variable costs for treatment, storage, and disposal for each treatability group.

Uncertainty Issues

The MTRU waste streams will be processed to meet the WIPP-WAC and the Waste Analysis Plan (WAP) of the WIPP RCRA permit. Budget and schedule uncertainties exist regarding the handling of these waste streams. Transportation of this waste to WIPP raises technical issues. If transportation limits are not modified, SRS may have to design and construct an organic destruction treatment facility, which would result in significant cost increases and schedule delays.

4.2.1.2 TRU Job Control Waste Group

The preferred option for this waste group is to characterize, sort, and supercompact the waste material onsite, followed by preparation for shipment and disposal at WIPP.

Waste streams within this waste group include the following:

SR-W025, Solvent/TRU Job Control Waste <100 nCi/g
SR-W033, Thirds/TRU Job Control Waste <100 nCi/g

General Information

SR-W025, Solvent/TRU Job Control Waste <100 nCi/g

This waste stream is composed primarily of solids such as booties, lab coats, floor sweepings, rags, labware, and other job control waste generated primarily through separation activities for plutonium production. The waste stream includes small amounts of TRU waste from onsite laboratories.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris
- Inorganic debris

Waste Code

- D001C (Low TOC Ignitable)
- D003D (Water Reactive)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (Benzene)
- D019 (Carbon tetrachloride)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresols-mixed)
- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents
- F003 (Spent non-halogenated solvents)
- F005A (Spent non-halogenated solvents)
- Nonwastewater
- P012 (Arsenic trioxide)
- P048 (2, 4–Dinitrophenol)
- P113 (Thallic oxide)
- P120 (Vanadium pentoxide)
- U002 (Acetone)
- U032 (Calcium chromate)
- U052 (Creosols–mixed)
- U080 (Methylene chloride)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U144 (Lead acetate)
- U151C (Low Mercury)
- U154 (Methanol)
- U161 (Methyl isobutyl ketone)
- U209 (1, 1, 2, 2–Tetrachloroethane)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (1, 1, 1–Trichloroethane)

- U239 (Xylenes)

LDR Treatment Standard

- D001 = specified technology = DEACT and meet UTS; or RORGS or CMBST
- D003 = specified technology = DEACT and meet UTS
- D004 = concentration based standard = 5.0 mg/l TCLP
- D006 = concentration based standard = 21 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP
- D011 = concentration based standard = 0.14 mg/l TCLP
- D018 = concentration based standard = 10 mg/kg
- D019 = concentration based standard = 6.0 mg/kg
- D022 = concentration based standard = 6.0 mg/kg
- D023 = concentration based standard = 5.6 mg/kg
- D024 = concentration based standard = 5.6 mg/kg
- D025 = concentration based standard = 5.6 mg/kg
- D026 = concentration based standard = 11.2 mg/kg
- F001 and F002 = concentration based standard = 6 – 30 mg/kg
- F003 = concentration based standard = 0.75 – 160 mg/kg
- F005 = concentration based standard = 4.8 mg/l TCLP – 170 mg/kg, except 2-Ethoxyethanol, 2-Niropropane = CMBST
- P012 = concentration based standard = 5.0 mg/l TCLP
- P048 and U002 = concentration based standard = 160 mg/kg
- P113 = specified technology = RYHRM or STABL
- P120 = specified technology = STABL
- U032 = concentration based standard = 0.86 mg/l TCLP
- U052 = concentration based standard = 5.6 – 11.2 mg/kg
- U080 and U239 = concentration based standard = 30 mg/kg
- U133 = specified technology = CHOXD, CHRED, or CMBST
- U134 = specified technology = ADGAS fb NEUTR; or NEUTR
- U144 = concentration based standard = 0.37 mg/l TCLP
- U151 = concentration based standard = 0.025 mg/l TCLP
- U154 = concentration based standard = 0.75 mg/l TCLP; or CMBST
- U161 = concentration based standard = 33 mg/kg
- U209, U211, and U226 = concentration based standard = 6.0 mg/kg
- U220 = concentration based standard = 10 mg/kg
- Alternate debris technology

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

The preferred option is supercompaction onsite and repackaging with other high activity TRU waste prior to shipment to WIPP for disposal. This option has the lowest cost and the highest In-Depth Option Analysis (IDOA) score. The supercompaction achieves a 4-to-1 volume reduction that reduces the total number of shipments to WIPP.

Waste Characterization

- Process knowledge was used to characterize the waste stream.
- Confidence level is medium based on the varying composition of the job control waste and the exact contents of specified waste containers.

Radiological Characterization

- Total activity is 10 – 100 nCi/g.

- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241}, and U^{233}) are present.
- Waste is primarily contact handled (<200 mR/hr).
- Mixed low-level waste (MLLW)

SR-W033, Thirds/TRU Job Control Waste <100 nCi/g

This waste stream is composed primarily of solids such as booties, lab coats, floor sweepings, rags, labware, and other job control waste generated primarily through separation activities for plutonium production. The waste stream includes small amounts of TRU waste from onsite laboratories. Waste from SR-W025 differs from SR-W033 because solvent rags are suspected to be in the waste. A conservative interpretation of the mixture rule causes all contents of SR-W033 containers to be characterized with listed solvent waste codes due to the presence of the solvent rags.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris
- Inorganic debris

Waste Code

- D001C (Low TOC Ignitable)
- D003D (Water Reactive)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D019 (Carbon tetrachloride)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresols)
- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents
- F003 (Spent non-halogenated solvents)
- F005A (Spent non-halogenated solvents)
- Nonwastewater
- P012 (Arsenic trioxide)
- P048 (2, 4–Dinitrophenol)
- P113 (Thallic oxide)
- P120 (Vanadium pentoxide)
- U002 (Acetone)
- U032 (Calcium chromate)
- U052 (Creosols–mixed)
- U080 (Methylene chloride)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U144 (Lead acetate)
- U151C (Low Mercury)
- U154 (Methanol)
- U161 (Methyl isobutyl ketone)
- U209 (1, 1, 2, 2–Tetrachloroethane)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (1, 1, 1–Trichloroethane)
- U239 (Xylenes)

LDR Treatment Standard

- D001 = specified technology = DEACT; or RORGS, or CMBST
- D003 = specified technology = DEACT
- D004 = concentration based standard = 5.0 mg/l TCLP
- D006 = concentration based standard = 21 mg/l TCLP
- D007 = concentration based standard = 0.60 mg/l TCLP
- D008 = concentration based standard = 0.75 mg/l TCLP
- D009 = concentration based standard = 0.025 mg/l TCLP

- D011 = concentration based standard = 0.14 mg/l TCLP
- D019 = concentration based standard = 6.0 mg/kg
- D022 = concentration based standard = 6.0 mg/kg
- D023 = concentration based standard = 5.6 mg/kg
- D024 = concentration based standard = 5.6 mg/kg
- D025 = concentration based standard = 5.6 mg/kg
- D026 = concentration based standard = 11.2 mg/kg
- F001 and F002 = concentration based standard = 6 – 30 mg/kg
- F003 = concentration based standard = 0.75 – 160 mg/kg
- F005 = concentration based standard = 4.8 mg/l TCLP – 170 mg /kg, except 2-Ethoxyethanol, 2-Niropropane = CMBST
- P012 = concentration based standard = 5.0 mg/l TCLP
- P048 and U002 = concentration based standard = 160 mg/kg
- P113 = specified technology = RYHRM or STABL
- P120 = specified technology = STABL
- U032 = concentration based standard = 0.86 mg/l TCLP
- U052 = concentration based standard = 5.6 – 11.2 mg/kg
- U080 and U239 = concentration based standard = 30 mg/kg
- U133 = specified technology = CHOXD, CHRED, or CMBST
- U134 = specified technology = ADGA S fb NEUTR; or NEUTR
- U144 = concentration based standard = 0.37 mg/l TCLP
- U151 = concentration based standard = 0.025 mg/l TCLP
- U154 = concentration based standard = 0.75 mg/l TCLP; or CMBST
- U161 = concentration based standard = 33 mg/kg
- U209, U211, and U226 = concentration based standard = 6.0 mg/kg
- U220 = concentration based standard = 10 mg/kg
- Alternate debris technology

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

The preferred option is supercompaction onsite and repackaging with other high activity TRU waste prior to shipment to WIPP for disposal. This option has the lowest cost and the highest In-Depth Option Analysis (IDOA) score. The supercompaction achieves a 4-to-1 volume reduction that reduces the total number of shipments to WIPP.

Waste Characterization

- Process knowledge was used to characterize the waste stream.
- Confidence level is medium based on the varying composition of the job control waste and the exact contents of specified waste containers.

Radiological Characterization

- Total activity is 10 – 100 nCi/g.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{244}) are present.
- Waste is primarily contact handled (<200 mR/h).
- Mixed low-level waste (MLLW).

Technology and Capacity Needs

SR-W025, Solvent/TRU Job Control Waste <100 nCi/g, and SR-W033, Thirds/TRU Job Control Waste <100 nCi/g, may be supercompacted onsite prior to blending with other high activity TRU waste and shipped to WIPP for final disposal.

An existing onsite Low-Level Waste (LLW) supercompactor may be modified and used to treat this waste.

Treatment Option Information

Prior to pre-treatment activities, SR-W025, Solvent/TRU Job Control Waste <100 nCi/g, and SR-W033, Thirds/TRU Job Control Waste <100 nCi/g, will be treated to meet transportation requirements. Because of the small volume of the waste stream, alternative treatment options are being investigated. One alternative is to ship the waste to INEEL (AMWTF) for processing. The AMWTF is a planned, funded facility but is not yet operational. Given the uncertainty in project start-ups, it is prudent for SRS to pursue both options in parallel until such time as it becomes evident which option provides the fastest and most cost-effective path forward.

Treatment Option Status and Uncertainties

Budget Status

The entire MTRU program cost is currently estimated at more than $1.3 billion. This is primarily based on the number of shipments to WIPP per calendar year; and both fixed and variable costs for treatment, storage, and disposal for each treatability group.

Uncertainty Issues

The MTRU waste streams will be processed to meet the WIPP-WAC. Budget and schedule uncertainties exist regarding the handling of these waste streams. Currently transportation of this waste to WIPP raises technical issues. If the transportation limits are not modified, SRS will have to design and build an organic destruction treatment facility, which would result in significant cost increases and schedule delays.

4.2.2 Other MTRU Waste Streams for Shipment to WIPP

The preferred option for this waste group is to characterize the waste material, followed by preparation for shipment and disposal.

Waste streams within this waste group include the following:

SR-W006, CH Mixed TRU/Liquids
SR-W053, Rocky Flats Ash
SR-W089, CH Mixed TRU from Mound for Shipment to WIPP
SR-W089, CH Mixed with PCBs TRU from Mound for Shipment to WIPP

General Information

SR-W006, CH Mixed TRU/Liquids

This waste stream is defense-related MTRU waste, consisting of a liquid waste generated from plutonium extraction analytical procedures at the Savannah River Technology Center (SRTC). It consists of a homogeneous, xylene based, liquid chelating agent. This is a small volume waste stream and is currently stored in compliance with RCRA in a satellite accumulation area at SRTC.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic liquid

Waste Code

- D001A (Ignitable-High TOC)
- Nonwastewater

LDR Treatment Standard

- D001 = specified technology = RORGS; CMBST; or POLYM

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high based upon knowledge of the chemicals used in the analytical procedures.

Radiological Characterization

- Total activity is >100 nCi/g.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, and Am^{241}) are present.
- Waste is contact handled (<200 mR/hr).

SR-W053, Rocky Flats Ash

This waste consists of a small volume of ash sent from Rocky Flats to SRS for research into plutonium recovery. Courts in the State of Colorado declared Rocky Flats' ash hazardous based on chemical analysis of F-listed solvent waste processed in the Rocky Flats incinerator. Upon learning of the Colorado court action, SRS placed the ash in a RCRA satellite accumulation area. SRS recently completed a treatability study with this material at SRTC.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Matrix

- Inorganic sludge/particulate

Waste Codes

- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- F001 (Spent halogenated degreasing solvents)
- F002 (Spent halogenated solvents)
- F005A (Spent nonhalogenated solvents)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)

LDR Treatment Standard

- D004 = concentration based standard = 5 mg/l, TCLP.
- D005 = concentration based standard = 21 mg/l, TCLP.
- D006 = concentration based standard =0.11 mg/l, TCLP.
- D007 = concentration based standard = 0.60 mg/l, TCLP.
- D008 = concentration based standard = 0.75 mg/l, TCLP.
- D009 = concentration based standard = 0.025 mg/l, TCLP.
- D0010 = concentration based standard = 5.7 mg/l, TCLP.
- D0011 = concentration based standard = 0.14 mg/l, TCLP.
- F001, F002 = concentration based standard = 6-30 mg/kg.
- D005 = concentration based standard = 4.8 mg/l, TCLP-170 mg/kg, exc ept 2-Ethoxyethanol, 2-Nitropropane = CMBST.

- D001 through D043 nonwastewaters to be land disposed must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents (UHC) that may be present.

Waste Characterization

- Process knowledge is used to characterize the waste stream.
- Confidence level is low. No analytical data is available, and the material is from another DOE site.
- This ash was declared mixed waste after SRS had the material in a vault and was handling the waste as a Special Nuclear Material (SNM).

Radiological Characterization

- Transuranic–alpha emitters (Am^{241}, Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, and Pu^{242}) are present.
- Waste is contact handled (<200 mR/hr).

Information listed below applies to both waste streams in this waste treatment group.

Technology and Capacity Needs

SR-W006, CH Mixed TRU/Liquids, will have preliminary or preparatory work performed on it by SRTC prior to characterization for shipment to WIPP. These initial steps will be performed within SRTC laboratory facilities with existing equipment. SR-W053, Rocky Flats Ash, may be utilized by SRTC to perform treatability studies. The residues could provide data for future use by the DOE Complex in learning about plutonium stabilization methods. After completion of the SRTC testing, the unused ash and study residues will be combined with SR-W026 and/or SR-W027 and will be shipped to WIPP for disposal.

Treatment Option Information

Prior to characterization to meet the WIPP-WAC, waste stream, SR-W006, CH Mixed TRU/Liquids, will be treated to meet transportation requirements. Because of the small volume of the waste stream, alternative treatment options are being investigated. One alternative is to handle the waste as a 90-day generator, remove the TRU portion of the stream, treat the ignitable characteristic, and extract the chelating agents.

Treatment Option Status and Uncertainties

Budget Status

The entire MTRU program cost is currently estimated at more than $1.3 billion. This is primarily based on the number of shipments to WIPP per calendar years, both fixed and variable costs for treatment, storage, and disposal for each treatability group.

Uncertainty Issues

The MTRU waste streams will be processed to meet the WIPP-WAC, which incorporates the requirement of the WIPP RCRA Part B permit. Budget and schedule uncertainties exist regarding the handling of these waste streams. Transportation of this waste to WIPP raises technical issues. If the transportation limits are not modified, SRS will have to design and construct a thermal or non-thermal treatment facility, which would result in significant cost increases and schedule delays.

SR-W089, CH Mixed TRU from Mound for Shipment to WIPP

This waste stream is a defense-related job control and D&D waste and is composed of organic solids such as booties, lab coats, floor sweepings, rags, labware, soils, and other job control waste along with gloveboxes, fume hoods, and general D&D debris. A small percentage (<5%) of this waste stream includes sludges, resins, filters, and miscellaneous waste. The sludges will be neutralized and solidified.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Organic debris

Waste Code

- D001C (Low TOC Ignitable)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- Nonwastewater

LDR Treatment Standard

- Manage at the WIPP.

The preferred option is to process the waste in the processing facilities utilizing High Activity TRU Facility (HATF) to sort and segregate and use other waste handling technologies to size-reduce, characterize, repackage, and certify the waste to meet type B TRUPACT II shipping requirements for disposal at WIPP.

Processing will include removing non-compliant items found from the waste. Treatment will remove, reduce, or destroy to meet LDR requirements to comply with the WIPP RCRA Part B permit. This option is preferred because it has the lowest cost and has the lowest risk for delays due to permitting, technical barriers, and system implementability. It uses equipment that has been demonstrated on similar activities or the technology development is in progress to support the facilities equipment needs.

Waste Characterization

- Sampling and analysis will be used to characterize the waste stream (NDE, NDA, and headspace sampling).
- Confidence level for the legacy waste is medium based on historical knowledge and the implementation of the Real Time Radiography.
- Confidence level for the D&D waste is high based on the implementation of the Mound TRU Certification process and oversight by SRS personnel.

Radiological Characterization

- Total activity is >100 nCi/g.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{244}) are present.
- Waste is exclusively contact handled (<200 mR/hr).

Technology and Capacity Needs

SR-W089, CH Mixed TRU from Mound for shipment to WIPP, will have preliminary work performed on it by Mound prior to characterization for shipment to WIPP. These initial steps will include venting and Real Time Radiography. Prohibited items identified by the RTR will be removed by Mound prior to shipment to the SRS.

SR-W089, CH Mixed with PCB's TRU from Mound for Shipment to WIPP

This waste stream is a defense-related job control and D&D waste and is composed of organic solids such as booties, lab coats, floor sweepings, rags, labware, soils, and other job control waste along with gloveboxes, fume hoods, and general D&D debris. A small percentage (<5%) of this waste stream includes liquids. The liquids will be solidified.

Volume

- Volume data for this waste stream can be found in Chapter 11. This waste stream consists of one box container (appx. 90 cu. ft of waste contaminated with PCB's at a level of 17,000 ppm) and 3 liters of liquid.

Waste Stream Composition

- Organic debris

Waste Code

- D001C (Low TOC Ignitable)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- Nonwastewater

LDR Treatment Standard

- Manage at the WIPP.

The preferred option is to process the waste in the processing facilities utilizing HATF to sort and segregate and other waste handling technologies to size-reduce, characterize, repackage, and certify the waste to meet type B TRUPACT II shipping requirements for disposal at WIPP.

Processing will include removing non-compliant items found from the waste. Treatment will remove, reduce, or destroy to meet LDR requirements to comply with the WIPP RCRA Part B permit. This option is preferred because it has the lowest cost and has the lowest risk for delays due to permitting, technical barriers, and system implementability. It uses equipment that has been demonstrated on similar activities or the technology development is in progress to support the facilities equipment needs.

Waste Characterization

- Sampling and analysis will be used to characterize the waste stream (NDE, NDA, and headspace sampling).
- Confidence level for the legacy waste is medium based on historical knowledge and the implementation of the Real Time Radiography.
- Confidence level for the D&D waste is high based on the implementation of the Mound TRU Certification process and oversight by SRS personnel.

Radiological Characterization

- Total activity is >100 nCi/g.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{244}) are present.
- Waste is exclusively contact handled (<200 mR/hr).

Technology and Capacity Needs

SR-W089, CH Mixed with PCB’s TRU from Mound for shipment to WIPP, will have preliminary work performed on it by Mound prior to characterization for shipment to WIPP. These initial steps will include venting and Real Time Radiography. Prohibited items identified by the RTR will be removed by Mound prior to shipment to the SRS.

Chapter 5. Mixed High-Level Waste (HLW)

The following waste streams are in the mixed high-level waste category. This chapter discusses the high-level waste streams and the available treatment. Refer to Table 1.1, Chapter 1, Volume II of the STP for the user's guide. The user's guide identifies each mixed waste stream, the preferred treatment option (PO), and the location where the waste stream is discussed in Volumes I and II of the STP. Also refer to Table 1.3, Chapter 1, Volume II for EPA Hazardous Waste Code Subcategories.

Mixed High-Level Waste Group for Vitrification

The preferred treatment option for this waste group is removal of the low-level component of the waste stream by evaporation with treatment at the F- and H-Areas Effluent Treatment Facility, or at the future Salt Processing Facility, or a facility that serves a similar function, with Stabilization at the Z-Area Saltstone Facility, followed by High-Level Waste Vitrification in the Defense Waste Processing Facility (DWPF).

Waste streams in this waste group includes the following:

SR-W016, 221-F Canyon High-Level Liquid Waste
SR-W017, 221-H Canyon High Level Liquid Waste

General Information

SR-W016, 221-F Canyon High-Level Liquid Waste

This waste is an aqueous liquid containing fission products generated from the 221-F Canyon facility in support of the PUREX Process. F-Canyon waste materials are generated from the extraction of plutonium from reactor targets assemblies and dissolution of spent fuel rods.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous liquid

Waste Code

- D002 (corrosive waste managed as wastewater)
- D005 (TCLP Ba)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- Nonwastewater slurry

LDR Treatment Standard

- All waste codes = specified technology = HLVIT

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high based on availability of analysis, with the exceptions of TCLP.

Radiological Characterization

- Total activity for radiological characterization is ~10.5 Ci/gal.
- Alpha emitters (U^{235}, U^{238}, Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, Cm^{241} , and others) are present.
- Beta/gamma emitters (Sr^{90}, Ru^{106}, Zr^{95}, Nb^{95}, Rh^{106}, Cs^{137}, Ce^{144}, Pr^{144}, Pm^{147}, H^3, and others) are present.
- Waste is remote handled.
- High-level waste

SR-W017, 221-H Canyon High-Level Liquid Waste

This waste stream is an aqueous liquid containing mixed fission products from the H-Canyon facility in support of the modified PUREX process. The stream also contains decontamination solution from maintenance activities in the H-Area High-Level Waste Tank Farm. H-Canyon waste materials are generated from the recovery of enriched uranium from fuel tubes.

Volume

- Volume data for this waste stream can be found in Chapter 11.

Waste Stream Composition

- Aqueous liquid

Waste Code

- D002A (corrosive waste managed as wastewater)
- D005 (TCLP Ba)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- Nonwastewater slurry

LDR Treatment Standard

- All waste codes = specified technology = HLVIT

Waste Characterization

- Sampling and analysis are used to characterize the waste stream.
- Confidence level is high based on availability of analysis, with the exceptions of TCLP.

Radiological Characterization

- Total activity for radiological characterization is ~12 Ci/gal.
- Alpha emitters (U^{235}, U^{238} , Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Am^{241}, and Cm^{241}) are present.
- Beta/gamma emitters (Sr^{90}, Ru^{106}, Zr^{95}, Nb^{95}, Rh^{106}, Cs^{137}, Ce^{144}, Pr^{144}, Pm^{147}, and H^3) are present.
- Waste is remote handled.
- High-level waste

The following information applies to all the waste streams in this waste group.

Technology and Capacity Needs

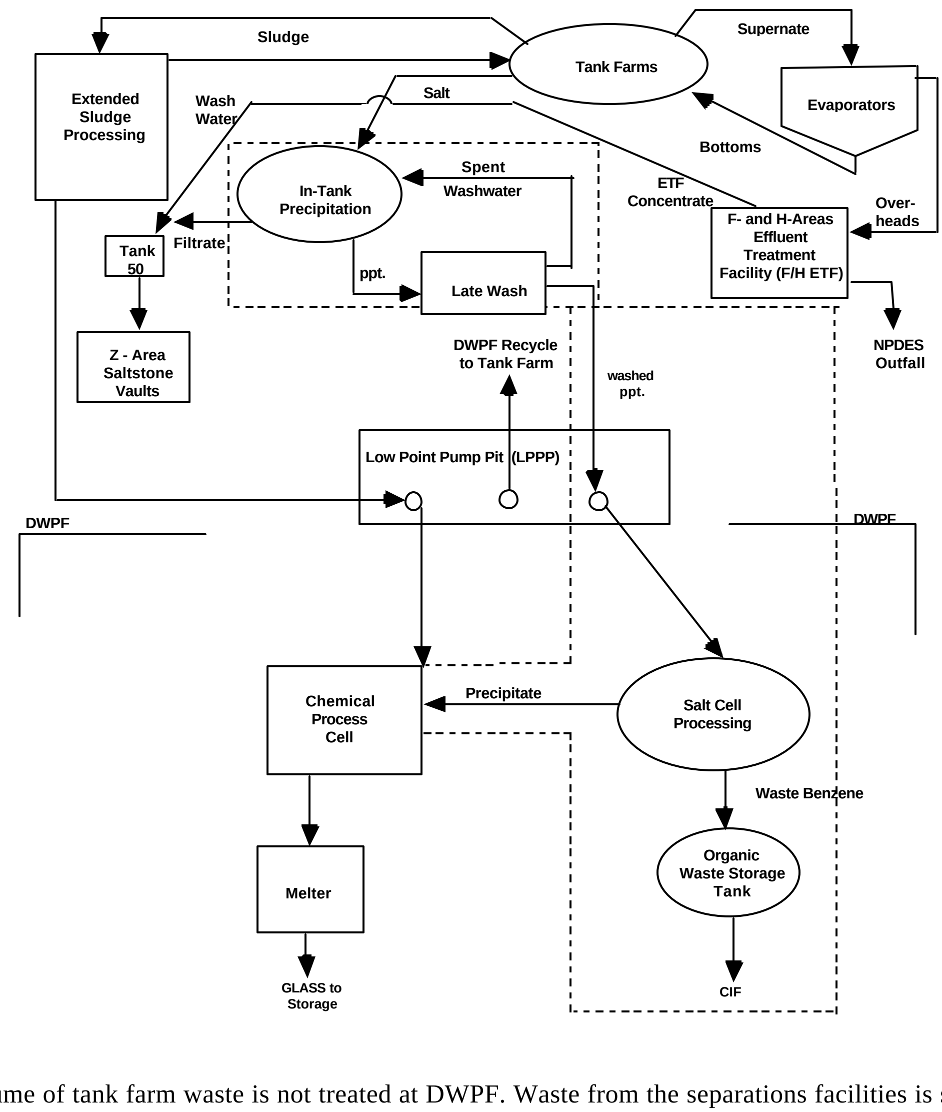
Vitrification is the specified technology for all of the waste codes in SRS high-level wastes. These wastes are generated from the extraction of plutonium and the recovery of enriched uranium. DWPF is designed with capacity to treat the identified, existing, and future high-level liquid waste streams at SRS.

The high-level waste tanks in F Area and H Area currently store a total volume of approximately 137,000 m^3 of salt solution, saltcake or precipitate, and sludge generated mostly from the dissolution of target assemblies irradiated in the SRS reactors. It is expected that an additional volume of high-level liquid waste from both F Canyon and H Canyon will be generated at SRS in the next five years. The treatment schedule prioritizes the removal of waste from tanks that are at most risk. These are the single-walled tanks, and tanks that have only a partial secondary containment structure.

Treatment Option Information

A general schematic diagram of the high-level waste treatment process at SRS is shown below.

NOTE: The dotted portion of the process may change depending upon the selected salt processing technology. See "Facility Status" section following diagram for more information.



The total volume of tank farm waste is not treated at DWPF. Waste from the separations facilities is sent to the high-level waste tank farm for storage. The waste solution is then sent to an evaporator to reduce the volume placed in storage. An evaporator located in H Area concentrates the salt waste in the tank farms to be treated and released via ETF.

Vitrification has been identified by EPA as the specified technology for treatment of high-level waste. Borosilicate glass has been determined to be the best stabilization matrix.

TCLP tests of simulated high-level wastes were done on both expected metal levels of wastes to be processed in DWPF and at three times the level of metal expected. These tests indicated that the waste form produced at DWPF will be below the hazardous waste characteristic limits for toxicity (reference WSRC-IM-91-116-13, Rev 0).

Facility Status

On March 7, 1996, DWPF commenced operation by transferring mixed waste "sludge" from the H-Area Tank Farm to the vitrification facility. During 1996, shake-down operations occurred utilizing batch processes of diluted and full-strength mixed waste sludge until conditions of typical, routine operation had been achieved, and all operational difficulties were identified and addressed. Currently, DWPF is in “sludge only” operation. Precipitate or "salt" operations are not expected to commence until a salt processing technology is selected. Work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE’s selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

Regulatory Status

DWPF is operated under an industrial wastewater permit. Several permit modifications have been issued since the DWPF was first designed for new construction to remove interfering contaminants or to make the operation safer.

Treatment Option Status and Uncertainties

As of January 25, 2001, DWPF has produced or filled a total of 1047 stainless steel canisters, which have been placed in storage at SRS awaiting final disposition at Yucca Mountain.

Budget Status

A budget evaluation was completed for the treatment of high-level liquid waste streams. The evaluation appeared in a document titled *High-Level Waste System Plan, Revision 11,* April 2000 (HLW-2000-00019). Information in this document SRS evaluated funding scenarios needed to ensure:

1. Safe storage of high level waste
2. Risk reduction progress by removing waste from high risk tanks
3. Waste immobilization by operating DWPF
4. Selection, design, construction, and startup of the salt processing facility

In addition, funding levels were developed so that regulatory commitments, as defined in the *F/H Area High-Level Waste Removal Plan and Schedule* (WSRC-RP-93-1477, Rev. 0), submitted to the regulators November 9, 1993, can be met. This plan was revised by the *High-Level Waste (HLW) Removal Plan and Schedule*, which was approved on February 26, 1998, by the regulators.

Under these conditions, the high-level waste treatment program for the F- and H-Canyon high-level liquid wastes can be completed by 2028.

Uncertainty Issues

Technical uncertainty exists because work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE’s selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

No other significant uncertainties (budgetary, permitting, etc.,) are identified or anticipated for this composite waste stream at this time.

Chapter 6. Future Generation of Mixed Waste Streams

This chapter addresses waste streams generated by Environmental Restoration and Decontamination and Decommissioning for which specific waste characterization data is needed before an in-depth options analysis can be performed. The section explains the types of waste to be generated in future activities at the Savannah River Site (SRS) and the general estimates of those waste volumes.

6.1 Environmental Restoration Waste

The SRS Environmental Restoration (ER) Mission is to remediate inactive waste sites to ensure that the environment and the health and safety of the people are protected. SRS has implemented a comprehensive environmental program to maintain compliance with environmental regulations and to mitigate impacts to the environment. ER activities at SRS are governed by the Federal Facility Agreement (FFA). The FFA is a tri-party agreement among the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the South Carolina Department of Health and Environmental Control (SCDHEC), which became effective on August 16, 1993. The FFA requires that SRS set work priorities on an annual basis with schedules and deadlines for environmental restoration actions. These priorities will be negotiated and updated each year. SRS must also submit to EPA and SCDHEC long-term projections including projected deliverable dates for work activities to be conducted over the next two fiscal years and Record of Decision (ROD) dates for the third fiscal year and beyond. Other ER activities are defined by Resource Conservation and Recovery Act (RCRA) permits, closure plans, groundwater corrective action requirements, settlement agreements, and consent decrees. Known mixed wastes for which a clean-up decision is scheduled within the next five years and for which treatment in accordance with the RCRA LDRs may be required are discussed for general planning purposes. Due to the uncertainty of how these ER wastes ultimately will be managed, their inclusion into the Site Treatment Plan (STP) (and therefore the specification of how and when they will be treated) will not occur until a final cleanup decision (under Comprehensive Environmental Response Compensation and Liability Act [CERCLA] or RCRA) has been reached. This final decision, which will be reviewed with the SCDHEC RCRA group, will be made in compliance with applicable statutory/regulatory requirements and, where appropriate, established schedules in existing compliance documents. If environmental restoration mixed waste is removed from an area of contamination and is not otherwise subject to an RCRA/CERCLA order or agreement or specifically excluded from the STP, the following actions will be taken to include these waste streams in the STP: (1) review characterization data and obtain more information if necessary to proceed with the preferred option selection process; (2) determine if the new waste would fit into any existing waste stream category by reviewing the waste opposite the characterization information and the preferred treatment option for the existing waste stream; (3) if able to fit into an existing waste stream, modify the MWIR and the STP at the next annual update of the MWIR and STP and proceed with treatment on the same schedule as has been identified for the existing waste stream; (4) if unable to fit this new waste stream into an existing waste category, create a new waste stream and notify SCDHEC within 30 days of discovery as required in the Consent Order, 95-22-HW; (5) identify a preferred treatment option (using the same or similar process as was used to develop other preferred treatment options) and schedule within one year of the notification date.

Given all of the uncertainties associated with the volume and contaminant concentration of ER waste, it is expected that it will consist of the following broad categories: (1) soils, (2) liquid wastes, (3) noncombustible debris (tools, equipment, etc.), (4) combustible debris, and (5) recoverable waste and sludges (e.g., residues in unearthed containers).

In general, the five ER waste categories could be treated as follows:

Soil could be treated in the same manner as is determined appropriate for SR-W048 soils from spill remediation. Liquid wastes could receive treatment at a waste water treatment facility. Noncombustible debris would be decontaminated (potentially in a containment building or in a tank/container in a 90-day staging area).

Combustible debris may be incinerated at CIF or treated offsite at a commercial treatment facility. Recoverable wastes and sludges may be incinerated at CIF (if organic or combustible debris), stabilized at the CIF ashcrete unit if only metal contaminants are present, treated offsite at a commercial treatment facility, or incinerated at the Oak Ridge TSCA incinerator, if waste contains PCBs (Refer to Section 3.1.2.3.3 of Volume I).

Investigation-Derived Waste

One element of the ER program is the investigation of waste units. Environmental investigations typically employ activities such as drilling and excavating, which produce investigation byproducts. In cases where investigations confirm the presence of contamination and the byproducts contain wastes in concentrations high enough to be of environmental or health concern, special management procedures are warranted. The term used by the EPA and SCDHEC for these potentially contaminated byproducts is Investigation-Derived Waste (IDW).

The *Investigation-Derived Waste Management Plan* (WSRC-RP-94-1227, Rev. 2), which was approved by EPA and SCDHEC on 2/28/95, describes how IDW generated during characterization and assessment activities will be managed. Finalization of the *IDW Management Plan* was a milestone commitment under the FFA. The *IDW Management Plan* describes the SRS plan to manage IDW generated during investigations performed under the regulatory authority of RCRA, as amended, and CERCLA, as amended. IDW includes potentially contaminated environmental media such as monitoring well purge water, well pumping test and development water, drilling mud, and soil drill cuttings. IDW also includes decontamination water and rinse water as well as equipment and personnel protective equipment that have not been decontaminated. The SRS IDW management strategy is to minimize the quantity of IDW generated while cost-effectively managing the IDW that must be generated.

One of the management programs encompassed within this Plan is for the IDW derived from contact with mixed wastes. (Note: References to Appendix A, B, and C are the Appendices in the IDW Management Plan.) The Plan describes the following IDW streams that may be potentially mixed waste:

- Non-listed radioactive IDW is defined as media contaminated with radioactive and RCRA characteristic hazardous constituents in excess of the IDW Management Plan Appendix A (Aqueous) and Appendix B (Non-Aqueous) levels. This contaminated media will be managed as mixed waste if the hazardous substance component exceeds the levels outlined in the South Carolina Hazardous Waste Management Regulations R. 61 -79. 261 Subpart C.
- Listed radioactive IDW is defined as media contaminated with radioactive and RCRA listed hazardous constituents in excess of the IDW Management Plan Appendix A (Aqueous) and Appendix B (Non-Aqueous) levels. Listed IDW exceeding the levels in the Appendices will be managed as a hazardous waste, consistent with EPA's Contained-In Policy.

This program is consistent with EPA guidance for management of IDW and is protective of human health and the environment.

The following summaries provide a general overview of the potential IDW mixed waste generated by ER activities. These records are not to preclude the record of decision (ROD) process:

SR-W064, IDW Soils/Sludges/Slurries: This IDW stream includes soil cuttings, drilling fluids, and turbid well development water with soil being the primary matrix. Depending on the site of the remediation activity, metals and organics may also be present. Radiological levels and hazardous constituent levels depend on the source location.

SR-W065, IDW Monitoring Well Purge/Development Water: This IDW stream includes purge water from monitoring wells generated during routine groundwater sampling events and well development water generated directly after monitoring well installations or during well redevelopment. This waste stream also includes aqueous interim action IDW. Radiological levels and hazardous constituent levels depend on the source location.

SR-W066, IDW Debris: This IDW stream includes tools and devices used to sample soils and sediments at waste sites. Examples include drill bits, split spoons, and augers. Radiological levels and hazardous constituent levels depend on the source location.

SR-W067, IDW Personal Protective Equipment (PPE) Waste: This waste stream includes plastic glove boxes, plastic film, coveralls, gloves, shoe covers, and associated waste. Waste matrices may include paper, cloth, plastic, and wood. As with the other three IDW streams, radiological levels and hazardous constituent levels depend on the source location.

SR-W070, Mixed Waste from Laboratory Samples: Refer to Section 3.1.1.1.E of Volume II for the description of this waste stream.

SR-W077, Aqueous Characteristic Wastewater: This waste stream consists of characteristically hazardous wastewaters that are suitable for treatment in a SRS wastewater treatment facility. An example is wastewater collected from CIF sumps that are found to be characteristically hazardous because of TCLP metal contamination and/or toxic organics. Radiological levels and hazardous constituent levels depend on the source location.

Since the *IDW Management Plan* is a regulatory commitment under the FFA, negotiations on the Plan's content and treatment schedules have occurred with EPA and SCDHEC. The negotiations resulted in an *IDW Management Plan* that was approved by all parties on February 28, 1995. To avoid dual regulatory commitments in the FFA and STP compliance order, the details of management of IDW have been deferred to the *IDW Management Plan* for those treatment processes specified in the *IDW Management Plan*. The *IDW Management Plan* Appendix C implementation schedules contain regulatory commitments for the treatment of the aqueous mixed waste stream (SR-W065). Thus, an in-depth option analysis for this stream has not been done, and the treatment schedules are not provided in Volume I of the STP. Because of the coverage provided by the *IDW Management Plan*, this waste stream is specifically excluded from the STP process.

The mixed waste non-aqueous IDW media (SR-W064, SR-W066, SR-W067), which is generated outside the Area of Contamination, will be placed in storage for treatment and disposal. Since these waste streams are future waste streams, characterization data does not exist to enable an in-depth options analysis to be performed. Thus, upon the availability of characterization data, these future waste streams will be addressed in the STP. In general, a review of existing waste streams and their preferred treatment options will be made once the IDW stream has been characterized. Should the IDW stream be comparable to an existing waste stream and meet the preferred treatment option's Waste Acceptance Criteria (WAC), the IDW stream will be treated as identified in the STP for the existing waste stream. If a comparable waste stream is not found, a new waste stream will be created and identified to SCDHEC within 30 days. A treatment option analysis will be performed and a treatment option identified within 12 months. A preferred treatment option and schedule will be identified, using the same or similar process as was used to develop other preferred treatment options.

Remediation Waste

In addition to IDW, ER activities could generate remediation wastes. These wastes would be generated during closure or restoration of inactive waste units or during groundwater corrective action. Contaminated soil, waste pits, and groundwater are the focus of many remedial actions. A variety of contaminated soils, sludges, and liquids will result from cleanup activities including secondary waste streams from remediation treatment processes. One general remediation waste stream was generated by ER in 1999 and was included in the 1998 MWIR update. This waste stream, SR-W084, Remediation Waste Soils that Meet LDR, consisted of soils that are usually RCRA listed wastes that have been treated to meet RCRA treatment standards for all underlying hazardous constituents.

Many remediation units are currently in the assessment phase, so the nature and extent of contamination has not yet been defined. In addition, detailed information on the specific clean-up activities that may be applied to the various contamination problems is not yet available, so the resultant waste that could be generated cannot yet be reliably determined. In fact, the plans for many remediation units have not yet advanced to the stage where even the broad category of response is known. For example, the decision on whether a given contaminated area such as a waste pit is to be excavated or stabilized in place is not typically made until after the nature of the problem has been adequately defined, various response alternatives and related impacts have been evaluated in considerable detail, and other agencies (EPA and SCDHEC) and the local community have had a chance to comment on the preferred alternative. If characterization activities identified both radioactive and hazardous contaminants in the pit, it is possible that mixed waste could be generated if the pit were excavated, whereas no waste would be generated if the pit were capped in place. Thus, early volume estimates for mixed waste associated with this pit are uncertain because of the nature of the remedial action process.

Even in those cases where the decision has already been made and specific activities have advanced beyond the conceptual planning stage, the information needed to support a reasonable estimate of resultant waste volumes is still generally unavailable. For example, a site may already have conducted bench-scale and pilot-scale testing for a given water treatment system, and scale-up and construction may have been completed, but key data such as the operating efficiencies of its individual components, including pretreatment and post-treatment processes, cannot be known until the actual treatment is well under way. Similarly, the contaminant concentrations of the effluents cannot be reliably known until the system is in full use, so the specific nature of the treatment residuals that may be produced over the next five years cannot be reliably determined.

IDW and Remediation Waste Forecasts

The waste inventories and projections listed on Table 6.1, Environmental Mixed Wastes Forecast, are based on the best available information. These estimates will continue to be updated as clean-up activities progress at the individual sites, and the appropriate information becomes available. Since detailed waste stream information is not currently available for environmental restoration activities, future mixed waste generation data has been estimated. The estimates are given in Table 6.1. In most instances, the forecast of new mixed waste streams resulting from ER activities will occur after a decision document such as a CERCLA ROD, RCRA closure plan approval, or RCRA Part B Permit for the waste unit is issued.

The process described in Section 6.1 was used to identify the forecasted remediation waste streams listed in Table 6.1. Characterization information was reviewed and compared to existing waste stream categories and their preferred treatment options to determine if the remediation waste fit into any existing waste stream category. Existing waste streams were identified for the forecasted remediation wastes. If a waste stream does not fit into an existing waste stream category, a new waste stream will be created and a preferred treatment option selected using the same or a similar process as was used to develop other preferred treatment options in the STP.

These same limitations inherent to the cleanup process also preclude the provision of certain detailed data that was broadly requested for the FFCAct. This request presumed detailed knowledge of waste streams, such as EPA waste codes and specified LDR treatment technologies. That information is not available for the ER program. For most sites, the contamination has not yet been fully characterized and the specific activities, including treatment that may be conducted have not yet been finalized. Therefore, more specific detail is needed to assign waste codes or other specific identifiers to environmental restoration waste projections. This is in contrast to waste streams being generated by operating facilities, which have been well characterized and for which specific descriptors and treatment technologies can be provided.

The volume estimates in Table 6.1 may reflect a lower estimate than the Mixed Waste Inventory Report. The STP does not include a waste forecast for waste streams covered by existing regulatory documents (i.e., IDW Management Plan).

For the reasons discussed above, the volumes projected for the ER sites are estimates only. The volume of mixed wastes generated is also dependent upon the funding available to begin environmental restoration activities, in a given year, which could subsequently generate mixed wastes. A good faith effort has been made to estimate the volume of such wastes. Nevertheless, in most cases, DOE is in the early stages of characterizing the wastes and identifying areas of contamination. The volume of mixed wastes that is subject to LDR varies according to the remedy selected; for example, in situ treatment will not generate mixed wastes that will require treatment capacity to be developed. Thus, the projection of mixed waste volumes subject to LDR that will require management by the sites will likely change as the remedial process advances.

Mixed wastes generation estimates as developed for the ERD solid waste forecast are listed in Table 6.1. This information is compiled from the most recently estimated volumes of mixed waste.

Table 6.1 – Environmental Restoration Mixed Wastes Forecast

Fiscal Year	Source Location	Waste Stream	EPA Waste Code/Isotopes	Volume (m^3)

2001	Laboratory Sample Waste	Sample residue return from onsite or offsite laboratories (SR-W077)	F001, D001/H^3, Cs^{137}, Co^{60}, Sr^{90}	2.1
	Sitewide Remediation Areas	Aqueous Interim Action IDW (SR-W065)*	F001, F002, F003, F004, F005	19.0
	Sitewide Remediation Areas	Mixed waste from laboratory samples (SR-W070)	F001, F002, F003, F004, F005, D001, D002, D009, D038	2.4
2002	Laboratory Sample Waste	Sample residue return from onsite or offsite laboratories (SR-W077)	F001, D001/H^3, Cs^{137}, Co^{60}, Sr^{90}	2.1
	Sitewide Remediation Areas	Aqueous Interim Action IDW (SR-W065)*	F001, F002, F003, F004, F005	19.0
	Sitewide Remediation Areas	Mixed waste from laboratory samples (SR-W070)	F001, F002, F003, F004, F005, D001, D002, D009, D038	2.4
2003	Laboratory Sample Waste	Sample residue return from onsite or offsite laboratories (SR-W077)	F001, D001/H^3, Cs^{137}, Co^{60}, Sr^{90}	2.6
	Sitewide Remediation Areas	Aqueous Interim Action IDW (SR-W065)*	F001, F002, F003, F004, F005	19.0
	Sitewide Remediation Areas	Mixed waste from laboratory samples (SR-W070)	F001, F002, F003, F004, F005, D001, D002, D009, D038	2.4
2004	Laboratory Sample Waste	Sample residue return from onsite or offsite laboratories (SR-W077)	F001, D001/H^3, Cs^{137}, Co^{60}, Sr^{90}	2.5
	Sitewide Remediation Areas	Aqueous Interim Action IDW (SR-W065)*	F001, F002, F003, F004, F005	19.0
	Sitewide Remediation Areas	Mixed waste from laboratory samples (SR-W070)	F001, F002, F003, F004, F005, D001, D002, D009, D038	2.4
2005	Laboratory Sample Waste	Sample residue return from onsite or offsite laboratories (SR-W077)	F001, D001/H^3, Cs^{137}, Co^{60}, Sr^{90}	0.4
	Sitewide Remediation Areas	Aqueous Interim Action IDW (SR-W065)*	F001, F002, F003, F004, F005	19.0
	Sitewide Remediation Areas Sitewide Remediation Areas	Mixed waste from laboratory samples (SR-W070) Contaminated Soil (SRW-064)	F001, F002, F003, F004, F005, D001, D002, D009, D038 F003	0 37.0

*IDW waste stream numbers are temporary placeholders until Environmental Restoration wastes can be properly identified and characterized. Upon completion of characterization Environmental Restoration mixed waste can be assigned to a waste stream in the STP, identified as a new waste in the STP, or be incorporated into the Federal Facility Agreement as described in Section 2.3.5, Volume I of the STP.

6.2 Decommissioning and Decontamination (D&D) Waste

At the end of a facility's lifecycle when it or its mission is no longer needed by DOE, the facility undergoes a process referred to as "disposition." This is a series of stages where the facility is brought from its condition and status at the time operations end to a final end state that involves either dismantlement or conversion for another use. As additional specific projects are funded, walkdowns and initial characterization will be done to generate the best estimated of the volume and nature of wastes that could be generated. This information will be incorporated into appropriate revisions of the STP as funding for those activities is allocated.

6.3 Additional Waste Streams

Other Mixed Waste Generated at SRS

A verbal agreement has been reached with SCDHEC and SRS that waste in satellite accumulation areas that is treated in a 90-day staging area or by elementry neutralization will not be included in the Site Treatment Plan or the Mixed Waste Inventory Report. Exceptions to this agreement are if the waste is continually generated and treated (e.g., SR-W050 supporting ITP process sampling activity) or if the waste is a large quantity (e.g., SR-W072 debris treatment by HLW Operations). These cases are evaluated on a case-by-case basis.

There is a mixed waste stream that will be generated in the future, SR-W034, Calcium Metal. This waste stream was generated in the past, only to be eliminated when it was determined not to be a mixed waste. A new generation of calcium metal is being forecast, and the treatment path will be determined and submitted to SCDHEC 12 months after the waste has been generated in sufficient quantities to enter the STP.

There are also two potential future mixed waste streams, SR-W085, Rocky Flats Plutonium Fluoride Residues, and SR-W086, Characteristically Hazardous Non-Incinerable Solids. Treatment paths for both of these potential waste streams will be determined and submitted to SCDHEC 12 months after the waste is generated in sufficient quantities to enter the STP.

Chapter 7. Storage

DOE is committed to storing mixed waste in compliance with RCRA storage requirements in 40 CFR 264 or 40 CFR 265, or equivalent state RCRA storage regulations, and approved variances pending the development of treatment capacity and implementation of the Site Treatment Plan (STP).

To ship mixed waste offsite for treatment, storage before, and after treatment will be arranged on a case-by-case basis between the shipping and receiving sites, in consultation with the affected states. Factors such as inadequate compliant storage capacity at the shipping site and the need to facilitate closure of the shipping site will be considered in proposing shipping schedules.

The Savannah River Site (SRS) currently operates several mixed waste storage facilities in accordance with the hazardous waste management regulations promulgated by the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC). The EPA established a framework for the proper management of hazardous waste by promulgating the regulations contained in 40 CFR 260-270. These regulations implement Subtitle C of the Resource Conservation and Recovery Act (RCRA). South Carolina has obtained authorization from the EPA to implement the South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.260-270 in lieu of the majority of federal regulations promulgated by the EPA in 40 CFR 260-270. There are some exceptions to the SCDHEC’s authority to implement the hazardous waste program in South Carolina, so the Savannah River Site (SRS) must comply with the both EPA and SCDHEC's environmental regulations depending on the delegation of authority. For the purposes of this document, compliance with the EPA regulations that South Carolina has not received authority for are included in the discussions concerning compliance with the SCHWMR, unless it is stated otherwise.

Each onsite, mixed waste storage facility at SRS complies with the SCHWMR. For the most part, facilities under interim status meet the minimum state standards of the SCHWMR R.61-79.265, while permitted facilities meet the final facility standards of SCHWMR R.61-79.264 and the specific requirements outlined in the facility's RCRA Part B Permit. Both categories of facilities must comply with future regulations adopted by EPA or SCDHEC.

The F-Area and H-Area Tank Farms, which receive high-level waste (HLW) generated by operations at the Savannah River Site, are permitted under Industrial Wastewater Permits 17,424-IW and 14,520-IW of the South Carolina Pollution Control Act rather than RCRA.

Due to a lack of treatment capacities for mixed wastes, a Federal Facility Compliance Agreement for the land disposal restrictions (LDR-FFCA) was entered into by the EPA-Region IV and the Department of Energy (DOE) to provide a period for the SRS to construct and operate treatment facilities for the prohibited mixed wastes. The wastes covered by the LDR-FFCA were either current stored wastes, or they were to be generated in the future, stored, and treated, by the operation of the facilities at the SRS, in accordance with the LDR-FFCA. The LDR-FFCA required notification to regulators of the generation of new LDR waste streams and estimates of future generation of LDR wastes. The LDR-FFCA formalized a plan for the mixed waste treatment facilities and included schedules, permitting requirements, and compliance issues. The LDR-FFCA was modified through a bridging amendment to cover the period of time until October 1995 when the Site Treatment Plan compliance order under the Federal Facility Compliance Act (FFCAct) of 1992 was signed and became effective. The Approved STP and Consent Order 95-22-HW superseded the LDR-FFCA on September 29, 1995.

7.1 Existing SRS Mixed Waste Storage Capacity

Mixed waste falls into three categories: mixed low-level waste (MLLW), mixed transuranic (MTRU) waste, or high-level waste (HLW). These three types of mixed wastes are not stored in the same facilities. Section 7.1.1 discusses the storage provisions for mixed low-level waste. Section 7.1.2 discusses storage of mixed TRU waste. Section 7.1.3 discusses the storage of HLW at the F-Area and H-Area Tank Farms.

7.1.1 Mixed Low-Level Waste (MLLW)

This section addresses the storage areas, waste inventories, and specific facility descriptions of MLLW at SRS. MLLW is currently stored in RCRA-permitted and interim status storage facilities, such as MLLW container storage and tank storage areas. Section 7.1.1.1 discusses the permitted and interim status facilities. Section 7.1.1.2 contains the inventories of the storage facilities as of October 1, 1997. Section 7.1.1.3 describes the MLLW storage facilities.

7.1.1.1 MLLW Permitted and Interim Status Storage

The following facilities are currently in use or planned for MLLW storage. These facilities have either been approved for interim status under RCRA Part A, or permitted by a RCRA Part B Permit.

Each of these storage facilities is described in Section 7.1.1.3, "Description of MLLW Facilities". Table 7.1, "MLLW – Storage Capacity", provides the current storage capacities and the storage permit status (RCRA Interim Status or RCRA Part B Permitted) for each of these storage facilities.

Mixed Low-Level Waste–Container Storage

- Mixed Waste Buildings 645-N, 645-2N, and 645-4N in the Hazardous Waste Storage Facility in N Area
- Solid Waste Storage Pad (SWSP) in N Area
- Mixed Waste Storage Building 643-29E in E Area
- Mixed Waste Storage Building 643-43E in E Area
- Mixed Waste Storage Shed 316-M in M Area
- Mixed Waste Storage Pad 315-4M in M Area

In addition, some MLLW is stored on TRU pads 2 through 19.

Construction of the CIF has been completed and waste burning has commenced, but the unit is currently in suspension of operations. There is no lag area for container storage at the CIF. The only container storage at the CIF is for accumulation of a modest few hundred boxes in support of the continuing combustion process. The stabilized ashcrete and blowdown resulting from the combustion process will be stored and/or disposed at the appropriate facilities.

Mixed Low-Level Waste–Tank Storage

- DWPF Organic Waste Storage Tank in S-Area
- Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks
- Liquid Waste Solvent Tanks S33-S36
- Note: Tanks S23–S30 are no longer in use.

Burial Ground Solvent Tanks S23-S30 have undergone closure and have been replaced by new Liquid Waste Solvent Tanks S33-S36. A revision to the RCRA Part A has been approved adding Liquid Waste Solvent Tanks S33-S36. During the closure of tanks S23-S28, waste from S23-S28 was transferred to S29 and S30. Waste from S29 and S30 has been transferred to S33-S36. With certification of closure of the Burial Ground Solvent Tanks (S23-S30), SRS submitted a final notice changing the capacity of the Burial Ground Solvent Tanks S23-S30 to zero and the Liquid Waste Solvent Tanks S33-S36 to 120,000 gallons.

Table 7.1 Mixed Low-Level Waste (MLLW)–Storage Capacity

MLLW Container Storage

Facility Name	Storage Area	Location	RCRA Status	Storage Capacity[(1)] Volume in Gallons (m^3)
Hazardous Waste Storage Facility	Mixed Waste Building N Area	645-N 645-2N 645-4N SWSP	B	780,968[(5)] (2,956)
Mixed Waste Storage Building	E Area	643-29E	A	133,303[(5)] (504)
Mixed Waste Storage Building	E Area	643-43E	A	436,263[(5)] (1,651)
Mixed Waste Storage Shed	M Area	316-M	A	30,800 (116.6)
Mixed Waste Storage Pad	M Area	315-4M	A	600,000 (2,271)
TRU Pads	E Area	Pads 2-19	A	N/A[(2)]
			TOTAL	1,981,334[(2)] (7,499)

MLLW Tank Storage

Facility Name	Storage Area	Location	RCRA Status	Storage Capacity[(1)] Volume in Gallons (m^3)
DWPF Organic Waste Storage Tank	S Area	430-S	B	150,000 (568)
SRTC Mixed Waste Storage Tanks	SRTC	776-2A	A	52,310 (198)
Solvent Tanks Burial Ground Solvent Tanks S23-S30	E Area	S23-S30	A (closed)	0 (0)
Liquid Waste Solvent Tanks S33-S36	H Area	S33-S36	A (new construction)	120,000[(3)] (454)
			TOTAL	322,310 (1,220)[(3)]

(1) This capacity is that allowed by RCRA Part A Interim Status or Part B Permits.

(2) There is no MLLW related capacity on the TRU pads. The MLLW in storage on the TRU pads or in Buildings 645-N and 645-4N uses storage capacity and storage space assigned to mixed TRU waste.

(3) Tanks S23-S30 have undergone interim closure. The 200,000 gallons will be eliminated, and 120,000 gallons will be the revised capacity for new Liquid Waste Solvent Tanks S33-S36. The TOTAL is based on 120,000 gallons capacity for tanks S33-S36.

(4) Maximum storage of non-free liquid wastes.

7.1.1.2 Stored MLLW Inventory

The inventory of waste currently stored in each of these facilities is given in Table 7.2, "MLLW Stored Inventory and Excess Capacity". These stored volumes, subtracted from the capacities listed in Table 7.1, result in the excess capacities listed in Table 7.2.

Table 7.2 MLLW Stored Inventory and Excess Capacity (9/30/99)

MLLW Container Storage

Facility	Stored Inventory Gallons (m^3)*	Excess Storage Capacity[(1)] Gallons (m^3)**
Mixed Waste Buildings 645-N, 645-2N, 645-4N, and SWSP[(2)]	276,325 (1046)	630,056 (2,384.8)
Mixed Waste Storage Building 643-29E	24,515.3 (92.8)	108,788 (411.2)
Mixed Waste Storage Building 643-43E	59,438.9 (225)	376,824.1 (1,426)
Mixed Waste Storage Shed, 316-M	17,292 (65.5)	13,508 (51.1)
Mixed Waste Storage Pad, 315-4M	309,104 (1,170)	290,896 (1,101)
TRU Pads	19,758 (87)	N/A[(2)]

TOTAL 1,453,881 (5,503)[(2)]

MLLW Tank Storage

Facility	Stored Inventory Gallons (m^3)	Excess Storage Capacity Gallons (m^3)
DWPF Organic Waste Storage Tank[(3)]	0 (0)	150,000 (567.8)
SRTC Mixed Waste Storage Tanks	26,278 (99.5)	26,022 (98.5)
Burial Ground Solvent Tanks S23–S30[(4)]	0 (0)	0 (0)
Liquid Waste Solvent Tanks S33–S36[(5)]	36,746 (139.1)	83,254 (314.9)

TOTAL 256,180 (969.7)

(1) For details see Section 7.2.1.

(2) There is no MLLW-related capacity on the TRU pads. The MLLW in storage on the TRU pads uses storage capacity and storage space assigned to mixed TRU waste.

(3) This facility may begin storing mixed waste after the DWPF begins salt process cell operations.

(4) These tanks are closed.

(5) Transfer operation of solvent from burial ground solvent tanks to Liquid Waste Solvent Tanks S33–S36 has been completed.

* The inventory includes all waste stored regardless of radioactive or hazardous classification.
** This is based on currently approved (Jan. 2000) storage volumes.

7.1.1.3 Description of MLLW Facilities

Buildings 645-N, 645-2N, 645-4N, and the Solid Waste Storage Pad (SWSP)

Buildings 645-N, 645-2N, 645-4N, and the SWSP are part of the HWSF and are used for storage of MLLW and non-radioactive hazardous waste. Storage containers in Buildings 645-N, 645-2N, and 645-4N are typically 55-gallon drums (0.2 m^3) or 20 to 90 ft^3(0.6 to 2.6 m^3) boxes. Building 645-2N primarily stores MLLW while Buildings 645-N and 645-4N primarily store non-radioactive hazardous waste.

Buildings 645-2N and 645-4N are steel-framed buildings with sheet metal siding. Building 645-N is a partially enclosed building with metal and chain-link fence for the walls. The floor in Building 645-N is subdivided into seven (7) cells, the floor in Building 645-2N is subdivided into four (4) cells, and Building 645-4N is not subdivided. Building 645-4N and each of the cells in Buildings 645-N and 645-2N have concrete dikes capable of containing at least 10% of the maximum volume of wastes containing free liquids that the building and the cells can store. In addition, the floor in Building 645-4N as well as each cell in Buildings 645-N and 645-2N slopes to a sump. All three buildings have lighting, and Building 645-2N has forced ventilation.

The SWSPs are open storage areas located on the asphalt in the N-Area HWSF. The SWSP is comprised of three waste pads: Waste Pad 1, Waste Pad 2, and Waste Pad 3. Waste Pad 1 is located between Buildings 645-2N and 645-4N. Waste Pad 2 is located between Buildings 645-4N and 645-N. Waste Pad 3 is located east of Building 645-N. The SWSPs are each partially covered with 18-foot-wide weather shelters. The SWSP has storage capacity to store 13,400 55-gallon drums or 2,192 45-ft^3-storage containers.

Access to the SWSP and Buildings 645-N, 645-2N, and 645-4N, which are all located within the chain-link fence surrounding the N-Area HWSF, is controlled by the custodian, Solid Waste Operations. The security fence gate is locked when operations are not occurring within the HWSF.

Building 643-29E

Building 643-29E is primarily used for storage of mixed low-level waste. The building is designed and constructed as a curbed, concrete pad covered by a metal-framed building. The building is constructed of steel I-beam frames with a sheet metal roof and partial sheet metal siding. The building measure 60 feet × 60 feet with a 50 feet × 50 feet storage pad area.

The storage area of the pad is curbed and includes a concrete sump to collect any leaks. Waste stored in the building is packaged in a variety of drums (23-gallon, 55-gallon, 83-gallon [0.09 m^3, 0.2 m^3, 0.31 m^3, respectively]) 20 ft^3 to 90 ft^3 steel boxes (0.6-2.6 m^3), concrete casks used as shielding overpacks to reduce dose rate, and sea-land containers for shipment to CIF. Other containers, including special design containers, may also be used occasionally.

Building 643-43E

Building 643-43E is designated for storage of mixed low-level and hazardous waste. The building is nearly identical in design to Building 643-29E. Building 643-43E measures 160 feet × 60 feet overall with a 150 feet × 50 feet storage pad area. Building 643-43E is located just east of Building 643-29E. The concrete pad within the building is curbed around the storage area and includes a sump. A RCRA Part B modification will be submitted to allow the placement of HATF and HANDS-55 within this building.

Waste stored in the building is contained in 55-gallon drums (0.2 m^3), 20 ft^3 to 90 ft^3 steel boxes (0.6-2.55 m^3), concrete casks used as shielding overpacks to reduce dose rate, and intermodal shipping containers for shipment to CIF. Other containers, including special design containers, may also be used occasionally.

Building 316-M

The Mixed Waste Storage Shed, Building 316-M is typically used for storage of mixed low-level waste that contains no free liquids. The building measures 120 feet × 50 feet. The storage area of the building is 100 feet × 40 feet.

The storage area of the concrete pad within the building is curbed on three sides. The fourth side of the pad is elevated to ensure positive drainage to 12 static sumps within the pad. An interior curb divides the pad into halves, each half having six sumps. The sumps are divided into sets of three, which are connected. Liquids found in the sumps can be checked for radioactivity. If present, additional analysis is made for RCRA constituents.

Waste stored in the building is packaged in 55-gallon (0.2 m^3) drums and large steel boxes (typically B-25 type, 2.55 m^3). Other containers, including special design containers, may also be used occasionally.

315-4M Storage Pad

The 315-4M storage pad is a concrete pad and is used for containerized storage of hazardous and mixed wastes. The storage pad is 135 feet × 200 feet overall and is curbed on all four sides except for a 23-ft access way on the south side. It has a 134 feet × 199 feet storage area within the curbed area.

The pad has a 0.6% grade, running east to west. Curbing will prevent run on to the facility and serve to direct rainwater to a storm water drain, located on the west portion of the pad. The pad is completely fenced with a lockable access gate on the south side.

The waste to be stored will be packaged in approved containers, generally 71-gallon square steel drums, 55-gallon drums, and large steel boxes (typically B25 type, 2.55 m/box). Other type containers, including special design containers, may be used occasionally. No liquid or multiphasic waste will be stored within the pad.

DWPF Organic Waste Storage Tank

The DWPF Organic Waste Storage Tank has a capacity of 150,000 gallons (567.8 m^3). The tank is constructed of 304-L stainless steel and is approximately 35 feet in diameter. It has a double-seal internal floating roof and a fixed dome roof. A full height carbon steel outer vessel serves as secondary containment. The outer vessel is equipped with provisions for continuous liquid leak detection and has a roof for weather protection.

The tank vapor space is made inert with nitrogen gas. Foam injection nozzles are installed in the primary and secondary tanks for fire suppression. An emergency vent, which relieves to the atmosphere, prevents over-pressure of the tank in case of an external fire.

SRTC Mixed Waste Storage Tanks

There are ten radioactive liquid waste tanks identified as tanks A through H, J and K. They are located below grade in an underground vault. Tanks A through G each have a capacity of 5900 gallons (22.3 m^3) and are 10 feet in diameter × 11 feet high. Tanks H, J, and K each have a capacity of 3670 gallons (13.9 m^3) and are 8 feet in diameter × 11 feet high. All tanks are constructed of 0.5-inch stainless steel in accordance with the American Society of Mechanical Engineers (ASME) Codes for unfired pressure vessels. The tanks are located in concrete vaults. The exterior walls of the vaults are 12 inches thick with 18-inch thick partition walls between adjacent vaults.

Each tank is equipped with an agitator, a sampling system, and a dip line extending to about one inch above the tank bottom. The dip line is used for transferring waste material from the tank. The tanks are agitated for sampling and during waste transfer operations. After a tank is emptied, a liquid heel of approximately 50 liters remains in the bottom of the tank. Each tank has an internal wash jet such that liquid can be circulated internally and sprayed.

Solvent Tanks

The solvent in the Burial Ground Solvent Tanks S23-S30 was transferred to the Liquid Waste Solvent Tanks S33-S36. Tanks S23-S30 have undergone interim closure. The Liquid Waste Solvent Tanks S33-S36 have replaced, or partially replaced, the capacity currently permitted for the Burial Ground Solvent Tanks S23-S30 as discussed in Section 7.1.1.1. The approved RCRA Part A revision that SRS submitted to include Tanks S33-S36 on the RCRA Part A describes the tanks as four buried, double-walled tanks with nominal capacities of 30,000 gallons each. Each tank has been constructed of carbon steel and has been provided with corrosion protection, a leak detection system, leak collection sump, overfill protection, waste agitation pumps, single filtration system, and inspection ports.

7.1.2 MTRU Waste

There are currently 19 mixed TRU waste storage pads located at the burial ground in E Area. Mixed TRU waste is stored on storage pads 1-19. Pads 18 and 19 were approved for interim storage in January 1996 by SCDHEC.

The 19 storage pads are included in the RCRA Part A permit for SRS. TRU pad 1 is covered with soil and currently managed as a RCRA Subpart X Miscellaneous Unit while TRU pads 2-19 are managed as a RCRA Subpart I Container Storage Unit. Retrieval on TRU pads 2-5 is complete.

Storage containers on the pads consist mainly of 55-gallon (0.2 m^3) carbon steel and galvanized steel drums. Other containers include concrete culverts that contain either 55-gallon drums or small polyboxes, large carbon steel boxes, steel and concrete casks, and numerous steel boxes of various sizes.

7.1.2.1 MTRU Waste Storage

Storage pads 1-19 are under interim status for storage of an aggregate of 4,031,000 gallons (15,257 m^3) of mixed TRU waste as follows:

Pads 1-5	1,111,000 gallons	(4,205 m^3)
Pads 6-19	2,920,000 gallons	(11,052 m^3)
TOTAL	4,031,000 gallons	(15,257 m^3)

In 1989, SRS was granted a variance from a portion of the South Carolina Hazardous Waste Management Regulations (SCHWMR), R.61-79.265.35 and 265.173(c) and (d) for Pads 6-13. These sections of the regulations described the requirements for aisle spacing and labeling of container storage areas. A Conditional Variance from aisle spacing requirements of SCHWMR R.61-79.265.35 for containers stored on TRU pads 14 through 17 was granted to the SRS on June 2, 1993. The Conditional Variance was issued to SRS through December 31, 1998. A plan was submitted to SCDHEC in September 1998, to reconfigure aisle spacing on all TRU storage pads. A modification to the STP for the aisle spacing reconfiguration was submitted to SCDHEC September 20, 1999. This reconfiguration was further amended in October 2000. The schedule is included in Chapter 3 of Volume I.

In March 1989, SRS discovered that rainwater had infiltrated through the filter vents into some of the drums stored on concrete pads. Subsequently, in February 1991, SRS submitted a dewatering plan to SCDHEC that outlined a procedure for dewatering the drums. SRS has completed dewatering of the TRU drums, and the drums are being appropriately labeled and stored on enclosed TRU pads 14 through 19. These eight pads (14 through 19, and pads 4 and 6) are presently the only TRU pads with weather enclosures. On July 31, 1998, SCDHEC was notified by letter of rainwater in leakage that was discovered in 15 boxes on the TRU storage pads. An inspection and dewatering schedule was submitted to SCDHEC April 28, 1999. Dewatering is complete. Disposition of liquid is in progress.

7.1.2.2 MTRU Waste Stored Inventory

The inventory of mixed TRU waste stored on the TRU pads is 1,868,428 gallons (7,072 m^3) as of October 1, 2000.

7.1.2.3 Description of MTRU Waste Storage Pads

TRU pads 1 through 6 are located in the southeastern corner of the 643-7E Solid Waste Disposal Facility (SWDF). Each has been filled with containerized waste. Pads 1 through 5 were subsequently covered with three feet of fill soil, a synthetic liner, a foot of fill soil, and six inches of topsoil with grass seed (Pensacola Bahai). Pads 1 through 4 were coated with spray made from asphalt (for erosion control). Mounding over the pads provides shielding for the stored radionuclides and protection of the waste forms from nature and intrusion. Retrieval is complete on TRU pads 2-5.

TRU pads 7 through 13 are located adjacent to each other in the northeastern corner of the 643-7E SWDF, and TRU pads 14 through 19 are located adjacent to each other in approximately the center of the 643-7E SWDF. TRU pads 2 through 19 are not covered with soil and will not be covered because this waste will be shipped to WIPP.

Each of the 19 TRU pads is sloped to the center and to one end. This directs any liquid to a drain that is connected to a sump. The liquid in each sump is sampled, analyzed, and, if there is any radioactive contamination, removed by pumping, and managed accordingly.

TRU pads 4 and 6 and 14 through 19 are roofed with a structural enclosure system. Similar enclosures are planned for other pads. The purpose of the enclosures is to protect stored waste drums from rain until treated and disposed.

Salient features of the enclosures are (1) leak proof roof with ultraviolet light protection (Ledlar or equivalent), (2) high wind load resistance, and (3) no center columns.

7.1.3 High-Level Waste (HLW)

The F-Area and H-Area Tank Farms contain waste tanks and evaporator systems that manage and treat the high-level radioactive wastewater generated by operations at the Savannah River Site. These HLW waste streams are generated at several different sources and are introduced into the tank farms at several different locations. HLW is produced during reprocessing of spent nuclear fuel or are derived from other processes that handle HLW. The tanks and evaporator systems in the F-Area and H-Area Tank Farms receive fresh wastes, allow radioactive decay by waste aging, provide primary clarification by gravity settling, and remove dissolved salts after concentration by evaporation. The H-Area HLW Tank Farm also contains process units to treat the accumulated sludges and salts. The F-Area and H-Area Tank Farms operate under Industrial Wastewater permit number 17,424-IW, with the exception of Tank 50 that operates under Industrial Wastewater permit number 14,520-IW.

7.1.3.1 HLW Storage

The F-Area and H-Area Tank Farms are currently permitted under Industrial Wastewater permits to store HLW. The tank farms are described in Section 7.1.3.3, “Description of F-Area and H-Area Tank Farms”.

7.1.3.2 HLW Stored Inventory

The total inventory of stored HLW in all of the tanks in the F-and H-Area Tank Farms is approximately 36 million gallons (137,000 m^3 as of October 1, 2000). Of the 27 Type III/IIIA tanks (Table 7.3), four tanks are dedicated for processing of HLW for final disposal. The excess available capacity within these tanks is approximately 1,350,000 gallons (5,720 m^3), not including tanks 48 and 49 (salt processing), tank 50 (ETF concentrate storage) and Tank 51 (DWPF feed). This excess capacity does not take into account dedicated capacity for emergency storage in an amount equivalent to the volume of two tanks.

7.1.3.3 Description of F- and H-Area HLW Tank Farms

The F- and H-Area HLW Tank Farms contain waste tanks and evaporator systems to manage and treat the high-level radioactive wastewaters generated by the SRS operations. The above units function to receive fresh wastes, allow radioactive decay by waste aging, provide preliminary clarification by gravity settling, and remove dissolved salts by evaporation. The low activity aqueous portion (overheads from the evaporator systems) is transferred to ETF for final treatment prior to discharge to Upper Three Runs Creek. Mercury is recovered from the wastewater and collected for recycle/reuse within the SRS separations processes.

The H-Area HLW Tank Farm also contains process units to treat the accumulated sludges and salts. The sludge processing operation is designed to prepare the sludges for transfer to the DWPF Vitrification Facility.

Work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3)

Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE's selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

The F-Tank Farm contains 22 tanks and the H-Tank Farm contains 29 tanks. Due to a history of leakage, Tank 16, a Type II tank, has been emptied, cleaned, removed from service, and is not included in this discussion. Also, F-Tank Farm tanks 17 and 20, Type IV tanks, have been operationally closed, back-filled with grout, and are not included in this discussion.

Table 7.3 Storage Capacity for F-Area and H-Area Tank Farms

Tank Type	Area	No. of Tanks	Capacity, Each (10^6 gallons)	Total Capacity (10^6 gallons)
I*	F	8	0.75	N/A
I*	H	4	0.75	N/A
II*	H	3**	1.03	N/A
III/IIIA	F	10	1.3	13.0
III/IIIA	H	17	1.3	22.1
IV*	F	2***	1.3	N/A
IV*	H	4	1.3	N/A
			TOTAL	35.1

* These tanks do not meet secondary containment criteria as described in the FFA and are therefore not used in determining the total and excess storage capacity. These tanks, however, currently contain waste that has been included in the total current waste inventory.

** Tank 16 is excluded.

*** Tank 17 and Tank 20 are operationally closed and backfilled with grout.

The design of each of the four types of waste tanks was based on the best available professional engineering judgment, proposed use, and progressive operating experience. In general, the Type I waste tank design consists of a primary tank made of carbon steel. Surrounding the primary tank is a 5-foot-high carbon steel secondary pan. The annulus pan has a leak detection system consisting of conductivity probe to detect liquid and a liquid level bubbler. The secondary pan is enclosed by a concrete vault, which also surrounds the entire primary tank. Type I tanks have a nominal storage capacity of 750,000 gallons (2,838.7 m^3).

The Type II tanks are also made of carbon steel with a 5-foot high annulus pan, surrounded by a concrete vault and provided with leak detection. Type II tanks have a 1.03 million gallon (3,898.5 m^3) nominal storage capacity.

The primary tanks of Type III/IIIA tanks are constructed of carbon steel. A full-height carbon steel secondary tank that is capable of containing the complete volume of the primary tank surrounds each primary tank. The secondary tank is provided with leak detection. Type III/IIIA tanks have a nominal storage capacity of 1.3 million gallons (4,920 m^3).

Each of the Type IV tanks is basically a carbon steel-lined pre-stressed concrete tank with a domed roof. Leak detection for these tanks is provided by a grid of channels in the concrete foundation under the tank that drain to a sump outside the periphery of the tank wall. Type IV tanks are not equipped with a steel annulus pan or full steel secondary tanks. The nominal storage capacity for Type IV tanks is 1.3 million (4,920 m^3).

7.2 Future Storage Capability Needs for SRS Wastes

Requirements for future storage capability for mixed TRU and mixed low-level wastes are based on the current aisle spacing plan. The generation of TRU and MLLW and the capacity required to store it might change as missions change and shipping volumes to WIPP decrease.

The information provided in Section 7.2.3, “High-Level Waste,” concerning future waste generation is based on the current best available estimate. The generation of HLW and the capacity required to store it might change drastically as missions of facilities producing HLW change.

7.2.1 MLLW

The future generation of mixed low-level waste derived from the waste forecast is given in Table 7.4. These forecasted wastes include wastes generated by ER activities. This forecasted waste in Table 7.4 does not include stabilized M-Area sludge and stabilized ash and blowdown resulting from operation of the CIF. Storage of these two wastes has already been accounted for on an existing storage pad in the M Area.

Table 7.4–Future Generation of Mixed Low-Level Waste

Units	MLLW Volume					
	FY2001	FY2002	FY2003	FY2004	FY2005	TOTAL
Gallons	4,914	4,058	4,005	4,135	3,923	21,036
Cubic meters	18.6	15.4	15.2	15.7	14.9	79.6

Storage of the total of the forecasted waste will exceed the storage capability of the MLLW storage facilities. The excess will be stored on the TRU pads and will use some of the available interim status storage capacity of the TRU storage facilities. Storage of the wastes in the MLLW storage facilities will be within the interim status or permitted capacities.

MLLW storage Building 643-43E became operational in 4Q federal FY 95. Filter paper take-up rolls have been removed from MLLW storage Buildings 645-2N and 316-M, shredded and treated at CIF leaving storage space available in storage Building 645-2N.

Building 643-29E is currently filled due to odd-sized containers and will not accept additional containers. The storage capacity of 31,750 gallons for this building is based on 210 55-gallon drums and 30-90 ft^3 boxes. The 31,750-gallon capacity does not take into consideration other types of containers such as concrete culverts and specially designed boxes, stored in Building 643-29E, which currently limit the storage capability to the stored volume listed in Table 7.2.

B25 boxes and 55-gallon drums will be stored in buildings 645-2N and 643-43E. SRTC casks, ITP filters, and miscellaneous containers will be stored on vacant areas of the TRU pads. The storage capacity of the MLLW storage buildings is based on container receipts spread over the five years as indicated by the annual generation in Table 7.4.

Due to the timing of waste receipts and the beginning and rate of treatment in the CIF there may be more MLLW to store than space available in the MLLW storage buildings. Space on the TRU pads will be utilized to temporarily meet the need. Approval of the Part B renewal application for the Mixed Waste Storage Buildings is currently under review by SCDHEC and will enable activation of storage pads 20-22 for mixed waste storage use.

The plan for interim MLLW storage tentatively retains MLLW on TRU pads, although some containers have been shipped offsite and plans continue for the removal of other containers.

The Part A revision approved by SCDHEC provided an interim status capacity of 600,000 gallons (2,271 m^3) from the available capacity of TRU pads 6 through 19 for the M-Area pad (315-4M). This enables storage of 200,000 gallons of M-Area stabilized sludge and 250,000 gallons (946.2 m^3) of CIF stabilized ash and blowdown (see discussion in Section 7.2.2). The recent waste forecast has segregated the CIF stabilized ash and blowdown produced by the CIF into MLLW and LLW with the LLW representing approximately 70% of that generated. This has significantly reduced the volume of MLLW from the CIF to be stored, such that the storage space on the M-Area pad can accommodate the storage of the CIF MLLW through approximately mid-federal FY 2003.

The MLLW currently stored in tanks is shown in Table 7.3 by individual storage area. Processes for treatment of these wastes are planned for implementation and will progressively diminish the volumes of waste currently stored and generated in the future. Consequently, the inventory in the tanks will vary with time and will be the result of a balance between waste processing rate and rate of future generation of waste such that the established capacities are not exceeded.

7.2.2 MTRU Waste

The study completed in the beginning of federal FY 96 of stored MTRU, TRU, and MLLW waste included a detailed evaluation of containers of wastes currently stored on the TRU pads in consideration of current container storage configurations, locations, and containers of future generated waste to be stored. In order to provide the necessary storage capability for MTRU and MLLW, including some TRU waste, a new RCRA storage area may be required to support storage of the forecasted containers through federal FY 2004. It was necessary to include TRU waste containers in the evaluation of containers stored on the TRU pads since existing and future generated drummed TRU waste and TRU waste in culverts may continue to be stored on the TRU pads for safety reasons. Storage of MLLW on the TRU pads is necessary to support storage in excess of the storage capability of the MLLW storage facilities. This may necessitate the addition of more storage area for the forecasted containers including a portion of the drums retrieved from pads 2-5. The current Aisle Spacing Plan may necessitate the construction and permitting of additional storage pads.

The interim status capacity of 4,031,000 gallons (15,257 m^3) for TRU pads 1 through 19 was given in Section 7.1.2.1. The inventory of RCRA wastes stored on these pads must be subtracted from this total capacity to determine available capacity. This information, including the inventory in storage on the TRU pads as of September 30, 2000, is summarized in Table 7.5.

Table 7.5-Available Interim Status Capacity of TRU Pads Based on 9/30/00 Inventory

Volume Category	Gallons (m^3)
Total interim status capacity of TRU pads, Section 7.1.2.1	4,031,000 (15,257.3)
LESS: Total mixed TRU and MLLW stored on TRU pads	1,868,428 (7,072)
TOTAL AVAILABLE UNUSED CAPACITY OF TRU PADS	2,162,572

All non-mixed black boxes of TRU Waste stored on TRU pads were moved to a non-RCRA storage location. Also, all future generation of black boxes of TRU Waste will be located at a non-RCRA storage location.

In 1989, SRS was granted a variance from a portion of the South Carolina Hazardous Waste Management Regulations (SCHWMR), R.61-79.265.35 and 265.173 (c) and (d) for Pads 6-13. These sections of the regulations described the requirements for aisle spacing and labeling of container storage areas. A Conditional Variance from aisle spacing requirements of SCHWMR R.61-79.265.35 for containers stored on TRU pads 14 through 17 was granted to the SRS on June 2, 1993. The Conditional Variance was issued to SRS through December 31, 1998. A plan was submitted to SCDHEC in September 1998, to reconfigure aisle spacing on all TRU storage pads. A modification was submitted to SCDHEC September 30, 1999 and amended October 31, 2000. The schedule is included in Chapter 3 of Volume II.

Various waste containers including MTRU, TRU, and MLLW containers largely occupy the TRU pads. Some storage space is available on the TRU pads. Empty areas of covered pads will be reserved for storage of retrieved mixed TRU waste drums.

Drums of TRU waste will be stored in covered storage on TRU pads 14-19 and culverts containing TRU waste containers (>0.5 Ci each) will be stored on TRU pads 7-13. Since these TRU waste containers currently occupy

TRU pad storage area, they must be considered in arriving at available storage space. Presently, culverts containing both TRU and MTRU containers are being placed on the TRU pads and new MTRU culverts are being aisle spaced as received.

Forecasted mixed TRU waste generation is given in Table 7.6.

Table 7.6–Forecasted Generation of Mixed TRU and TRU Wastes

Waste Type	Volume, Gallons (m^3)					
	FY2001	**FY2002**	**FY2003**	**FY2004**	**FY2005**	**TOTAL**
Mixed TRU	2.166 (8.2)	925 (3.5)	845 (3.2)	1,083 (4.1.)	2,378 (9.0)	7,397 (28)
TRU	26,895 (101.8)	23,461 (88.8)	21,215 (80.3)	16,143 (61.1)	45,892 (173.7)	133,606 (505.7)

Storage of these containers essentially consumes the available MTRU storage space. Pads 18 and 19 are essentially filled with retrieved drums. With various non-standard MLLW containers sharing some of the TRU pad storage area, all available TRU pad storage space will be occupied. It is likely that additional storage space will be needed by the end of the five-year period.

In Table 7.5 it was noted that the available interim status storage capacity of TRU pads 1 through 19, as of September 30, 2000, was 1,868,428 gallons (7,072 m^3). The available interim status storage capacity remaining after receipt of the 7,397 gallons (28 m^3) is 1,861,031 gallons (7,044 m^3). This available storage capacity is considered adequate to provide for storage of some of the MLLW containers on the TRU pads and unanticipated changes in forecasted future generation MTRU waste storage needs.

7.2.3 HLW

Forty-nine tanks in the F-Area and H-Area Tank Farms are industrial wastewater permitted. Twenty-two of these tanks are old-style (Type I, II, or IV) tanks that are in limited service. The other 27 tanks are type III/IIIA tanks that are in active service supporting the storage and processing of HLW. Four of the 27 type III/IIIA tanks are currently dedicated for the support of sludge or salt processing. Of the remaining 23 tanks, an excess storage capacity of only approximately 1,305,000 gallons (5,720 m^3) is available for future waste receipts.

The forecast of future HLW influents for federal FY01 through FY05 is approximately 15 million gallons (HLW System Plan, Rev. 11 target case) including 3,600,000 gallons (13,700 m^3) from the F-Area and H-Area Separations process to F-Area and H-Area Tank Farms, 4,900,000 gallons (18,647 m^3) of DWPF recycle, 4,200,000 gallons (15,983 m^3) of ESP wash water, and 2,300,000 gallons (8,753 m^3) of miscellaneous smaller streams. This forecast exceeds the currently available storage capacity of 1,350,000 gallons (5,720 m^3); however, HLW will continue to be evaporated and will be processed. In addition, numerous alternatives are currently being pursued to maximize the available tank space until the start of salt processing. The DWPF and Saltstone Manufacturing Facility will provide final waste treatment and storage of the HLW.

Work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include: 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE’s selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

Based on current projections and scheduling, the F-Area and H-Area Tank Farms will have sufficient storage capacity for future waste generation through the five-year period of federal FY 2001 through FY 2005.

7.3 Storage Capacity Needs

MLLW Capacity

Table 7.7 gives the current available storage capacity for the aggregate of the MLLW facilities and the future waste generation volumes. The mixed TRU waste current available capacity and forecasted waste generation volumes are also included in the table. Since all of these storage facilities are RCRA interim status/permitted facilities and can be used for storage of both MLLW and mixed TRU waste, Table 7.7 also includes a combined interim status/permitted capacity for MLLW and mixed TRU waste storage facilities to show an overall net available storage capacity.

The volumes of forecasted future generation wastes are within the available interim status/permitted capacity envelope, and additional capacity will not be needed. The available capacity is also adequate to store the anticipated small volume of residuals shipped back to SRS following treatment of SRS wastes at other DOE sites.

Table 7.7 Overall Mixed Waste Excess Capacity Through Federal FY 2004

Waste Type	Available Capacity, Gallons (m^3)	Forecasted Generation FY00-FY04, Gallons (m^3)	Capacity After Five Years, Gallons (m^3)
MLLW - Aggregate of existing facilities	1,453,881 (5,503) from Table 7.2	100,053 (378.7) from Table 7.4	1,353,828 (5,124.3)
Mixed TRU Waste and MLLW on TRU pads	2,260,590 (8,556.3) from Table 7.5	11,089 (42) from Table 7.6	2,249,501 (8,514.3)
NET AVAILABLE INTERIM STATUS/PERMITTED CAPACITY			3,603,329 (13,638.6)

Table 7.7 Overall Mixed Waste Excess Capacity Through Federal FY 2004 (cont'd)

Waste Low-Level Waste Tank Storage

Waste Type	Available Capacity Gallons (m^3)	Forecasted Generation FY00-FY04, Gallons (m^3)	Capacity After Five Years Gallons (m^3)
DWPF Organic Waste Storage Tank	150,000 (567.8)	35,271 (133.5)	114,729 (434.3)
SRTC Mixed Waste Storage Tanks	26,022 (98.5)	N/A(1)	N/A(1)
Liquid Waste Storage Tanks S33-S36	80,158 (303.4)	7,345 (27.8)	72,814 (275.6)

(1) The inventory in the SRTC MWST will change with time as treatment continues. The treatment processes and future generation will be well coordinated so as to ensure that the stored volume does not exceed capacity.

7.4 Future Storage Capacity Needs for Offsite Waste

Relatively small volumes of offsite waste are projected to be sent to SRS. These small volumes do not currently represent a storage problem for SRS.

7.5 Preliminary TRU Shipping Schedule

The following data identifies the TRU shipping schedule and supports the schedule with additional clarification information and assumptions. Similar information was also provided to SCDHEC under separate letter February 28, 2000.

The site will make 4 shipments in FY01, and then 12 shipments a year for the next 13 years at which point the shipping schedule will increase to 60 shipments a year for the next 8 years and then increase again to 120 shipments a year for the next 10 years or until the inventory of TRU waste at SRS has been eliminated. Additional shipments in FY01 and FY02 may be completed to allow receipt of Mound TRU waste in accordance with the October 2000 agreement between DOE and SCDHEC.

A nominal shipment includes 3 TRUPACT-II containers. Each container can hold 14 drum equivalents (2.8 cubic meters). Due to transportation limits shipping volumes may be decreased.

The shipping schedules assume that budget and are available as scheduled. The schedule also assumes that the National Program can and will continue to support the schedule as illustrated. The plan assumes that additional capability will be obtained through Technology Development advancements and through the design, permitting, construction and operation of both a low hazard TRU treatment facility and a high hazard TRU treatment facility as discussed in the STP.

The waste volumes indicated or subject to change if the site receives additional missions or if the site is directed to begin D&D of its plutonium facilities. These waste forecasts and their impacts are not included in this plan. Additionally, it should be noted that as waste is further characterized to go to WIPP some waste may be reclassified as low level waste or low level mixed waste or non-mixed TRU. The SRS TRU program is comprehensive in that it covers all currently identified TRU waste regardless of its RCRA determination. The end objective is that all mixed and non-mixed TRU waste be properly disposed of in a timely manner.

The shipping schedule reflects our strategic plan with the characterization currently available. As such, the first several waste streams identified to be shipped to WIPP include primarily drummed Pu-239 waste, both mixed and non-mixed. These campaigns will be followed by non-mixed poly-boxes and standard waste boxes. When the low hazard facility becomes available, additional drummed waste, both mixed and non-mixed can be shipped. The plan also assumes that some of the waste forecasted to be received from the generators will be packaged in such a manner that it can be shipped directly to WIPP with minimal processing. After the high hazard facility becomes available, the site will have the capability to process higher activity drums, and the non-drummed waste.

Chapter 8. Disposal in Support of the Site Treatment Plan Discussions

This section discusses the overall Department of Energy (DOE) strategy for the disposal of residuals from the treatment of mixed low-level waste (MLLW) subject to the Federal Facility Compliance Act (FFAct). The viable options for the disposal of treatment residuals are provided in this section

8.1 Background

The FFCAct does not impose a requirement for the disposal of mixed wastes after treatment. However, DOE recognizes the need to address this final phase of mixed waste management. Sites identified for mixed waste disposal follow state and federal regulations for siting and permitting and include appropriate public involvment.

Options for disposal of high-level and mixed transuranic wastes are not identified because there are established processes for studying, designing, constructing, and operating disposal facilities for these wastes.

DOE has historically planned to develop MLLW disposal facilities at the six DOE sites currently disposing of low-level waste. These sites are Hanford, Savannah River, Oak Ridge Reservation, Idaho National Engineering Laboratory, Nevada Test Site, and Los Alamos National Laboratory. Of these six sites, only two have been developed and are recognized as complex-wide MLLW disposal sites by the final Waste Management Programmatic Environmental Impact Statement (PEIS) Record of Decision (ROD). These sites are Hanford and Nevada Test Site. Along with the two DOE sites, one commercial site, Envirocare of Utah, was developed to dispose of treatment residues.

DOE may initiate site-specific National Environmental Policy Act (NEPA) evaluations for the proposed disposal facilities and initiate performance assessment analyses for compliance with DOE Order 435.1.

8.2 Current Status of Disposal Sites

8.2.1 Hanford Site

The Hanford Site currently accepts onsite generated mixed wastes that meet Land Disposal Restrictions (LDR). Hanford does not accept offsite treated mixed waste. The disposal facility consists of two double-lined RCRA Subtitle C land disposal units with leachate collection. Each trench has a capacity of approximately 21,000 cubic meters. Additonal capacity may be available in the future.

Before accepting offsite treated mixed waste for disposal, the Hanford site must complete a lower tier EIS. The resulting ROD of their EIS is necessary to support disposal of offsite waste. Completion date for the lower tier EIS is expected by September 2002.

8.2.2 Nevada Test Site

The Nevada Test Site accepts treated mixed waste residues of DOE/NV waste generated in Nevada. Offsite and out-of-state generated mixed waste is not accepted. The disposal facility is an unlined pit located at Area 5. The disposal facility operated under RCRA interim status.

The NTS Part B Permit Application must be revised and approved by the State of Nevada prior to acdepting offsite or out-of-state mixed waste for disposal. The revision must include a justification for an alternative liner and a RCRA compliant verification program. The projected start date for accepting offsite mixed waste is about May 2002.

8.2.3 Envirocare of Utah

Envirocare of Utah accepts treated mixed waste residues for Subtitle C disposal. The Utah State Division of Radiation Control and the Division of Solid and Hazardous Waste jointly permit this disposal facility. A new disposal facility is planned to be built on the Envirocare site. The new facility will include separate low-level radioactive waste and mixed waste portions. Both portions will have liners and covers, but will be a different design. The new facility is expected to be completed by late 2001 or early 2002.

The current complex-wide Broad Spectrum treatment contracts are established with Envriocare of Utah being the designed disposal site for residues generated from those processes.

Chapter 9. Treatment Facilities and Treatment Technologies

This chapter discusses the existing treatment facilities at SRS, the treatment process descriptions, and the planned and proposed facilities that are being considered in the options analysis for the generation of treatment options for the waste streams in the STP.

9.1 Existing Facility Descriptions

This section describes existing SRS treatment facilities considered in the options analysis. The facilities discussed include:

9.1.1 M-Area Liquid Effluent Treatment Facility (LETF)
9.1.2 M-Area Vendor Treatment Facility (VTF)
9.1.3 Consolidated Incineration Facility (CIF) and Ashcrete Stabilization Facility
9.1.4 Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks (MWST)
9.1.5 Defense Waste Processing Facility (DWPF)
9.1.6 F and H Effluent Treatment Facility (ETF)

9.1.1 M-Area Liquid Effluent Treatment Facility (LETF)

The M-Area Liquid Effluent Treatment Facility, which included the Process Waste Interim Treatment/Storage Facility (PWIT/SF), was closed per the Clean Water Act as of October 1, 1999 and is no longer available for treatment.

9.1.2 M-Area Vendor Treatment Facility (VTF)

The M-Area Vendor Treatment Facility was closed per the Clean Water Act as of October 1, 1999 and is no longer available for treatment.

9.1.3 Consolidated Incineration Facility (CIF) and Ashcrete Stabilization Facility

CIF received both solid and liquid wastes from several generators within SRS. One of CIF’s primary design basis waste streams is benzene from the Defense Waste Processing Facility (DWPF) and PUREX solvent. CIF is currently in suspension of operations pending an evaluation of alternatives for PUREX solvent. CIF will remain in standby until completion of the PUREX evaluation expected April 2002.

Facility Description

CIF is a rotary kiln incinerator with a secondary combustion chamber. The liquid waste is fed into the rotary kiln's primary or secondary combustion chamber. Solid wastes are fed into the primary combustion chamber. Organic materials are combusted to water and carbon dioxide. The offgas is quenched, scrubbed, and released to the atmosphere. Non-combustible materials (ash) are captured, mixed with Portland® cement and other stabilizing additives, and cast into a stable solid waste form (ashcrete). The ashcrete system also stabilizes listed blowdown liquid from the quench and scrubber (blowcrete).

Capacity

The CIF permitted waste feed throughputs are based on the design estimate of waste volume expected in inventory at the time of CIF startup and wastes expected to be generated annually after CIF startup (OPS-WPM-90-4140). To maximize the flexibility and utilization of the CIF, the material handling systems for feeding solid and liquid waste were sized for a greater throughput than the average annual requirement for each system. The instantaneous permitted capacity of each system is

• Solid waste to rotary kiln	900 lbs/hr
• Organic liquid waste to rotary kiln	385 lbs/hr
• Aqueous liquid waste to rotary kiln	950 lbs/hr
• Organic liquid waste to secondary combustion chamber	191 lbs/hr

The CIF can treat any combination of liquids and solids up to the rates listed above provided that the thermal capacity and other operational limits are not exceeded.

In 1993, the CIF utilization was re-estimated in the CIF Mission Need and Design Capacity Review. Utilization in 1996 was predicted to be 60% for solid waste and 20% for organic liquid waste. Outyear utilization was estimated to increase as the scope of the SRS Environmental Restoration (ER) and Decontamination and Decommissioning (D&D) missions increase. Starting in the year 2001, annual utilization was predicted to occasionally approach 75% for solids and 100% for organic liquids. However, a varying amount of spare capacity is expected to usually be available for the treatment of other DOE incinerable mixed wastes. The schedule for treating other wastes at CIF will be established based on several key factors including:

- Available thermal capacity
- Concentrations of waste constituents (e.g., hazardous metals) that are controlled by the various CIF environmental permits
- Concentrations of waste constituents (e.g., chlorides and noncombustibles) that directly influence the amount of bottom ash and offgas scrubber blowdown generated. When wastes that generate significant ash or blowdown are incinerated, the demand on the spare ashcrete unit capacity could become the factor that limits waste feed rates.

9.1.4 Savannah River Technology Center Ion Exchange Treatment Probes for Low- and High-Activity Waste Streams

Savannah River Technology Center (SRTC) ion exchange treatment probes treat wastes that are captured in laboratory waste storage tanks located in the laboratory complex.

Facility Description

The treatment probes remove chromium (III), lead, mercury, and benzene from low-activity and high- activity mixed waste. The entire probe, developed by SRTC, is placed in the waste tank, and the waste solution is pumped through it. The probes contain ion exchange resins that adsorb the constituents of concern.

After the probes remove the hazardous characteristics, the decontaminated solution is sent to another low-level waste treatment facility for volume reduction and disposal as a low-level waste. The constituents of concern are bound so tightly to the resins that studies indicate the resin will pass a toxicity characteristic leaching procedure (TCLP) so the spent resin also becomes a non-hazardous low-level waste.

Capacity

The RCRA Part A revision, under which the probes operate, limits the throughput of the mixed waste storage tank treatment process (both low-activity and high-activity waste streams) to 457,229 gallons per year. The treatment capacity of the probes in low-level waste service is 396,300 gallons per year.

9.1.5 Defense Waste Processing Facility (DWPF)

DWPF is currently receiving high-level sludge waste from the tank farms. High-level defense waste is radioactive material from reprocessing spent nuclear fuel. This waste includes liquids, sludge, and precipitated materials in slurry. High-level waste contains transuranic elements and fission products. DWPF is not receiving salt waste at this time because work on salt processing was suspended in January 1998, due to technical issues with the In-Tank Precipitation (ITP) Facility. Since January 1998, a rigorous systems engineering evaluation has been completed on all available salt processing technologies, reducing the viable alternatives from 130 to 3. These viable alternatives include 1) Small Tank Tetraphenylborate Precipitation, 2) Crystalline Silicotitanate Non-Elutable Ion Exchange, and 3) Solvent Extraction. Currently, research and development (R&D) is being conducted on these 3 alternatives to aid DOE's selection of the preferred alternative. For the purpose of planning, one of the 3 alternatives, Small Tank Tetraphenylborate Precipitation process, also referred to as Small Tank Precipitation, is being used for modeling of the HLW system.

Facility Description

DWPF has two treatment processes:

1. For salt waste, a chemical process hydrolyzes the precipitate slurry into a low-level radioactive organic liquid stream (primarily benzene) and a high-level radioactive aqueous stream (salt cell operation, not currently in operation).
2. A chemical process treats the high-level radioactive aqueous stream and sludge to remove mercury, mixes the streams with additives and glass-forming materials, and continuously feeds a high-temperature melter in which the materials are vitrified into borosilicate glass (chemical cell operation).

The organic liquid goes to CIF (not currently in operation) for incineration. The borosilicate glass, which bonds with and encapsulates the hazardous constituents of concern, is placed in stainless steel canisters for storage.

Capacity

Actual capacity will be significantly impacted by required outages for melter replacement and control system upgrades. SRS HLW will be treated in acordance with the treatment schedule identified in Chapter 5 of Volume I of the SRS Approved Site Treatment Plan, 2000 Annual Update.

9.1.6 F- and H-Area Effluent Treatment Facility (F/H ETF)

F/H ETF is a multi-purpose plant for treating highly dilute aqueous wastes. Waste arrives at F/H ETF by pipeline. A station has also been provided to unload liquid waste for treatment in F/H ETF. The treatment option of interest for treating mixed waste streams is the ion exchange process. However, other treatment components in F/H ETF, carbon adsorption and reverse osmosis, may also be of benefit in treating mixed waste streams.

Facility Description

A treatability study determines the compatibility of the constituents of concern in the waste with the ion exchange resin that will be used for adsorption. The waste is pumped from the feed tank to the ion exchange beds. The constituents of concern are bound so tightly to the ion exchange resins that studies indicate the resin will pass TCLP, so the spent resin also becomes a non-hazardous low-level waste. Decontaminated liquid effluent is collected in check tanks for analysis, which confirms the liquid meets release specifications. Liquid that meets specifications is released to a surface outfall. In the unlikely event that the treated effluent fails to meet release specification, it can easily be recycled to the feed system for reprocessing. Nothing is released from F/H ETF without passing a final assay.

Capacity

Demonstrated maximum throughput of F/H ETF is about 130 gallons per minute (gpm). At present F/H ETF is processing about 40-50 gpm average. Acceptance of waste streams at F/H ETF must be on a case-by-case basis, depending on the quantity of waste and concentration of the constituent of concern.

9.2 Process Descriptions

This section contains descriptions of the treatment technologies considered in the options analysis. These processes are commercially available for onsite or offsite use and include the following:

9.2.1 Amalgamation
9.2.2 Combustion
9.2.3 Filtration
9.2.4 Immobilization
9.2.5 Ion Exchange
9.2.6 Macroencapsulation
9.2.7 Decontamination of Lead
9.2.8 Neutralization
9.2.9 Precipitation
9.2.10 Pretreatment Process
9.2.11 Roasting/Retorting
9.2.12 Stabilization
9.2.13 Vitrification

9.2.1 Amalgamation

Amalgamation is a process applicable to waste liquid, elemental mercury contaminated with radioactive materials. Mercury is combined with inorganic reagents such as copper, zinc, nickel, gold, or sulfur that results in a non-liquid semi-solid amalgam, which is more easily managed and less mobile.

9.2.2 Combustion

Combustion is incinerators, boilers, or industrial furnaces operated in accordance with the applicable requirements of Part 264 of SCHWMR, Subpart O, or Part 266 SCHWMR, Subpart H.

9.2.3 Filtration

Filtration is removal/separation of particles from a mixture of fluid and particles by a medium that permits the flow of the fluid but retains the particles. Usually, the larger the particles, the easier they are to remove from the fluid. Chemicals called flocculents may be mixed with the fluids to increase the size of the particles and make it easier to separate particles from the fluid.

9.2.4 Immobilization

Immobilization is treatment of waste through macroencapsulation, microencapsulation, or sealing to reduce surface exposure to potential leaching media or to reduce the leachability of the hazardous constituents.

9.2.5 Ion Exchange

Ion exchange uses a resin to replace certain specific ions in a solution with other ions that are innocuous. Ion exchange is used to separate a mixed waste into its radioactive and hazardous constituents if the components are ionic. It will also concentrate the radioactive ionic species into a small volume on an organic polymec (ion exchange resin), leaving a less radioactive aqueous phase. The principal mixed waste application of this process is to recover metallic radionuclides from wastewaters or acid leach liquids.

9.2.6 Macroencapsulation

One type of macroencapsulation is immobilization by application of surface coating materials such as polymeric organics (e.g., resins and plastics) or a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Another type of macroencapsulation is immobilization by enclosing the waste in a specially designed container that substantially reduces surface exposure to potentially leaching media.

9.2.7 Decontamination of Lead

Elemental lead waste can be decontaminated by immersion in an acid bath. The acid dissolves the surface of the lead, which has been contaminated with radionuclides. The decontaminated lead can then be washed and reused. The acid solution is neutralized and the dissolved lead is precipitated. The precipitate is removed and stabilized for disposal. The neutralized solution can be further treated for reuse or recycle. Other methods of lead decontamination may involve scouring the lead surface with an abrasive or simply slicing away the contaminated surface layer.

9.2.8 Neutralization

Neutralization uses these chemicals alone or in combination; acids, bases, or water (including wastewaters) resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals.

9.2.9 Precipitation

Precipitation removes metals and other inorganics by forming insoluble compounds of oxides, hydrides, carbonates, sulfides, sulfates, chlorides, fluorides, or phosphates. These precipitants are typically used alone or in combination: lime (i.e., containing oxides and/or hydroxides of calcium and/or magnesium); caustic (i.e., sodium and/or potassium hydroxides); soda ash (i.e., sodium carbonate); sodium sulfide; ferric sulfate or ferric chloride; alum; or sodium sulfate. Additional chemicals for flocculating and coagulating precipitates to enhance sludge dewatering may also be used.

9.2.10 Pretreatment Process

Processes (e.g., shredding, grinding, physical separation, repackaging, volume, reduction, etc.,) that make the waste amenable to the treatment process that ultimately destroys, removes, or immobilizes the hazardous contaminants or characteristics.

9.2.11 Roasting/Retorting

Roasting and retorting mercury from radioactive contaminated process equipment has two major components as explained below.

Mercury Oven (Roaster)

The mercury oven is electrically heated to approximately 400°C with a mechanical vacuum pump providing the required vacuum or negative pressure. At this temperature, elemental mercury is vaporized and driven into the offgas stream of the roaster.

Condenser/Decanter (Retort)

The condenser is connected to the offgas system from the oven to condense the mercury vapor and vaporized organic compounds. The mercury is drawn off the bottom of the condenser receiver. Liquid organics are decanted at the supernatant interface. The gas coming out of the condenser may be exhausted through the offgas system or receive further treatment.

9.2.12 Stabilization

Stabilization comprises treatment processes that immobilize hazardous constituents in a waste. For treatment of metals in mixed low-level wastes, stabilization technologies will reduce the leachability of the hazardous metal constituents (regardless of whether the metals are radioactive) in nonwastewater matrices. Stabilization usually involves the use of Portland® cement, lime pozzolans, iron salts, silicates or clays as treatment reagents.

9.2.13 Vitrification

Vitrification is a waste treatment process in which waste is mixed with glass and fused into a solid mass. The resultant mass is expected to remain a stable and insoluble form for long time periods. (Vitrification with borosilicate glass is the specified LDR treatment standard for HLW and certain mixed waste streams.)

9.3 Planned/Proposed Facilities

This section contains descriptions of planned or proposed facilities considered in the options analysis.

9.3.1 Low-Activity MTRU Waste Facility

The Low-Activity MTRU Waste Facility is a proposed Category III facility that will provide capabilities to assay, open, sort, size reduce, characterize, treat, and repackage >100 nCi/g and 10-100 nCi/g mixed and non-mixed wastes. The waste types include job control waste (wipes, shoe covers, etc.), process equipment (gloveboxes, pumps, HEPA filters, etc.), and miscellaneous debris (concrete, metal, etc.) from production, D&D, and ER activities.

Facility Description

The Low-Activity MTRU Waste Facility will process wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20 years and an atomic number above 92) utilizing the Handling and Segregating System for 55 gallon drums (HANDSS-55) technology to prepare for final disposal. This facility will size reduce (30%) some waste before further processing (i.e., assay, gas sampling, sorting, treatment, and repackaging). After assay and characterization, 10 to 100 nCi/g wastes will be blended with high activity wastes to facilitate meeting the transportation limits of TRUPACT-II, treated (if required), and disposed in onsite facilities. Wastes greater than 100 nCi/g will be further processed (if required) for shipment and disposal in the Waste Isolation Pilot Plant (WIPP).

9.3.2 High-Activity MTRU Waste Facility

The High-Activity MTRU Waste Facility is a proposed Category II, line-item facility that will provide capabilities to treat greater than 100 nCi/g alpha contaminated mixed and non mixed wastes. This includes newly generated waste, stored waste, and soils. The High-Activity MTRU Waste Facility is in the pre-conceptual phase of development and is unfunded.

Facility Description

The High-Activity MTRU Waste Facility will treat solid, liquids, sludge, and soil wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20 years and an atomic number above 92) for disposal. This includes preparing the waste for vitrification, vitrifying the waste, and treating secondary waste gases and liquids. The High-Activity MTRU Waste Facility will receive waste from the Low-Activity MTRU Waste Facility. Furthermore, the High-Activity MTRU Waste Facility will require a greater level of containment than a non-alpha vitrification facility. Vitrified and low temperature stabilized waste forms will be routed through the Low-Activity MTRU Waste Facility for final certification. After certification, these waste forms will be sent for final disposal to a RCRA disposal facility, Shallow Land Disposal Facility, or the Waste Isolation Pilot Plant (WIPP).

9.3.3 Visual Examination (VE) Facility

The Visual Examination (VE) Facility, which began operations during 4QFY00, provides capabilities to visually confirm the physical characteristics of the TRU waste as compared with the radiography results, sort, and repackage >100 nCi/g and 10-100 nCi/g mixed and non-mixed TRU wastes. The waste types include job control waste, process equipment, and miscellaneous debris from production, D&D, and ER activities.

Also included in this facility is a similar activity for non-TRU mixed wastes. The containers are opened, the contents sorted into like categories to meet treatability groups, the waste sampled and analyzed to confirm radioactive characterization, and the waste repackaged. The mixed waste side of the building is scheduled to be completed by 1QFY02.

Facility Description

The VE Facility has been merged to include the TRU and MW sorting activities into one facility. The VE Facility is a stainless steel, radioactive containment building consisting of two airlocks, secondary and tertiary confinement rooms, a glovebox to provide primary confinement, and a ventilation system.

9.3.4 Mobile Vendor

SRS will begin utilizing a Mobile Vendor to augment current inspection/characterization capability and to increase the TRU Waste shipped from SRS to WIPP. The Mobile Vendor will mobilize to SRS 2QFY01 and is expected to begin characterization operations in 3QFY01. The Mobile Vendor is expected to process and ship waste from SRS to WIPP through FY02. The Mobile Vendor will provide this additional characterization and shipping capability through the use of four mobile systems. The first is a real time radiography trailer that will be used to x-ray TRU drums to determine drum contents and waste attributes. Following x-ray the drums will be processed through the non-destructive assay trailer. This system uses an integrated gamma and imaging passive/active neutron/gamma energy analysis (IPAN/GEA) mobile waste assay trailer. The IPAN/GEA will provide information to determine the isotopic composition of each TRU waste drum. After assay the drums will be placed into heated sealand storage containers for 72 hours prior to head space gas sampling. The third mobile system is the drum headspace gas sampling system. This system utilizes a gas chromatograph (GC) and mass spectrometer (MS) to analyze the constituents of the TRU drum headspace gases. The drums will then be moved to the final system which is the mobile loading unit. This system contains the adjustable center gravity lift fixture, shrink wrap machine and equipment necessary to configure and load TRU drums into TRUPACT-II containers for transport to WIPP for disposal. These systems will be set-up on existing TRU waste storage Pads #4 and #3. This process will be supported by existing SRS infrastructure to include the Visual Examination Facility on TRU Pad #6.

Chapter 10. Offsite Waste Streams for which SRS is the PREFERRED OPTION

Naval Reactors (NR) had selected the SRS Consolidated Incineration Facility (CIF) as a preferred option in the Naval Reactors Program STPs. DOE-SR had confirmed the ability of CIF to treat the selected Naval Reactors mixed wastes.

Naval Reactors has re-evaluated treatment options and decided that most of the mixed waste streams originally destined for CIF will receive treatment at other facilities. The Naval Reactors mixed waste currently listed for treatment at SRS are the Charleston Naval Shipyard waste and the Bettis Atomic Power Laboratory Waste.

Shipment has been received for Charleston Naval Shipyard waste by SRS, and the waste is currently in RCRA regulated storage. Bettis waste was shipped to SRS March 1999.

SRS will treat Naval Reactor's program upon SCDHEC approval (see also October 17, 1997, letter to SCDHEC).

Other waste described below includes future MTRU waste shipments from DOE's Mound Site (see Vol. I, Sec. 4.2.2).

Table 10.1 Offsite Waste Streams

Waste Stream No.	Site	Waste Stream	SRS Treatment Facility	Current Cumulative Inventory through 9/30/00 (m^3)	Future Forecast Generation (2001-2005) (m^3)
SR-W080	Charleston Naval Shipyard (CN-W001, CN-W004)	Solids containing Potassium Chromate; Organic Debris containing Lead and/or Chromium	CIF	1.7*	0**
SR-W087	Bettis Atomic Power Laboratory Contaminated Oil (BT-W035, part of BT-W003)	Oil containing uranium, cadmium, and lead	CIF	0.1	0
SR-W089	Mound	TRU Mixed Waste	TRU Facilities (prepare for shipment to WIPP)	0	3

* Cumulative inventory through 9/30/00
** No future mixed waste will be generated from the Charleston Naval Shipyard since that facility was closed in April 1996.

Chapter 11. Volume Summary Information

This chapter includes volume and treatment residue summaries for the waste streams listed in the STP. Table 11.1 lists the volume summary of each waste stream by its unique waste stream number. Table 11.2 lists the volume summary for each waste stream by treatment facility. CIF is currently in suspension of operations, and M-Area VTF is closed. Volume summaries include inventories as of September 30, 2000. Table 11.3 show the volume and status of mixed treatment residues for those waste streams that have been treated and the residues must continue to be managed as a mixed waste. The following waste streams have undergone treatment at the M-Area Vendor Treatment Facility: SR-W005, Mark 15 Filtercake; SR-W029, M-Area Sludge Treatability Samples; SR-W031, Uranium/Chromium Solution; SR-W037, M-Area Plating Line Solution; SR-W038, Plating Line Sump Material; SR-W039, Nickel Plating Line Solution; SR-W048, Soils from Spill Remediation; and SR-W082, Radioactive Chemicals, Metals, and Pesticides (CMP) Soils.

Table 11.1 Volume Summary by Waste Stream Number

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SR-W001	Rad-Contaminated Solvents	Combustion in CIF or at commercial facility	28.5	0.1	28.6
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A*	N/A*	N/A*
SR-W003	Solvent Contaminated Debris (LLW)	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	46.5	15.7	62.2
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	Consolidated with SR-W037	N/A	N/A	N/A
SR-W005	Mark 15 Filtercake	Stabilization by Vitrification–M-Area Vendor Treatment Facility	0	0	0
SR-W006	CH Mixed TRU/Liquids	Characterization at SRS–WIPP Disposal	0.1	0	0.1
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	28.2*	375*	403.2*
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	79.1*	375*	454.1*
SR-W009	Silver Coated Packing Material	Macroencapsulation in a Steel Container –Onsite	6.0*	0*	6.0*
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	N/A	N/A
SR-W011	Cadmium Coated HEPA Filters	Scrap Metal Exclusion	0	0	0
SR-W012	Toxic Characteristic Solids for Treatment in CIF	Combustion in CIF or macroencapsulation or stabilization at commercial facility	16.7	0.9	17.6

SR-W013	Low-Level Waste (LLW) Lead–to be Decontaminated Onsite	Decontamination in an Onsite Facility	3.8	12.7	16.5
SR-W014	Tritium Contaminated Mercury	Amalgamation–Offsite DOE Complex-wide Broad Spectrum Vendor	4.2	0.4	4.6
SR-W015	Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	16.5	13.0	29.0
SR-W016	221-F Canyon High-Level Liquid Waste	Stabilization by Vitrification-DWPF	55,182*	7,258*	62,440*

Table 11.1 Volume Summary by Waste Stream Number (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SR-W017	221-H Canyon High-Level Liquid Waste	Stabilization by Vitrification–DWPF	84,488*	7,760*	92,248*
SR-W018	Listed Incinerable Solids	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	10.2	0	10.2
SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	N/A	N/A	N/A
SR-W020	Salt Processing Filters	Acid Washing followed by Placement in an Engineered S. S. Container	0	0	0
SR-W021	Poisoned Catalyst Material	Waste stream eliminated	N/A	N/A	N/A
SR-W022	DWPF Benzene	Combustion in CIF or at commercial facility	0	0	0
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a cask, as a 90-day generator	3.5*	0	3.5*
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	3.8	0.4	4.2
SR-W025	Solvent /TRU Job Control Waste <100 nCi/g	Characterization at SRS	3560	0	3560
SR-W026	CH Mixed TRU/Thirds	Characterization at SRS–WIPP Disposal	148	28.0	176
SR-W027	CH Mixed TRU/F-listed Solvents	Characterization at SRS–WIPP Disposal	3355	0	3355
SR-W028	Mark 15 Filter Paper	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	0	0	0
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification M-Area Vendor Treatment Facility	0	0	0
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	N/A	N/A
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification M-Area Vendor Treatment Facility	0	0	0
SR-W032	Mercury Contaminated Heavy Water	Waste Stream Eliminated	0	0	0
SR-W032B	Mercury -Contaminated Heavy Water Residues	Solidification in container as a 90-day generator	0	0	0
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization at SRS	9.0	0	9.0

SR-W034	Calcium Metal	Future Generation – Treatment to be Determined	0	0.1	0.1
SR-W035	Mixed Waste Oil–Sitewide	Combustion in CIF or at commercial facility	6.2	0	6.2
SR-W036	Tritiated Oil with Mercury	Treatment by aging followed by Combustion	22.1	2.7	24.8
SR-W037	M-Area Plating Line Sludges	Stabilization by Vitrification M-Area Vendor Treatment Facility	0	0	0

Table 11.1 Volume Summary by Waste Stream Number (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SR-W038	Plating Line Sump Material	Stabilization by Vitrification M-Area Vendor Treatment Facility	0	0	0
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification M-Area Vendor Treatment Facility	0	0	0
SR-W040	Listed Stabilized Sludge/Listed LDR-Compliant Debris	Waste Stream Treated in Compliance with LDR	1,171	0	1,171
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	0.4	0	0.4
SR-W042	Paints and Thinners	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	0.6	1.6	2.2
SR-W043	Lab Waste w/Tetraphenyl Borate	Consolidated with SR-W012	N/A	N/A	N/A
SR-W044	Tri-Butyl-Phosphate & n-Paraffin – TRU	Consolidated with SR-W045	N/A	N/A	N/A
SR-W045	Tri-Butyl-Phosphate & n-Paraffin (PUREX)	Combustion in CIF	139.1*	19.7*	158.8*
SR-W046	Consolidated Incineration Facility Ash	Stabilization-CIF Ashcrete Unit	0	0	0
SR-W047	Consolidated Incineration Facility Blowdown	Stabilization-CIF Ashcrete Unit or Wastewater Treatment at F/H ETF	3.4	0.6	4.0
SR-W048	Soils from Spill Remediation	Stabilization by Vendor (to be determined)	0.4	5.0	5.4
SR-W049	Tank E-3-1 Clean Out Material	Stabilization Onsite CIF Vendor	0	0	0
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	0.2	0.1	0.3
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	111.1	1.0	112.1
SR-W052	Cadmium Contaminated Glovebox Section	Waste stream eliminated	N/A	N/A	N/A
SR-W053	Rocky Flats Ash	Characterization at SRS–Ship to WIPP	0.1	0	0.1

SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	N/A	N/A
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	282.5	0.1	282.6
SR-W056	Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes	Waste stream re-characterized	N/A	N/A	N/A
SR-W057	D-Tested Neutron Generators	Waste stream eliminated	N/A	N/A	N/A

Table 11.1 Volume Summary by Waste Stream Number (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	0	0	0
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	N/A	N/A
SR-W060	Tritiated Water with Mercury	Macroencapsulation in a Steel Container via a Treatability Variance	0.1*	0	0.1*
SR-W061	DWPF Mercury	Consolidated with SR-W068	N/A	N/A	N/A
SR-W062A	Normal Low-Level Contaminated Debris	Macroencapsulation by a Vendor at an Offsite Facility	179.5	94.2	273.7
SR-W062B	Difficult-to-Treat Low-Level Contaminated Debris †	Macroencapsulation by a Vendor in an Existing SRS Facility	0	0	0
SR-W063	Macroencapsulated Low-Level Waste	Meets Treatment Standard	0.2	0	0.2
SR-W064	IDW Soils/Sludges/Slurries	Awaiting ROD, etc.			
SR-W065	IDW Monitoring Well Purge/Development Water	Awaiting ROD, etc.			
SR-W066	IDW Debris	Awaiting ROD, etc.			
SR-W067	IDW Personal Protective Equipment (PPE) Waste	Awaiting ROD, etc.			
SR-W068	Elemental (Liquid) Mercury–Sitewide	Amalgamation–Offsite DOE Complex-wide Broad Spectrum Vendor	0.3	0	0.3
SR-W069A	Low-Level Waste (LLW) Lead–to be Macroencapsulated Offsite	Macroencapsulation by a Vendor at an Offsite Facility	134.5	6.0	140.5
SR-W069B	Low-Level Waste (LLW) Lead–to be Macroencapsulated Onsite †	Macroencapsulation by a Vendor in an Existing SRS Facility	0	0	0
SR-W070	Mixed Waste from Laboratory Samples	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	10.5	9.6	20.1
SR-W071	Wastewater Suitable for Treatment in CIF	Combustion in CIF or at commercial facility	0.6	2.2	2.8

SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Extraction or Immobilization Alternative Debris Technologies as 90-day Generator	0.3	0	0.3
SR-W073	Cadmium-Containing Raschig Rings	Macroencapsulation - Onsite	1.8	0	1.8
SR-W077	Aqueous Characteristic Wastewater	Ion Exchange, Filtration, and/or Stabilization at F/H ETF, Saltstone, or D-area or combustion at commercial facility	2.2	2.1	4.3

Table 11.1 Volume Summary by Waste Stream Number (cont'd)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	Awaiting Characterization	18.6	0	18.6
SR-W079	Polychlorinated Biphenyl (PCB) Mixed Waste	Combustion in the TSCA Incinerator at ETTP	1.8	0	1.8
SR-W080	Charleston Naval Shipyard Waste (CN-W001, CN-W004)	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	1.7	0	1.7
SR-W081	Reactive and Ignitable Mixed Waste	Deactivation followed by combustion in CIF or at commercial facility	0.2	0	0
SR-W082	Radioactive Chemicals, Metals, and Pesticides (CMP) Soil	Stabilization by Vendor (to be determined)	0	0	0
SR-W083	Mercury- and Chromium-Contaminated Residues	Waste Stream Eliminated	0	0	0
SR-W084	Remediation Waste Soils that Meet LDR	Meets Treatment Standard	0	0	0
SR-W085	Rocky Flats Plutonium Fluoride Residues	Future Generation – Treatment to be Determined	0	0	0
SR-W086	Characteristically Hazardous Non-Incinerable Solids	Roasting/retorting followed by Amalgamation–Offsite DOE Complex-wide Broad Spectrum Vendor	0.8	0	0.8
SR-W087	Bettis Atomic Power Laboratory Contaminated Oil (BT-W035, part of BT-W003)	Combustion in CIF or at commercial facility or macroencapsulation or stabilization at commercial facility	0.1	0	0.1
SR-W088	Aqueous Halogenated Salts	Treatment Option to Be Determined	19.8	0	19.8
SR-W089	TRU Waste From Mound	Treatment Option to be Determined	0	3	3
		TOTALS	149,078.7	15,987.3	165,066

Note: Volumes listed above are from the 2000 Mixed Waste Inventory Report. The volumes may not represent actual volumes of mixed waste stored at SRS as of the date of the annual update. The volume of wastes stored in tanks or certain special containers marked with an asterisk (*) is reported as net. Volume of wastes stored in other containers such as boxes or drums is reported as gross. Volumes have been updated from those volumes reported in the 1999 STP update due to waste treatment progress, waste generation, changes in volume of waste streams based on further characterization, reassignment of some stream volumes to different stream numbers, and inventory adjustments.

† Volumes for SR-W062A and SR-W069A include the volumes for SR-W062B and SR-W069B. Currently there is no inventory for the "B" streams. It is anticipated that only small portions of each "A" stream will be split into its "B" stream counterpart upon treatment.

Table 11.2 Volume Summary by Treatment Facility

Waste Stream No.	Waste Stream Name	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
Consolidated Incineration Facility (CIF) or Commercial Facility				
Treatment Standard – Incineration				
SR-W001	Rad-Contaminated Solvents	28.5	0.1	28.6
SR-W003	Solvent Contaminated Debris (LLW)	46.5	15.7	62.2
SR-W012	Toxic Characteristic Solids for Treatment in CIF	16.7	0.9	17.6
SR-W018	Listed Incinerable Solids	10.2	0	10.2
SR-W022	DWPF Benzene	0	0	0
SR-W028	Mark 15 Filter Paper	0	0	0
SR-W035	Mixed Waste Oil–Sitewide	6.2	0	6.2
SR-W042	Paints and Thinners	0.6	1.6	2.2
SR-W045	Tri-Butyl Phosphate & n-Paraffin (PUREX)	139.1*	19.7*	158.8*
SR-W051	Spent Filter Cartridges and Carbon Filter Media	111.1	1.0	112.1
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	282.5	1.0	283.5
SR-W070	Mixed Waste from Laboratory Samples	10.5	9.6	20.1
SR-W071	Wastewater Suitable for Treatment at CIF	0.6	2.2	2.8
SR-W080	Charleston Naval Shipyard (CN-W001, CN-W004)	1.7	0	1.7
SR-W081	Reactive/Ignitable Waste	0.2	0	0.2
SR-W087	Bettis Atomic Power Laboratory Contaminated Oil (BT-W035, part of BT-W003)	0.1	0	0.1
Ashcrete Stabilization				
SR-W046	Consolidated Incineration Facility Ash	0*	0	0*
SR-W047	Consolidated Incineration Facility Blowdown	3.4	0.6	4.0
	Subtotal	657.9	51.5	709.4
Effluent Treatment Facility-Wastewater Treatment				
SR-W041	Aqueous Mercury and Lead	0	0	0
SR-W077	Aqueous Characteristic Wastewater	2.2	2.1	4.3
	Subtotal	2.2	2.1	4.3

SRTC Low Activity Waste Storage Tanks–Ion Exchange				
SR-W007	SRL (SRTC) Low Activity Waste	28.2	375	403.2
SRTC High Activity Waste Storage Tanks–Ion Exchange				
SR-W008	SRL (SRTC) High Activity Waste	79.1	375	454.1
High-Level Waste ITP Facility				
SR-W020	Salt Processing Filters	0	0	0

Table 11.2 Volume Summary by Treatment Facility (cont'd)

Waste Stream No.	Waste Stream Name	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
D-Area Heavy Water Operations Facility				
SR-W032	Mercury-Contaminated Heavy Water	0	0	0
SR-W032B	Mercury-Contaminated Heavy Water Residues	0	0	0
	Subtotal	0	0	0
Defense Waste Processing Facility				
SR-W016	221-F Canyon High-Level Liquid Waste	55,182*	7,258*	62,440*
SR-W017	221-H Canyon High-Level Liquid Waste	84,488*	7,760*	92,248*
	Subtotal	139,670*	15,018*	154,688*
Meet Treatment Standards				
SR-W024	Tritium Gold Traps	3.8	0.4	4.2
SR-W040	Stabilized Sludge/LDR-Compliant Debris	1,171	0	1,171
SR-W063	Macroencapsulated Low-Level Waste	0.2	0	0.2
SR-W084	Remediation Waste Soils that Meet LDR	0	0	0
	Subtotal	1,175	0.4	1,175.4
Macroencapsulation as a 90-Day Generator				
SR-W015	Tritium Contaminated Equipment	16.5	13.0	29.5
SR-W023	Cadmium Safety/Control Rods	3.5	0	3.5
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	0	0	0
	Subtotal	20.0	13.0	33.0
M-Area Vendor Treatment Facility				
SR-W005	Mark 15 Filtercake	0	0	0
SR-W029	M-Area Sludge Treatability Samples	0	0	0
SR-W031	Uranium/Chromium Solution	0	0	0
SR-W037	M-Area Plating Line Sludge	0	0	0
SR-W038	Plating Line Sump Material	0	0	0
SR-W039	Nickel Plating Line Solution	0	0	0
SR-W082	Radioactive Chemicals, Metals, and Pesticides (CMP) Soils	0	0	0
	Subtotal	0	0	0

SRS (Facility TBD)–Macroencapsulation				
SR-W009	Silver Coated Packing Material	6.0	0	6.0
SR-W060	Tritiated Water with Mercury	0.1	0	0.1
SR-W062B	Difficult-to-Treat Low–Level Contaminated Debris†	N/A	N/A	N/A
SR-W069B	Low-Level Waste (LLW) Lead–to be Macroencapsulated Onsite†	N/A	N/A	N/A
SR-W073	Cadmium-Containing Raschig Rings	1.8	0	1.8
	Subtotal	7.9	0	7.9

Table 11.2 Volume Summary by Treatment Facility (cont'd)

Waste Stream No.	Waste Stream Name	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
SRS (Facility TBD)–Decontamination				
SR-W013	Low-Level Waste (LLW) Lead – To be Decontaminated Onsite	3.8	12.7	16.5
Onsite Vendor Stabilization				
SR-W049	Tank E-3-1 Clean Out Material	0	0	0
Treatment by Aging Followed by Incineration				
SR-W036	Tritiated Oil with Mercury	22.1	2.7	24.8
Offsite Vendor Facility – Macroencapsulation				
SR-W062A	Normal Low–Level Contaminated Debris	179.5	94.2	273.7
SR-W069A	Low-Level Waste (LLW) Lead–to be Macroencapsulated Onsite	134.5	6.0	140.5
	Subtotal	314.0	100.2	414.2
Offsite Vendor Stabilization				
SR-W048	Soils from Spill Remediation	0.4	5.0	5.4
Offsite DOE Facility–Amalgamation Offsite–Broad Spectrum Contract Vendor				
SR-W014	Tritium Contaminated Mercury	4.2	0.4	4.6
SR-W068	Elemental (Liquid) Mercury Sitewide	0.3	0	0.3
SR-W086	Characteristically Hazardous Non-Incinerable Solids	0.8	0.1	0.9
	Subtotal	5.3	0.5	5.8
Offsite DOE–Combust in the TSCA Incinerator at ETTP				
SR-W079	Polychlorinated Biphenyl (PCB) Mixed Waste	1.8	0	1.8
Waste Streams to be Further Characterized				
SR-W025	Solvent /TRU Job Control Waste <100 nCi/g**	3,560	0	3,560
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g**	9.0	0	9.0
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	18.6	0	18.6
	Subtotal	3,587.6	0	3,587.6
TRU Waste Streams Undergoing Characterization/Certification for Shipment to WIPP				
SR-W006	CH Mixed TRU/Liquids	0.1	0	0.1

SR-W026	CH Mixed TRU/Thirds	148	28	176
SR-W027	CH Mixed TRU/F-listed Solvents	3,355	0	3,355
SR-W053	Rocky Flats Ash	0.1	0	0.1
SR-W089	TRU Waste From Mound	0	3	3
	Subtotal	3,503.1	31	3,534
Lab Waste Treated as a 90-day Generator at SRTC followed by Vitrification				
SR-W050	Waste to Support High-Level Waste (HLW) Processing Demonstrations	0.2	0.1	0.3
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	0	0	0
	Subtotal	0.2	0.1	0.3

Table 11.2 Volume Summary by Treatment Facility (cont'd)

Waste Stream No.	Waste Stream Name	Current Cumulative Inventory through 09/30/00 (m^3)	Future Forecast Generation (Cumulative) (m^3) 2001-2005	Total Cumulative (Current + Forecast) (m^3)
Scrap Metal Exclusion				
SR-W011	Cadmium Coated HEPA Filters	0	0	0
Future Generation – Treatment Plan to be Developed				
SR-W034	Calcium Metal	0	0.1	0.1
SR-W085	Rocky Flats Plutonium Fluoride Residues	0	0	0
	Subtotal	0	0.1	0.1
Waste Streams Consolidated				
SR-W002	Rad-Contaminated Chlorofluorocarbons	N/A	N/A	N/A
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	N/A	N/A	N/A
SR-W010	Scintillation Solution	N/A	N/A	N/A
SR-W019	244-H RBOF High Activity Liquid Waste	N/A	N/A	N/A
SR-W030	Spent Methanol Solution	N/A	N/A	N/A
SR-W043	Lab Waste with Tetraphenyl Borate	N/A	N/A	N/A
SR-W044	Tri-Butyl-Phosphate & n-Paraffin–TRU	N/A	N/A	N/A
SR-W054	Enriched Uranium Contaminated with Lead	N/A	N/A	N/A
SR-W059	Tetrabutyl Titanate (TBT)	N/A	N/A	N/A
SR-W061	DWPF Mercury	N/A	N/A	N/A
Waste Streams Re-characterized or Eliminated				
SR-W021	Poisoned Catalyst Material	N/A	N/A	N/A
SR-W052	Cadmium Contaminated Glovebox Section	N/A	N/A	N/A
SR-W056	Job Control Waste with Enriched Uranium and Solvent Contaminated Wipes	N/A	N/A	N/A
SR-W057	D-Tested Neutron Generators	N/A	N/A	N/A
SR-W083	Mercury- and Chromium-Contaminated Residues	N/A	N/A	N/A
	TOTAL	149,078.7	15,987.3	165,066

* Volume includes unstabilized ash and blowdown that does not meets the LDR standards.
** Mixed low-level waste conservatively managed as TRU (transuranic waste).

† or wastestreams SR-W062B and SR-W069B waste volumes have been combined with "A" designated wastestreams. Wastestream volumes will be separated into "A" and "B" streams upon treatment.

Note: Volumes in this table are taken from the 1999 Mixed Waste Inventory Report and reflect inventories as of 09/30/00. They may not represent actual volumes of mixed waste of SRS as of the date of the annual update.

Waste streams with 0 volumes have been treated or otherwise managed in accordance with RCRA regulations, or are future waste streams.

Waste streams with N/A in the volume columns have had their waste volume incorporated into other waste streams or, if they have been re-characterized, are no longer a part of the STP.

Table 11.3 Mixed Waste Treatment Residue Summary

Residue from mixed waste treatment requiring RCRA Subtitle C disposal.

Waste Stream	Treatment	Residue Status	Comment
SR-W015 Mercury/Tritium Contaminated Equipment	Macroencapsulated in a stainless steel container	Container stored at SRS in Mixed Waste Storage Buildings (645-2N and 643-29E) Total Volume = 14.0 m^3	Waste continues to be generated.
SR-W023 Cadmium Safety/Control Rods	Macroencapsulated in a stainless steel container.	Container stored at SRS on TRU Pad 12. Volume of waste = 3.5 m^3	Total volume = 15.2 m^3. Calculated from container outside dimension.
SR-W024 Mercury/Tritium Gold Traps	Macroencapsulated in a stainless steel container.	Containers stored at SRS Mixed Waste Storage Building (643-29E). Total volume = 3.8 m^3.	
SR-W040 Listed Stabilized Sludge/Listed LDR Compliant Debris	Stabilization at CIF Ashcrete Unit or Vitrification at M-Area Vendor Treatment Facility	Containers stored on SRS M-Area Mixed Waste Storage Pad (315-4M). Total volume = 1,171 m^3.	Volume breakdown: VTF-related glass waste = 803 m^3. CIF Stabilized Ashcrete and Blowcrete = 368 m^3.

NOTES:

The following characteristic waste streams have undergone treatment. However, treatment residues are not TCLP hazardous and do not require disposal in a RCRA Subtitle C facility: SR-W041, Aqueous Mercury and Lead; SR-W077, Aqueous Characteristic Wastewater; SR-W032B, Mercury-Contaminated Heavy Water Residues.

As of March 1, 2001, M-Area is storing approximately 2600 drums of vitrified waste that were generated by the M-Area Vendor Treatment Unit. Should the delisting petition be approved for the vitrified M-Area waste, disposal in a Subtitle C facility will not be required.

As of January 25, 2001, DWPF has produced or filled a total of 1,047 stainless steel glass canisters, which have been placed in storage at SRS awaiting final disposition at Yucca Mountain.

The following material has been recycled in part or total. No residues have been generated requiring disposal as mixed waste by SRS: SR-W011, Cadmium Coated HEPA Filters; SR-W013 Low-Level Waste Lead to be Decontaminated (partial volume only); SR-W032, Mercury-Contaminated Heavy Water.

Chapter 12. Acronyms and Definitions Glossary

Acronyms

– A –

ADGAS	Venting of compressed gases into an absorbing or reacting media
AEA	Atomic Energy Act
Ag	Silver
ALARA	As Low As Reasonably Achievable
Am	Americium
AMALG	Amalgamation
AOC	Area of Contamination
As	Arsenic
ASME	American Society of Mechanical Engineers
AVF	Alpha Vitrification Facility

– B –

B/D	Blowdown
Ba	Barium
BACT	Best Available Control Technology
BDAT	Best Demonstrated Available Technology
BIODG	Biodegradation
BOD	Biochemical Oxygen Demand
Br	Bromine
BTU	British Thermal Unit

– C –

C	Carbon
Ca	Calcium
CAA	Clean Air Act
CAB	Citizens Advisory Board
CBFO	Carlsbad Field Office
CARBN	Carbon Adsorption
CB	Containment Building
CCMC	Chemical Commodity Management Center
Cd	Cadmium
Ce	Cerium
CEP	Catalytic Extraction Processing
CEQ	Council on Environmental Quality

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Cf	Consequence of Failure
CFR	Code of Federal Regulations
CH	Contact Handled
Chem	Chemical
CHOXD	Chemical or Electrolytic Oxidation
CHRED	Chemical Reduction
Ci	Curie
CIF	Consolidated Incineration Facility
Cm	Curium
CMBST	Combustion
CMP	Chemicals, Pesticides, and Metals
CNS	Charleston Naval Shipyard
Co	Cobalt
CO_2	Carbon Dioxide
COBRA	Computerized Radioactive Waste Burial Record Analysis
Cont. Bldg.	Containment Building
Cr	Chromium
CRADA	Cooperative Research and Development Agreement
Cs	Cesium
CSTP	Conceptual Site Treatment Plan
CTF	Chemical Transfer Facility
CWA	Clean Water Act
°C	Degrees Celsius

– D –

D&D	Decontamination and Decommissioning
DEACT	Deactivation
Decon	Decontamination
Dest	Destruction (Thermal Destruction)
DETF	Dilute Effluent Treatment Facility
DF	Disposal Facility
Distill	Distillation
DOD	Department of Defense
DOE	U.S. Department of Energy
DOE-AL	Department of Energy–Albuquerque
DOE-HQ	U. S. Department of Energy–Headquarters
DOE-SR	Department of Energy–Savannah River Office
DOT	Department of Transportation
DSTP	Draft Site Treatment Plan

DWPF	Defense Waste Processing Facility

– E –

EA	Environmental Assessment
EAV	E-Area Vaults
ECA	Environmental Compliance Authority
ECM	Environmental Compliance Manual
EIS	Environmental Impact Statement
EM	DOE Office of Environmental Restoration and Waste Management
EPA	U. S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPD	Environmental Protection Department
ER	Environmental Restoration
ETF	Effluent Treatment Facility
ETTP	East Tennessee Technology Park
ETWAF	Experimental Transuranic Waste Assay Facility
EU	Enriched Uranium
Eu	Europium

– F –

FBC	Fluidized Bed Combustion
FFA	Federal Facility Agreement
FFCA	Federal Facility Compliance Agreement
FFCAct	Federal Facility Compliance Act
FMWIR	Final Mixed Waste Inventory Report
FONSI	Finding of No Significant Impact
FP	Filter Paper
FPR	Functional Performance Requirements
FPTUR	Filter Paper Take-Up Rolls
FR	Federal Register
FSUBS	Fuel Substitution
FY	Fiscal Year
FYP	Five Year Plan

– G –

g or gm	Gram
GAC	Granular Activated Carbon
GAO	Government Accounting Office
GOCO	Government Owned Contractor Operated

– H –

H	Hydrogen
H^3	Tritium
HATF	High Activity Transuranic Facility
HANDSS-55	Handling and Segregating System for 55 Gallon Drums
HBL	Health Based Levels
HEPA	High Efficiency Particulate Air
Hg	Mercury
HL	High-Level
HLLW	High-Level Liquid Waste
HLVIT	High-Level Vitrification
HLW	High-Level Radioactive Waste or High-Level Waste
HSWA	Hazardous and Solid Waste Amendments
HW	Hazardous Waste
HW/MW	Hazardous Waste/Mixed Waste
HW/MW DV	Hazardous Waste/Mixed Waste Disposal Vaults
HW/MW-TB	Hazardous Waste/Mixed Waste Treatment Building
HWCTR	Heavy Water Components Test Reactor
HWSF	Hazardous Waste Storage Facility

– I –

I	Iodine
ICP	Ion Column Partitioning
ICPP	Idaho Chemical Processing Plant
ID	Idaho
IDMS	Integrated Defense Waste Processing Facility Melter System
IDOA	In-Depth Options Analysis
IDW	Investigation or Investigative Derived Waste
IMERC	Incineration of Wastes Containing Organics and Mercury
IMWIR	Interim Mixed Waste Inventory Report
INCIN	Incineration
INEEL	Idaho National Engineering and Environmental Laboratory
ITP	In-Tank Precipitation
IWPF	Idaho Waste Processing Facility
IWT	Interim Waste Technology

– J –

JCW	Job Control Wastes

– K –

K	Potassium
kg	Kilogram

– L –

L	Liter
LAER	Lowest Achievable Emission Rate
LATF	Low Activity Transuranic (TRU) Facility
LAW	Low Activity Waste
LDR	Land Disposal Restrictions
LETF	Liquid Effluent Treatment Facility
LLNL	Lawrence Livermore National Laboratory
LLW	Low-Level Waste
LW	Late Wash

– M –

m	Meter
MACRO	Macroencapsulation
mg	Milligram
MGD	Million gallons/day
Mil	Million
mil	Millimeter
MLLW	Mixed Low-Level Waste
mm	Millimeter
MOU	Memorandum of Understanding
mrem	One-thousandth of a rem (Millirem)
MSDS	Material Safety Data Sheet
MTRU	Mixed Transuranic Waste
MWIP	Mixed Waste Integrated Program
MWIR	Mixed Waste Inventory Report
MWSB	Mixed Waste Storage Building
MWST	Mixed Waste Storage Tanks

– N –

N	Nitrogen
Na	Sodium
NASA	National Aeronautics and Space Administration
Nb	Niobium
NDA	Non-Destructive Analysis

NDE	Nondestructive Evaluation
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEUTR	Neutralization
NF	Naval Fuels
Ni	Nickel
NMD	No-Migration Determination
NMP	No-Migration Petition
NMV	No-Migration Variance
NOI	Notice of Intent
Np	Neptunium
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NPV	Net Present Value
NR	Naval Reactors
NRC	Nuclear Regulatory Commission
NTPO	National Transuranic Program Office
NWPA	Nuclear Waste Policy Act
NWW	Non wastewater

– O –

O	Oxygen
O&M	Operations and Maintenance
OGC	Office of General Council
OR	Oak Ridge
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
OTD	Office of Technology Development
OWST	Organic Waste Storage Tank
Ox	Oxidation

– P –

P	Phosphorus
PA	Performance Assessment
PAC	Powdered Activated Carbon
Pb	Lead
Pc	Complexity Factor
PCB	Polychlorinated Biphenyl
PCC	Primary Combustion Chamber
PEIS	Programmatic Environmental Impact Statement

Pf	Probability Factor
Pm	Maturity Factor
Pm	Promethium
PO	Preferred Option
PPA	Pollution Prevention Act
PPE	Personal Protective Equipment
ppm	Parts Per Million
ppb	Parts Per Billion
ppt	Precipitate
Pr	Praseodymium
Pre-Op	Pre-Operational
Precip	Precipitation
PRECP	Precipitation
PSD	Prevention of Significant Deterioration
psig	Pounds per Square Inch Gauge
PSTP	Proposed Site Treatment Plan
Pu	Plutonium
Pu Sep	Plutonium Separation
PUREX	Plutonium Uranium Extraction
PVC	Polyvinyl Chloride
PWIT	Process Waste Interim Treatment
PWIT/SF	Process Waste Interim Treatment/Storage Facility
Pyrol	Pyrolysis

– Q –

QA	Quality Assurance
QC	Quality Control

– R –

R&D	Research and Development
R&R	Roast/Retort
RA	Remedial Action
Rad	Radiation
RBOF	Receiving Basin for Offsite Fuel
RCA	Radiologically Controlled Area
RCRA	Resource Conservation and Recovery Act
React	Reaction
rem	Roentgen Equivalent Man
RF	Risk Factor
RFERTS	Rocky Flats Environmental Technology Site

RFP	Request For Proposal
RH	Remote-Handled Waste
Rh	Rhodium
RL	Richland, Washington (Hanford)
RLEAD	Thermal Recovery of Lead
RMCP	Residuals Management Contingency Plan
RMERC	Retorting or Roasting
RMETL	Recovery of metals or inorganics
RMMA	Radioactive Materials Management Area
RO	Reverse Osmosis
ROD	Record of Decision
RORGS	Recovery of Organics
RTHRM	Thermal recovery of metals or inorganics
RTR	Real Time Radiography
Ru	Ruthenium

– S –

S.S.	Stainless Steel
SAA	Satellite Accumulation Area
SAR	Safety Analysis Report
SARP	Safety Analysis Report for Packaging
Sb	Antimony
Sc	Scandium
SCC	Secondary Combustion Chamber
SCDHEC	South Carolina Department of Health and Environmental Control
SCHWMR	South Carolina Hazardous Waste Management Regulation
Se	Selenium
SED	Special Equipment Development
SEIS	Supplemental Environmental Impact Statement
SFIA	Surplus Facilities Inventory Assessment
SMPD	Sample Management Program Department
SNM	Special Nuclear Material
SR	Savannah River
Sr	Strontium
SR-WXXX	Savannah River–Waste XXX
SRL	Savannah River Laboratory (old reference–currently known as Savannah River Technology Center)
SRS	Savannah River Site
SRTC	Savannah River Technology Center (previously known as Savannah River Laboratory)
Stab	Stabilization

STABL	Stabilization
STP	Site Treatment Plan
SWDF	Solid Waste Disposal Facility
SWMD	Solid Waste Management Department
SWSP	Solid Waste Storage Pads

– T –

TAC	Technical Advisory Committee
TB	Treatment Building
TBD	To Be Determined
TBT	Tetrabutyl Titanate
TC	Toxic Characteristic
Tc	Technetium
TCLP	Toxicity Characteristic Leaching Procedure
TDEC	Tennessee Department of Environmental Conservation
TEC	Total Estimated Cost
Thermal Dest	Thermal Destruction
TOC	Total Organic Carbon
TPB	Tetraphenyl borate
TRU	Transuranic
TSCA	Toxic Substance Control Act
TSD	Treatment, Storage, and Disposal
TSF	Technology Success Factor
TSS	Total Suspended Solids
TTA	Thenoyl Trifluoroacetone
TWCCF	Transuranic Waste Certification/Characterization Facility
TWF	Transuranic Waste Facility

– U –

U	Uranium
USAEC	United States Atomic Energy Commission
USC	University of South Carolina
USC	United States Code
USQ	Unreviewed Safety Question
UTS	Universal Treatment Standards
UV	Ultraviolet

– V –

VE	Visual Examination
VES	Vinyl Ester Styrene

VOC	Volatile Organic Compounds
Vol	Volume
VTF	Vendor Treatment Facility

– W –

WAC	Waste Acceptance Criteria
WAP	Waste Analysis Plan
WBS	Work Breakdown Structure
WEDF	Waste Engineering Development Facility
WERF	Waste Experimental Reduction Facility
WIPP	Waste Isolation Pilot Plant
WITS	Waste Information Tracking System
WMEIS	Waste Management Environmental Impact Statement
WMPEIS	Waste Management Programmatic Environmental Impact Statement
WMin/PP	Waste Minimization/Pollution Prevention
WSRC	Westinghouse Savannah River Company
Wt	Weight
WW	Wastewater
WWT	Wastewater Treatment
WWTF	Wastewater Treatment Facility

– X –

– Y –

Y	Yttrium

– Z –

Zr	Zirconium

Definitions

The following definitions are provided to assist the reader with the specialized language in the STP. Effort has been made to assure that regulatory definitions listed in the STP are identical in wording with the appropriate definition in state and/or federal regulations. Where there are differences, regulatory definition wording takes precedence over that found in this definition section in the STP.

Amalgamation (AMLGM)–a process applicable to radioactive elemental mercury wastes. Mercury is converted into a solid alloy, which is more easily managed and less mobile than solutions containing radioactive mercury. Amalgamation provides a significant reduction in air emissions of mercury, and provides a change in mobility from liquid mercury to a paste-like solid, potentially reducing leachability. R.61-79.268.42 of the South Carolina Hazardous Waste Management Regulations (SCHWMR) defines amalgamation as amalgamation of liquid, elemental mercury contaminated with radioactive materials utilizing inorganic reagents such as copper, zinc, nickel, gold, and sulfur that result in a nonliquid semisolid amalgam and thereby reducing potential emission of elemental mercury vapors to the air.

Aqueous Liquids (as a waste matrix)–liquids/slurries with a total organic carbon (TOC) content less than 1%. Slurries must be pumpable (e.g., suspended/settled solids can be up to approximately 35-40%). Only liquids/slurries packaged/stored in bulk form (i.e., tank stored, drummed bulk free liquids) are included in this category. Liquids packaged in lab pack-type configuration are categorized as lab packs.

Back-logged waste–For the purpose of Section 3.1.1.1 of Volume I, back-logged waste is defined as incinerable waste which has been received into storage at RCRA permitted or RCRA interim status storage facilities as of 9/30/97. (Note: the 9/30/97 volume of backlogged incinerable mixed waste is 888 m^3 of which 729 m^3 is non-PUREX incinerable mixed waste, and 159 m^3 is PUREX mixed waste. This volume differs from the 9/30/96 MWIR volumes as reported in the 1997 STP Annual Update because of receipt of additional mixed wastes into storage, shredding, and other volume adjustments determined during repackaging and further characterization efforts.)

Best Demonstrated Available Technology (BDAT)–to determine BDAT, the EPA examines all available performance data on technologies that are identified as demonstrating (using statistical techniques) whether one or more of the technologies performs significantly better than the others. The technology that performs “best” on a particular waste or waste treatability group is then evaluated to determine whether it is “available.” To be available, the technology must be commercially available to any generator and provide “substantial” treatment of the waste, as determined through evaluation of accuracy-adjusted data. In determining whether treatment is substantial, EPA may consider data on the performance of a waste similar to the waste in question, provided that the similar waste is at least as difficult to treat. If the best technology is found to be not available, then the next best technology is evaluated, and so on.

Biodegradation (BIODG)–the degradation of organics or non-metallic inorganics (i.e., inorganics that contain phosphorous, nitrogen, and sulfur) in units operated under either aerobic or anaerobic conditions such that a surrogate compound or indicator parameter has been substantially reduced in concentration in the residuals (e.g., total organic carbon can often be used as an indicator parameter for the biodegradation of many organic constituents that cannot be directly analyzed in wastewater residues). Biodegradation is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Borosilicate Glass–a type of heat-resistant glass containing at least 5% boric oxide (by weight); used in glassware that resists heat. Borosilicate glass is a leading candidate for use in high-level waste immobilization and disposal.

Capacity (of a facility)–the annual process throughput, in m^3/yr under normal operating conditions. “Normal operating conditions” are the shift schedule under which the facility normally operates (i.e., one 8-hour shift/day, 5 days a week; two shifts/day, 5 days a week; 24 hours a day, 7 days a week). Facility operating capacity can be limited or regulated under a regulatory permit or interim status.

Carbon Adsorption (CARBN)–a treatment technology used to treat wastewaters containing dissolved organics at concentrations less than about 5% and, to a lesser extent, dissolved metal and other inorganic contaminants. The two most common carbon adsorption processes are the granular activated carbon (GAC), which is used in packed beds, and the powdered activated carbon (PAC), which is added loosely to wastewater. R.61-79.268.42 SCHWMR defines carbon adsorption as: Carbon adsorption (granulated or powdered) of nonmetallic inorganics, organometallics and /or organic constituents operated such that a surrogate compound or indicator parameters has not undergone breakthrough (e.g., Total Organic Carbon can often be used as an indicator parameter for the adsorption of many organic constituents that cannot be directly analyzed in wastewater residues). Breakthrough occurs when the carbon has become saturated with the constituent (or indicator parameter) and substantial change in adsorption rate associated with that constituent occurs.

Cemented Solids (as a waste matrix)–sludges or solids (e.g., particulates, etc.) that have been solidified/stabilized with cement or other solidifying agents but do not meet LDR treatment standards. These wastes may require preparation for treatment (e.g., crushing/grinding) prior to subsequent LDR treatment.

Characterization–the determination of waste contents and properties, whether by review of process knowledge, nondestructive evaluation/nondestructive analysis (NDE/NDA) or sampling and analysis.

Chemical Fixations–any waste treatment process that involves reactions between the waste and certain chemicals, and results in solids that encapsulate, immobilize, or otherwise trap hazardous components in the waste to minimize the leaching of such components and to render the waste nonhazardous and more suitable for disposal.

Chemical Oxidation (CHOXD)–chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combinations of reagents: (1) hypochlorite (e.g., bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent efficiency, performed in units operated such that a surrogate compound or indicator parameter is substantially reduced in concentration in the residuals (e.g., total organic carbon can often be used as an indicator parameter for the oxidation of many organic constituents that cannot be directly analyzed in wastewater residues). Chemical oxidation specifically includes what is commonly referred to as alkaline chlorination. Chemical oxidation is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Chemical Reduction (CHRED)–chemical reduction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (1) sulfur dioxide; (2) sodium, potassium, or alkali salts of sulfites, bisulfites, metabisulfates, and polyethylene glycols (e.g., total organic halogens can often be used as an indicator parameter for the reduction of many halogenated organic constituents that cannot be directly analyzed in wastewater residues). Chemical reduction is commonly used for the reduction of hexavalent chromium to the trivalent state. Chemical reduction is a hazardous waste treatment process identified in R61-79.268.42 SCHWMR.

Cleanup–(1) actions undertaken during a removal or remedial response to physically remove or treat a hazardous substance that poses a threat or potential threat to human health and welfare, the environment, and/or real and personal property. Sites are considered cleaned up when removal or remedial programs have no further expectation or intention of returning to the site and threats have been mitigated or do not require action; or (2) actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and/or the environment. The term “cleanup” is sometimes used interchangeably with either remedial action, removal action, response action, or corrective action.

Closure-Operational Closure–actions taken upon completion of operations to prepare the disposal site or disposal unit for custodial care (e.g., addition of cover, grading, drainage, erosion control). Final Site Closure: Actions taken as part of a formal decommissioning or remedial action plan, the purpose of which is to achieve long-term stability of the disposal site and to eliminate to the extent practical the need for active maintenance so that only surveillance, monitoring, and minor custodial care are required.

Compliance Agreements–legally binding agreements between regulators and regulated entities that set standards and schedules for compliance with environmental statutes, including Consent Order and Compliance Agreements, Federal Facility Agreements, and Federal Facility Compliance Agreements.

Combustion (CMBST)–High temperature organic destruction technologies, such as combustion, in incinerators, boilers, or industrial furnaces operated in accordance with the applicable requirements of R.61-79.264, Subpart 0, or R.61-79.265, Subpart O, or R.61-79.266, Subpart H, of SCHWMR and in other units operated in accordance with applicable technical operating requirements; and certain noncombustive technologies, such as the Catalytic Extraction Process.

Concentration Based Standard–a land disposal restricted hazardous waste treatment standard for which the standard developed for an extract of the waste or treatment residue, or the constituent concentration in the waste or treatment residue has been determined at a specific maximum concentration level. These standards were based on best demonstrated available technology (BDAT) and the waste or waste extract or treatment residue must not exceed these concentrations if the waste is to be land disposed.

Contact-Handled Waste (CH)–waste or waste containers whose external surface dose rate does not exceed 200 mrem per hour at the surface of the container.

Container–any portable device in which a material is stored, transported, treated, disposed of, or otherwise handled (SCHWMR R.61-79.260.10 Subpart B Definitions).

Containment Building–a hazardous waste management unit used to store or treat hazardous waste under the provisions of Subpart DD of R.61-79 parts 264 and 265 SCHWMR

Corrosive/Corrosivity–(1) a solid waste exhibits corrosivity if a representative sample of the waste has either of the following properties (1) it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 as determined by a pH meter using Method 904D, "Test Methods for Evaluating Solid Waste Physical/Chemical Methods; or (2) it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F) as determined by the test method specified in NACE (National Association of Corrosion Engineers) Standard TM-01-69 as standardized in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", EPA publication SW-846.

Curie–a measurement of a level of radiation activity in relation to the number of disintegrations per unit of time. One curie equals 2.7×10^{10} disintegrations per second. Activity measured in milli (10^{-3}), micro (10^{-6}), nano (10^{-9}), or pico (10^{-12}) curie units is often expressed.

Deactivation (DEACT)–the removal of the hazardous characteristics of a waste due to its ignitability, corrosivity, and/or reactivity. Deactivation is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Debris–solid material exceeding a 60-mm particle size that is intended for disposal and that is (1) a manufactured object; or (2) plant or animal matter; or (3) natural geologic material. However, the following materials are not debris: (1) any material for which a specific treatment standard is provided in Subpart D, part 268; (2) process residuals such as smelter slag and residues from the treatment of waste, wastewater, sludges or air emission residues; and (3) intact containers of hazardous waste that are not ruptured and that retain at least 75% of their original volume. A mixture of debris that has not been treated to the standards provided by R.61-79.268.45 SCHWMR and other material is subject to regulation as debris if the mixture is comprised primarily of debris by volume based on visual inspection. [From R.61-79.268.2(g) SCHWMR]

Decommissioning–(1) actions taken to reduce the potential health and safety impacts of contaminated DOE facilities, including activities to stabilize, reduce, or remove radioactive materials or to demolish the facilities; (2) preparations taken for retirement of a nuclear facility from active service, accompanied by the execution of a program to reduce or stabilize radioactive contamination; or (3) the process of removing a facility or area from operation and decontaminating and/or disposing of it or placing it in a condition of standby with appropriate controls and safeguards.

Decontamination–the removal of unwanted material (typically radioactive material) from facilities, soils, or equipment by washing, chemical action, mechanical cleaning, or other techniques.

Defense Waste–(1) radioactive waste from any activity performed in whole or in part in support of DOE atomic energy defense activities; excludes waste under purview of the Nuclear Regulatory Commission or generated by the commercial nuclear power industry; or (2) nuclear waste derived mostly from the manufacture of nuclear weapons, weapons-related research programs, the operations of naval reactors, and the decontamination of production facilities.

Delist–use of the petition process to have a waste excluded from RCRA hazardous waste lists in Subpart D of Part 261.

Delisting–according to 40 CFR 260.20 and .22, to be exempted from the RCRA hazardous waste "system," a listed hazardous waste, a mixture of a listed and solid waste, or a derived-from waste must be delisted. Characteristic hazardous wastes never need to be delisted, but can be treated to eliminate the characteristic. A contained-in waste also does not have to be delisted; it only has to "no longer contain" the hazardous waste.

Department of Energy Waste–radioactive waste generated by activities of the DOE (or its predecessors), waste for which DOE is responsible under law or contract or other waste for which the DOE is responsible.

Derived-From Rule–This rule states that any solid waste derived from the treatment, storage, or disposal of a listed RCRA hazardous waste is itself a listed hazardous waste (regardless of the concentration of hazardous constituents) unless delisted per RCRA 40 CFR 260.22. For example, ash and scrubber water from the incineration of a listed waste are hazardous wastes on the basis of the derived-from rule. Solid wastes derived from a characteristic hazardous waste are hazardous wastes only if they exhibit a hazardous characteristic.

Difficult-to-Treat Waste–Waste that does not meet the acceptance criteria of an offsite commercial vendor and cannot be readily handled by the commercial vendor under special procedures.

Disposal–the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including groundwaters (per SCHWMR R.61-79.260.10).

Disposal Facility–a facility or part of a facility at which hazardous waste is intentionally placed into or on the land or water, and at which waste will remain after closure. The term disposal facility does not include a corrective action management unit into which remediation wastes are placed (per SCHWMR R.61-79.260.10)

Effluent–(1) airborne and liquid wastes discharged from a site or facility following such engineering waste treatment and all effluent controls, including onsite retention and decay, as may be provided. This term does not include solid wastes, wastes for shipment offsite, wastes that are contained (e.g., underground nuclear test debris) or stored (e.g., in tanks) or wastes that are to remain onsite through treatment or disposal; or (2) wastewater (treated or untreated) that flows out of a treatment plant, sewer, or industrial outfall. Effluent may refer to wastes discharged into surface waters.

Elemental Lead (Activated and Non-Activated) (as a waste matrix)–both surface contaminated and activated elemental lead. Activated lead includes lead from accelerators or other neutron sources that may result in irradiation. Surface contaminated lead materials include bricks, counterweights, shipping casks, and other shielding materials.

Environmental Impact Statement (EIS)–(1) a document prepared in accordance with the requirements of §102(2)(C) of National Environmental Policy Act (NEPA); or (2) a tool for decision making. It describes the positive and negative effects of the undertaking and lists alternative actions. The draft document (DEIS) is prepared by the DOE, or under DOE guidance, and attempts to identify and analyze the environmental impacts of a proposed action and feasible alternatives, and is circulated for public comment prior to preparation of the final environmental impact statement.

Environmental Restoration (ER)–measures taken to clean up and stabilize or restore a site to regulatory acceptable conditions when the site has been contaminated with hazardous substances during past production or disposal activities.

Environmental Restoration Waste–waste generated by environmental restoration program activities.

Facility–all contiguous land, buildings, structures; other appurtenances, and improvements on the land used for treating, storing, or disposing of hazardous waste. A facility may consist of several treatment, storage, or disposal operational units (e.g., one or more or landfills, surface impoundments, or combinations of them per SCHWMR R.61-79.260.10).

Federal Facility Agreement (FFA)–Developed in response to requirements in Section 120 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the FFA is an interagency agreement between the Department of Energy-Savannah River Operations, the Environmental Protection Agency-Region IV, and the South Carolina Department of Health and Environmental Control to establish an expeditious schedule of remedial actions at contaminated sites placed on the National Priorities List. The FFA became effective on August 16, 1993.

Federal Facility Compliance Act of 1992 (FFCAct)–The FFCAct was passed by Congress and made effective on October 6, 1992. The FFCAct requires that except as provided below, after the date that is three years after the date of enactment of this Act, the waiver of sovereign immunity contained in Section 6001(a) of the Solid Waste Disposal Act with respect to civil, criminal, and administrative penalties and fines shall apply to departments, agencies, and instrumentalities of the executive branch of the federal government for violation of Section 3004(j) of the Solid Waste Disposal Act involving storage of mixed waste. With respect to the Department of Energy, the waiver of sovereign immunity referred to above shall not apply so long as the Department of Energy is in compliance with both (i) a plan that has been submitted and approved pursuant to Section 3021(b) of the Solid Waste Disposal Act and which is in effect; and (ii) an order requiring compliance with such plan which has been issued pursuant to such Section 3021(b) and which is in effect.

Federal Facility Compliance Agreement (FFCA)–an agreement between the DOE, a host state and/or EPA with respect to how and when some waste-related activity will be conducted to achieve compliance with applicable regulations in a timely manner. This agreement is a major driver or constraint on activities that sites must undertake for waste operations.

Filtration–removal/separation of particles from a mixture of fluid and particles by a medium that permits the flow of the fluid but retains the particles.

Free Liquid–means liquids which readily separate from the solid portion of a waste under ambient temperature and pressure (per SCHWMR R.61-79.260.10).

Fuel Substitution (FSUBS)–This treatment description has been replaced by the term Combustion (CMBST) per the LDR Phase III Rule.

Generator–any person, by site, whose act or process produces hazardous waste identified or listed in South Carolina Hazardous Waste Management Regulation R.61-79.261 or whose act first causes a hazardous waste to become subject to regulation per SCHWMR R.61-79.260.10.

Glovebox–(1) a sealed volume penetrated by leaded-rubber gloves that allows safe manipulation of some alpha-emitting particles; or (2) a windowed, low-leaking enclosure equipped with one or more pairs of flexible gloves to allow outside personnel to handle radioactive material within the enclosure.

Groundwater –means water below the land surface in a zone of saturation (per SCHWMR R.61-79.260.10).

Groundwater Contamination–the pollution of the underground sources of liquid water by potentially hazardous or toxic materials that move downward through the unsaturated profile to the zone of saturation or from improperly constructed or operated wells.

Groundwater Remediation–treatment of groundwater to remove pollutants.

Hazardous Debris –means debris that contains a hazardous waste listed per Subpart D of Part 261 of SCHWMR or that exhibits a characteristic of hazardous waste identified in Subpart C of Part 261 of SCHWMR.

Hazardous Waste (HW)–those wastes that are designated hazardous by EPA (or state) Regulations. Those wastes listed by EPA (or state) or meeting characteristics specified by EPA (or state) in their criteria pursuant to RCRA. See South Carolina Hazardous Waste Management Regulations (SCHWMR) R.61-79.261.3 for specific detailed information.

Heterogeneous Debris (as a waste matrix)–wastes with matrices meeting the definition of debris per the August 18, 1992, LDR debris rule making (57 FR 37194, August 18, 1992). This category includes debris that do not meet the criteria for categorization as either Organic Debris or Inorganic Debris. This category also includes mixtures of debris and solid process residues or soil, provided debris comprises more than 50% of the waste.

High-Level Radioactive Waste (HLW)–(1) the highly radioactive waste material that results from the reprocessing of spent nuclear fuel including liquid waste produced directly in reprocessing and any solid waste derived from the liquid that contains a combination of transuranic (TRU) waste and fission products in concentrations requiring permanent isolation; or (2)(a) irradiated reactor fuel, (b) liquid wastes resulting from the operation of the first cycle solvent extraction system, or equivalent, and the concentrated wastes from subsequent extraction cycles, or equivalent, in a facility for reprocessing irradiated reactor fuel, and (c) solids into which such liquid wastes have been converted; or (3) as defined by the Nuclear Waste Policy Act (NWPA), (a) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including the liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (b) other highly radioactive material that the Nuclear Regulatory Commission (NRC), consistent with existing law, determines by rule to require permanent isolation; or (4) waste generated in the fuel of a nuclear reactor, or waste found at nuclear reactors or nuclear fuel reprocessing plants. These wastes are a serious threat to anyone who comes near them without shielding.

High-Level Vitrification (HLVIT)–vitrification of high-level radioactive wastes in units which comply with all applicable radioactive protection requirements under control of the Nuclear Regulatory Commission; or a mixed waste treatment process identified in R.61-79.268.42 of SCHWMR.

Ignitability/Ignitable–a waste property describing RCRA characteristically hazardous waste with a flash point lower than 140°F. More detail on this definition can be found by consulting the SCHWMR R.61-79.261.21.

Immobilization–treatment of waste debris through macroencapsulation, micro-encapsulation, or sealing to reduce surface exposure to potential leaching media; or to reduce the leachability of the hazardous constituents. Described in Treatment Standards for Debris R.61-79.268.45 of SCHWMR.

Incineration (INCIN)–This treatment description has been replaced by the term Combustion (CMBST) per the LDR Phase III Rule.

Incineration of Wastes Containing Organics and Mercury (IMERC)–incineration of wastes containing organics and mercury in units operated in accordance with the technical operating requirements of R.61-79.264 Subpart O and 265 Subpart O SCHWMR. All wastewater and nonwastewater residues derived from this process must then comply with the corresponding treatment standards per waste code with consideration of any applicable subcategories (e.g., high or low mercury subcategories) (per R.61-79.268.42 SCHWMR).

Inorganic Debris (as waste matrix)–wastes with matrices meeting the definition of debris per the August 18, 1992, LDR debris rule making (57 FR 37194, August 18, 1992). More specifically, this category is defined for wastes that contain >90% inorganic debris. Examples include the following; metal shapes (e.g., equipment, scrap), metal turnings, glass (e.g., light tubes, leaded glass, etc.), ceramic materials, concrete, rocks. To meet the debris definition, material must be incapable of passing through a 9.5-mm standard sieve.

Inorganic Sludges/Particulates (as a waste matrix)–solid process residues with a predominately inorganic matrix. Solid process residues do not fit the definition of debris. Typically, these solids are sludge or particulate materials. Waste in this category may also contain some debris materials, provided the amount of debris is less than 50% (based on LDR debris rule). The solids in this category may be contaminated with or contain organics such that thermal treatment is required. However, the matrices are predominantly inorganic so that thermal treatment would result in a high residue. Examples in this category are the following: sludges, ashes, and blasting media; absorbed aqueous or organic liquids (or inorganic particulate absorbents); ion exchange resins; and paint chips/residues.

Ion Exchange–a process that separates a mixed waste into its radioactive and/or hazardous constituents if the radioactive and/or hazardous components are ionic. It will also concentrate the radioactive and/or hazardous ionic species into a small volume, leaving a nonradioactive aqueous phase. The principal mixed waste application of this process is to recover metallic radionuclides from wastewaters or acid leach liquors. Ion exchange usually occurs through utilization of a resin which replaces the radioactive or hazardous ionic component with a nonradioactive or nonhazardous ionic component.

Job Control Waste (JCW)–discarded materials such as laboratory coats, plastic shoe covers, protective gloves and other paper, cloth, plastic, and glass products used in operations and preventive maintenance activities.

Lab Packs with Metals and Lab Packs without Metals (as waste matrices)–wastes with one or more small containers of free liquids or solids surrounded by solid materials (virgin or waste materials) within a larger container. Examples include scintillation fluids that are packaged with vials or containers of waste analytical reagents, used or unused laboratory samples, etc. The difference between wastes in these categories is contaminants. Lab packed wastes contaminated with TC metals are “Lab packs with Metals.” Lab packed wastes not contaminated with TC metals are categorized as “Lab packs without Metals.”

Land Disposal–placement in or on the land except in a corrective action management unit including, but not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome, salt bed formation, underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes (per SCHWMR R.61-79.268.2(c)).

Land Disposal Restrictions (LDR)–(1) provisions of the Hazardous and Solid Waste Amendments (HSWA) requiring treatment of hazardous wastes before disposal; or (2) a RCRA program that restricts land disposal of RCRA hazardous wastes and requires treatment to promulgated treatment standards.

Land Disposal Restrictions–Federal Facility Compliance Agreement (LDR-FFCA)–An agreement effective March 13, 1991, between the Environmental Protection Agency-Region IV (EPA-IV) and the Department of Energy-Savannah River Operations (DOE-SR), which allowed the Savannah River Site (SRS) to continue to generate and store prohibited mixed waste regulated under the land disposal restrictions (LDR) of the Resource Conservation and Recovery Act (RCRA) while developing treatment capacity. The LDR-FFCA established a number of compliance deadlines involving LDR mixed waste treatment activities at SRS. The LDR-FFCA was amended three times. The third amendment, called the Bridging Amendment, was effective June 20, 1994, and aligned the LDR-FFCA with requirements of the Federal Facility Compliance Act (FFCAct). The LDR-FFCA expired on September 29, 1995, with agreement by SCDHEC and SRS on the FFCAct Consent Order and approval of the STP.

Leachate–any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste (per SCHWMR R.61-79.260.10). Leaching may occur at landfills or spill sites and may result in hazardous substances entering soil, surface water, or groundwater.

Listed Waste–wastes listed as hazardous under R.61-79.261 Subpart D SCHWMR, which includes lists of nonspecific source wastes, specific source wastes, and commercial chemical products or manufacturing chemical intermediates. These materials are listed because they exhibit a characteristic of hazardous waste, meet the statutory definition of hazardous waste, or are acutely toxic, acutely hazardous, or otherwise toxic.

Liquid Mercury (as a waste matrix)–any wastes containing bulk volumes of elemental liquid mercury. The category includes lab packs of strictly liquid mercury or other containers containing bulk mercury.

Low-Level Radioactive Waste (LLW)–(1) waste that contains radioactivity and is not classified as high-level waste, transuranic (TRU) waste, or spent nuclear fuel, or the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level waste, provided the concentration of TRU is less than 100 nanoCuries/gram (nCi/g); or (2) radioactive waste not classified as high-level waste, TRU waste, spent nuclear fuel, or byproduct material.

Macroencapsulation (MACRO) (technology based standard)–application of surface coating materials such as polymeric organics (e.g., resins and plastics) or with a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. Macroencapsulation specifically does not include material that would be classified as a tank or container according to R.61-79.260.10 SCHWMR. Macroencapsulation is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Macroencapsulation (MACRO) (alternative standard for debris)–identical definition to the one immediately above for the technology based standard except this definition excludes the last sentence referring to use of materials that could be classified as a tank or container. A hazardous debris treatment identified in 40 CFR 268.45 of SCHWMR.

Metals Recovery (RMETL)–recovery of metals or inorganics utilizing one or more of the following direct physical/removal technologies: (1) ion exchange; (2) resin or solid (i.e., zeolites) adsorption; (3) reverse osmosis; (4) chelation/solvent extraction; (5) freeze crystallization; (6) ultrafiltration and/or (7) simple precipitation (i.e., crystallization). Note: This does not preclude the use of other physical phase separation or concentration techniques such as decantation, filtration (including ultrafiltration), and centrifugation, when used in conjunction with the above listed recovery technologies. Metals recovery is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Microencapsulation–stabilization of the debris with the following reagents (or waste reagents) such that the leachability of the hazardous contaminants is reduced; (1) Portland cement; or (2) lime/pozzolans (e.g., fly ash and cement kiln dust). Reagents (e.g., iron salts, silicates, and clay) may be added to enhance the set/cure time and/or compressive strength or to reduce the leachability of the hazardous constituents. Microencapsulation is a hazardous debris treatment identified in R.61-79.268.45 of SCHWMR.

Mixed Low-Level Waste (MLLW)–low-level waste that also includes hazardous materials as identified in R.61-79.261, Subparts C and D, SCHWMR.

Mixed TRU (MTRU) Waste–Transuranic (TRU) waste that also includes hazardous materials as identified in R.61-79.261, Subparts C and D, SCHWMR.

Mixed Waste–waste that contains both hazardous waste and source, special nuclear, or by-product material subject to the Atomic Energy Act of 1954 (42 USC 2011 et seq.) (from Sec 1004 of the Solid Waste Disposal Act–42 USC 6902).

Mixture Rule–under the mixture rule, when any solid waste and a listed hazardous waste is mixed, the entire mixture is a listed hazardous waste unless the listed waste is listed for exhibiting a characteristic of a hazardous waste. Mixtures of solid waste and listed hazardous waste that are listed solely for exhibiting a characteristic are not hazardous if the resulting mixture no longer exhibits any characteristic. Mixtures of solid wastes and characteristic hazardous wastes are hazardous only if the mixture exhibits a hazardous characteristic. [R.61-79.261.3(a)(2)].

Moratorium Waste–those Land Disposal Restrictions (LDR) wastes generated in areas with a potential for causing radioactive contamination or activation that are subject to the May 17, 1991, DOE moratorium on offsite shipment of hazardous waste to commercial treatment, storage, and disposal facilities. Also included in the 1991 moratorium are certain heterogeneous and homogeneous solids from which a representative sample for radiological screening purposes cannot be obtained until appropriate sampling protocols are established.

Neutralization (NEUTR)–use of the following reagents (or waste reagents) or combinations of reagents: (1) acids, (2) bases, or (3) water (including wastewaters) resulting in a pH greater than 2 but less than 12.5 as measured in the aqueous residuals. Neutralization is a hazardous waste treatment process developed in R.61-79.268.42 SCHWMR.

Nondefense-Related Waste– radioactive waste under the purview of the Nuclear Regulatory Commission or generated by the commercial nuclear power industry, and not derived from the manufacture of nuclear weapons, weapons related research programs, operations of naval reactors and the decontamination of production facilities.

Non-PUREX SRS mixed wastes - For the purpose of Section 3.1.1.1 of Volume I, Non-PUREX SRS mixed wastes are defined as those mixed wastes, exclusive of waste stream SR-W045, identified in Volume 1, Section 3.1.1.1 of the SRS Approved Site Treatment Plan, Revision 5, March 20, 1997.

Nonwastewater–waste that does not meet the criteria for wastewater found later in these definitions.

Normal Mixed Waste–waste that is similar to "standard commercial mixed waste."

Onsite–the same or geographically contiguous property which may be divided by a public or private right of way provided the entrance and exit between the properties is at a crossroads intersection and access is by crossing as opposed to going along the right-of-way. Noncontiguous properties owned by the same person, but connected by a right-of-way which he controls and to which the public does not have access is also considered onsite property (per SCHWMR R.61-79.260.10).

Onsite Facility–a hazardous waste treatment, storage, or disposal area that is located on the generating site.

Organic Debris (as a waste matrix)–wastes with matrices meeting the definition of debris per R.61-79.268.2 debris rule making (57 FR 37194, August 18, 1992). This category is defined for wastes that contain >90% organic debris. Examples include rags (including "solvent rags") plastic/rubber, paper, wood, glovebox gloves (including lead-lined), and animal carcasses.

Organic Liquids (as a waste matrix)–liquids/slurries with a total organic carbon (TOC) content greater than or equal to 1%. Slurries must be pumpable (e.g., suspended/settled solids can be up to approximately 35-40%). Only liquids/slurries packaged/stored in bulk form (i.e., tank stored, drummed bulk free liquids) are included in this category. Liquids packaged in lab pack-type configuration are categorized as lab packs.

Organic Sludges/Particulates (as a waste matrix)–solid process residues with an organic matrix. Solid process residues are solids that do not fit the definition of debris. Typically, these solids are sludge or particulate materials. Waste in this category may also contain some debris materials, provided the amount of debris is less than 50% (based on LDR debris rule). As opposed to Inorganic Sludges/Particulates, wastes in this category would not leave a large residue when thermally treated. Example waste materials are organic sludges, (e.g., sewage sludges) activated carbon, organic resins, and absorbed liquids (organic particulate absorbents).

Permit–an authorization, license, or equivalent control document issued by South Carolina or EPA to implement the requirements of R.61-79.124 and part 270 or equivalent federal regulation. Permit includes RCRA permit by rule (270.60). Permit does not include RCRA interim status (270.70) or any permit which has not yet been the subject of federal agency action, such as a draft permit or a proposed permit.

pH–(1) used to describe the hydrogen ion activity of a system. The logarithm of the reciprocal of hydrogen ion concentration ($-\log_{10}$ [H+], where [H+] is hydrogen-ion concentration in moles per liter); or (2) a symbol for the degree of acidity or alkalinity.

Plutonium-Uranium Extraction (PUREX) Process–a solvent extraction process used in the reprocessing of uranium/plutonium-based nuclear fuels.

Precipitation (PRECP)–chemical precipitation of metals and other inorganics to form insoluble precipitates of oxides, hydroxides, carbonates, sulfides, sulfates, chlorides, fluorides, or phosphates. The following reagents (or waste reagents) are typically used alone or in combination: (1) lime (i.e., containing oxides and/or hydroxides of calcium and/or magnesium); (2) caustic (i.e., sodium and/or potassium hydroxides); (3) soda ash (i.e., sodium carbonate); (4) sodium sulfide; (5) ferric sulfate or ferric chloride; (6) alum; or (7) sodium sulfate. Additional flocculating, coagulating, or similar reagents/processes that enhance sludge dewatering characteristics are not precluded from use. Precipitation is a hazardous waste treatment process developed in R.61-79.268.42 SCHWMR.

Preparation for Treatment Processes–processes (e.g., shredding, grinding, physical separation, etc.) that make the waste amenable to the treatment process that ultimately destroys, removes, or immobilizes the hazardous contaminants or characteristics.

Processing - For the purpose of Section 3.1.1.1 of Volume I, processing is defined as the treatment of incinerable mixed wastes to meet the LDR standards in effect as of 9/30/97.

Radiation–(1) ionizing radiation that includes any or all of the following; gamma rays and x-rays, alpha and beta particles, high-speed electrons, neutrons, high-speed protons, and other atomic particles. This definition does not include nonionizing radiations such as sound, microwave, radiowave or visible, infrared, or ultraviolet light; or (2) refers to the process of emitting energy in the form of rays or particles that are thrown off by disintegrating atoms. The rays or particles emitted may consist of alpha, beta, or gamma radiation.

Radioactive Materials Management Area (RMMA)–an area in which the potential exists for contamination due to the presence of unencapsulated or unconfined radioactive material or an area that is exposed to beams or other sources of particles (neutron, protons, etc.) capable of causing activation. Any of the following areas constitute an RMMA; (1) radiological buffer areas (except those established for a radiation field only) and all areas they encompass; (2) radioactive management areas; (3) soil contamination areas and the surrounding area that is greater than twice the background level of radiation; (4) underground radioactive material areas that have undergone operations to expose radionuclides (e.g., excavation); or (5) the area inside the OSHA physical control (e.g., fence) that was established for an environmental restoration activity where radioactive material is present.

Radioactive Mixed Waste–(See Mixed Waste)

Radioactive Waste–(1) solid, liquid, or gaseous material that contains radionuclides regulated under the AEA of 1954, as amended, and of negligible economic value considering recovery costs; or (2) a solid, liquid, or gaseous material of negligible economic value that contains radionuclides in excess of threshold quantities. Radioactive waste does not include material contaminated by radionuclides from nuclear weapons testing.

Radioactivity–(1) the spontaneous nuclear decay of material with a corresponding release of energy in the form of particles and/or electromagnetic radiation; or (2) the property or characteristic of radioactive material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie.

Radionuclide–(1) a species of atom having an unstable nucleus that is subject to spontaneous decay; or (2) any nuclide that emits radiation. A nuclide is a species of atom characterized by the constitution of its nucleus and hence by its number of protons, neutrons, and energy content.

Reactive Metals (as a waste matrix)–bulk reactive metals and equipment contaminated with reactive metals. Bulk reactive metals include sodium, alkali metal alloys, aluminum fines, uranium fines, zirconium fines, and other pyrophoric materials. Contaminated equipment includes piping, pumps, and other materials with a residue or reactive metals that cannot be separated from the equipment medium.

Reactivity–a solid waste exhibits the characteristic of reactivity if a representative sample of the waste has any of the following properties: (1) It is normally unstable and readily undergoes violent change without detonating. (2) It reacts violently with water. (3) It forms potentially explosive mixtures with water. (4) When mixed with water, it generates toxic gases, vapors, or fumes in a quantity sufficient to present a danger to human health and the environment. (5) It is a cyanide or sulfide bearing waste which when exposed to pH conditions between 2 and 12.5, and can generate toxic gases vapors or fumes in a quantity sufficient to present a danger to human health or the environment. (6) It is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement. (7) It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure. (8) It is a forbidden explosive as defined in 49 CFR 173.51, or a Class A explosive as defined in 49 CFR 173.53 or a Class B explosive as defined in 49 CFR 173.88. This definition comes from R.61-79.261.23 SCHWMR.

Recovery of Organics (RORGS)–recovery of organics utilizing one or more of the following technologies, (1) distillation, (2) thin film evaporation, (3) steam stripping, (4) carbon adsorption, (5) critical fluid extraction, (6) liquid-liquid extraction, (7) precipitation/ crystallization (including freeze crystallization), or (8) chemical phase separation techniques (i.e., addition of acids, bases, demulsifiers, or similar chemicals). Note: This does not preclude the use of other physical phase separation techniques such as a decantation, filtration (including ultrafiltration), and centrifugation when used in conjunction with the above listed recovery technologies. Recovery of organics is a hazardous waste treatment process developed in R.61-79.268.42 SCHWMR.

rem– Roentgen equivalent man–a measure of radiation equal to the dose in rad (radiation absorbed dose) or Roentgens multiplied by a quality factor measuring the effectiveness of the absorbed dose: mrem equals a millirem or one-thousandth of a rem.

Remedial Action (RA)–(1) activities conducted at DOE facilities to reduce potential risks to people and/or harm to the environment from radioactive and/or hazardous substance contamination; or (2) those actions consistent with permanent remedy taken instead of, or in addition to, removal action in the event of a release or threatened release of a hazardous substance into the environment to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. The term includes, but is not limited to, such actions at the location of the release as storage, confinement, perimeter protection, clay cover, neutralization, cleanup of released hazardous substances or contaminated materials, recycling or reuse, diversion, destruction, segregation of reactive wastes, dredging, or excavations, repair or replacement of leaking containers, collection of leachate and runoff, onsite treatment or combustion, provision of alternative water supplies, and any monitoring reasonably required to ensure that such actions protect the public health and welfare and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the president determines that, alone or in combination with other measures, such relocation is more cost-effective than, and environmentally preferable to, the transportation, storage, treatment, destruction, or secured disposition offsite of such hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term does not include offsite transport of hazardous substances or contaminated materials unless the president determines that such actions are more cost-effective than other remedial actions; will create new capacity to manage in compliance with Subtitle C of the SWDA, hazardous substances in addition to those located at the affected facility; or are necessary to protect public health or welfare or the environment from a present or potential risk that may be created by further exposure to the continued presence of such substances or materials [as defined by §101(24) of CERCLA].

Remote-Handled Waste (RH)–packaged waste with an external surface dose rate that exceeds 200 mrem per hour.

Remote Handling–the handling of wastes from a distance so as to protect human operators from unnecessary exposure.

Resource Conservation and Recovery Act (RCRA) Part A Permit Application–the first part of a Resource Conservation and Recovery Act permit application that identifies treatment, storage, and disposal units within a facility for which a permit is requested.

Resource Conservation and Recovery Act (RCRA) Part B Permit Application– the detailed second part of a RCRA permit application that describes waste to be managed, waste quantities, and facilities.

Retorting or Roasting (RMERC)–retorting or roasting in a thermal processing unit capable of volatilizing mercury and subsequently condensing the volatilized mercury for recovery. The retorting or roasting unit (or facility) must be subject to one or more of the following: (a) a National Emissions Standard for Hazardous Air Pollutants (NESHAP) for mercury; (b) a Best Available Control Technology (BACT) or a Lowest Achievable Emission Rate (LAER) standard for mercury imposed pursuant to a Prevention of Significant Deterioration (PSD) limit; or (c) a state permit that establishes emission limitations (within meaning of section 302 of the Clean Air Act) for mercury. All wastewater and nonwastewater residues derived from this process must then comply with the corresponding treatment standards per waste code with consideration of any applicable subcategories (e.g., high or low mercury subcategories). Retorting or roasting is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

Segregation–the separation of waste materials to facilitate handling, storage, treatment, transportation, and/or disposal.

Site–the land or water area where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity.

Site Characterization–the program of exploration and research, both in the laboratory and in the field, undertaken to establish the geologic conditions and the ranges of those parameters of a particular site. Site characterization includes borings, surface excavations, excavation of exploratory shafts, limited subsurface lateral excavations, and borings and geophysical testing.

Site Closure and Stabilization–those actions that are taken upon completion of operations that prepare the disposal site for custodial care and ensure that the disposal site will remain stable and will not need ongoing active maintenance.

Sludge–any solid, semi-solid, or liquid waste generated from a wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of treated effluent from a wastewater treatment plant.

Soil (as a waste matrix)–soils contaminated with hazardous constituents and radioactivity that are stored in waste containers. Soil (as a waste matrix) includes soils contaminated with organics, inorganics, or both.

Soil With <50% Debris (as a waste matrix)–soils contaminated with hazardous constituents and radioactivity that are stored in waste containers, including soils contaminated with organics, inorganics, or both. This category may include debris, provided it is less than 50% of the waste.

Stabilization (STABL)–a broad class of treatment processes that immobilize hazardous constituents in a waste. For treatment of metals in mixed low-level wastes and for TRU wastes containing low-level radioactive components, stabilization technologies will reduce the leachability of the hazardous metal constituents (regardless of whether the metals are radioactive) in nonwastewater matrices. R.61-79.268.42 SCHWMR defines stabilization as reaction with the following reagents (or waste reagents) or combination of reagents: (1) Portland cement; or (2) lime/pozzolans (e.g., flyash and cement kiln dust). This does not preclude the addition of reagents (e.g., iron salts, silicates, and clays) designed to enhance the set/cure time and/or compressive strength, or to overall reduce the leachability of the metal or inorganic.

Standard Commercial Mixed Waste–waste that meets the acceptance criteria of the commercial vendor or is readily handled by the commercial vendor under special procedures.

Steam Stripping–a continuous process conducted in a unit that consists of a boiler, a stripping column, a condenser, and a collection tank. Steam stripping of organics from liquid wastes utilizes direct application of steam to the wastes operated such that liquid and vapor flow rates, as well as, temperature and pressure ranges, have been optimized, monitored, and maintained. These operating parameters are dependent upon the design parameters of the unit such as the number of separation stages and the internal column design. Steam stripping results in a condensed extract high in organics that must undergo incineration, reuse as a fuel, or other recovery/reuse and an extracted wastewater that must undergo further treatment as specified in the standard.

Storage–(1) temporary holding of waste pending treatment or disposal. Storage methods include containers, tanks, waste piles, surface impoundments, and containment buildings; (2) the containment of hazardous waste, either on a temporary basis or for a period of years, in such a manner as not to constitute disposal of such hazardous waste; or (3) retrievable retention of waste pending disposal. SCHWMR R.61-79.260.10 defines storage as the holding of hazardous waste for a temporary period, at the end of which the hazardous waste is treated, disposed of, or stored elsewhere.

Supercompaction–a volume-reduction method relying on mechanical compaction.

Technology Based Standard–a restricted waste for which a technology based standard is specified may be land disposed after it is treated using that specified technology or an equivalent treatment method approved by the Administrator of the EPA.

Thermal Recovery of Lead (RLEAD)–thermal recovery of lead in secondary lead smelters. A technology based treatment standard defined in SCHWMR R.61-79.268.42.

Thermal Treatment–the treatment of hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological character or composition of the hazardous waste. Examples of thermal treatment processes are incineration, pyrolysis, calcination, wet air oxidation, and microwave discharge.

Toxicity Characteristic Leaching Procedure (TCLP)–a test designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, or multi-phase wastes. If a solid waste analyzed using this method or approved equivalent demonstrates contaminant levels in excess of the listed concentrations found in the RCRA regulations, the waste is hazardous for the characteristic of toxicity.

Transuranic Waste (TRU)–this core definition appears in modified form in various relevant documents: Waste containing alpha-emitting radionuclides with an atomic number greater than 92 and half-lives greater than 20 years, at concentrations greater than 100 nCi/g of waste. Modifications include the following: (1) For purposes of management, DOE Order 435.1 (a) considers TRU waste, as defined above, “without regard to source or form” [The proposed revision to the Order (“DOE Order 435.1 Major Issues for Revision,” May 6, 1992) contemplates removing this clause.]; (b) allows heads of field elements to determine that wastes containing other alpha-emitting radionuclides must be managed as TRU waste; and (c) adds “at time of assay,” implying both that the classification of a waste as TRU is to be made based on an assay and that such classification can be superseded only by another assay. (2) For purposes of setting standards for management and disposal, 40 CFR 191.02(i) adds “except for: (a) high-level radioactive wastes; (b) wastes that DOE has determined, with the concurrence of the Administrator [of EPA] do not need the degree of isolation required by this part; or (c) wastes that the Commission [NRC] has approved for disposal on a case-by-case basis in accordance with 10 CFR 61 [Licensing Requirements for Land Disposal of Radioactive Wastes].”

Treatability Group–based on the radioactive characteristics, hazardous components, and physical/chemical matrices as discussed above, DOE has grouped its wastes to reflect salient treatment considerations for each waste stream. These “treatability groups” are used to relate waste streams and waste quantities to treatment facilities and technology development needs.

Treatment–any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize, recover energy or material resources from the waste, or so as to render such waste nonhazardous, or less hazardous, safer to transport, store or dispose of, or amenable for recovery, amenable for storage, or reduced in volume per SCHWMR R.61-79.260.10.

Treatment Facility–the specific area of land, structures, and equipment dedicated to waste treatment and related activities.

Treatment, Storage, and Disposal (TSD) Facility–any building, structure, or installation where a mixed or hazardous waste has been treated, stored, or disposed.

Treatment System–the equipment and processes used for similar waste types at treatment facilities. A treatment system is the unit treatment operation or sequence of unit treatment operations carried out on all wastes that enter the system (e.g., a treatment system may consist of chemical reduction followed by precipitation or an incinerator and a vitrification unit for the ash).

Underlying Hazardous Constituent–means any constituent listed in 40 CFR 268.48 Table UTS–Universal Treatment Standards, except zinc, which can reasonably expected to be present at the point of generation of the hazardous waste at a concentration above the constituent-specific UTS treatment standard.

Unit–discrete part of a facility used to treat, store, or dispose of hazardous or mixed waste.

Universal Treatment Standards–concentration levels for the constituents listed in 40 CFR 268.48–Table UTS Universal Treatment Standards which are required to be met for underlying hazardous constituents in waste treated for land disposal.

Variance–any mechanism or provision which allows modification to or waiver of the generally applicable requirements of R.61-79.124, R.61-79.270, R.61-79.260 through R.61-79.266 SCHWMR.

Vitrification–(1) a waste treatment process in which calcined or another decomposed form of waste is mixed with glass and fused into a solid mass. The resultant mass is expected to remain a stable and insoluble form for long time periods, and thus will be a leading candidate for the most benign waste form for disposal (Vitrification with borosilicate glass is the BDAT for HLW and certain mixed waste streams); (2) the conversion of high-level waste materials into a glassy or noncrystalline solid for subsequent disposal; or (3) the process of immobilizing waste that produces a glass-like solid that permanently captures the radioactive materials. Per SCHWMR R.61-79.268.42, vitrification of high level mixed radioactive wastes in units in compliance with all applicable radioactive protection requirements under control of the Nuclear Regulatory Commission.

Volatile Organic Compound (VOC)–(1) any reactive organic compound; or (2) an organic compound that evaporates (volatilizes) readily at room temperature.

Waste Acceptance Criteria (WAC)–the criteria used to determine if waste and waste packages are acceptable for treatment, storage, transportation, and disposal purposes.

Waste Characterization–activities to determine the extent and nature of the waste. (Note: Waste characterization may be based on process knowledge, nonintrusive nondestructive examination/nondestructive assay [NDE/NDA], or intrusive examination such as sampling and analysis.)

Wasteform–the physical form of the waste such as sludges, combustibles, metals, etc.

Waste Isolation Pilot Plant (WIPP)–(1) the project authorized under §213 of the DOE National Security and Military Applications of Nuclear Energy Authorization Act of 1980 (Public Law 96-164; 93 Stat. 1259, 1265) to demonstrate the safe disposal of radioactive waste materials generated by atomic energy defense activities; or (2) a research and development facility, located near Carlsbad, New Mexico, to be used for demonstrating the safe disposal of TRU wastes from DOE activities.

Waste Management–the planning, coordination, and direction of those functions related to generation, handling, treatment, storage, transportation, and disposal of waste as well as associated surveillance and maintenance activities.

Waste Minimization–(1) an action that effectively avoids or reduces the generation of waste by source reduction, improving energy usage, or by recycling. This action is consistent with the general goal of minimizing present and future threats to human health, safety, and the environment; or (2) the reduction, to the extent feasible, of hazardous waste that is generated prior to treatment, storage, or disposal of the waste. Waste minimization includes any source reduction or recycling activity that results in either (a) reduction of total volume of hazardous waste, (b) reduction of toxicity of hazardous waste or (c) both.

Waste Segregation–the separation of waste materials before the package (or repackage) process to facilitate handling, storage, treatment, transportation, and/or disposal.

Waste Stream–a general term developed for the STP used to describe a volume of waste collected from various locations or generated from a specific process with a similar physical matrix and treatment requirement.

Wastewaters–wastes that contain less than 1% by weight total organic carbon (TOC) and less than 1% by weight total suspended solids (TSS) with the following exception: F001, F002, F003, F004, F005 wastewaters are solvent-water mixtures that contain less than 1% by weight TOC or less than 1% by weight total F001, F002, F003, F004, F005 solvent constituents listed in R.61-79.268.40, *Table Constituent Concentrations in Waste Extract*.