WSRC-TR-94-0608, Rev. 4

Approved Site Treatment Plan, Volumes I and II

by

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DOE Contract No. DE-AC09-89SR18035

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Approved Site Treatment Plan - Revision 4

3/22/96

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SAVANNAH RIVER SITE

MIXED WASTE

APPROVED SITE TREATMENT PLAN (STP) (U)

WSRC-TR-94-0608

Revision 4

Approved

/ 3-25-96

Ambrose Schwallie — Date
President
Westinghouse Savannah River Company

Approved

/ 4-19-96

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Manager, Department of Energy
Savannah River Site

GH5600srd 3/22/96

SAVANNAH RIVER SITE

MIXED WASTE

APPROVED SITE TREATMENT PLAN (STP) (U)

Revision 4

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ADC & Reviewing Official: Brent A. Daugherty Mgr Program Integ
(Name and Title)
Date: 3/22/96

Volumes I and II

April 15, 1996

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Volume I

Compliance Plan Volume

CHAPTER 1 PURPOSE AND SCOPE OF THE COMPLIANCE PLAN VOLUME

For each facility at which the 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 develop 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 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 STP Volume I and II will be done in accordance with the provisions of Consent Order 95-22-HW.

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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.

Section 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 Chapter 3.0 through 5.0 of this Volume in accordance with the Section 3021(b)(1)(B)(ii) of the Federal Facility Compliance Act (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 wastes that contain 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.).

Section 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 which occur in the upcoming federal fiscal year and which 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 through the submission of a target budget request and the identification of 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 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.

If a funding shortfall is identified for Appendix B activities, DOE-SR shall notify SCDHEC and attempt to resolve the shortfall through seeking additional funds, reprioritization, and/or implementing improved operating efficiencies. If the funding shortfall for Appendix B is not resolved, DOE-SR may 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.

Section 2.3 Covered Matters

2.3.1 Applicability

Except as specifically set forth elsewhere in this plan, this plan shall apply to the RCRA Land Disposal Restrictions (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.

2.3.2 Mixed Waste Treatment

This plan addresses or will address the development of treatment capacities and technologies for treating SRS mixed wastes, or otherwise manage mixed wastes in accordance with RCRA LDR regardless of the time the mixed wastes were generated. For the purpose of this plan, covered mixed wastes shall mean those mixed wastes not excluded by the Covered Matters herein.

2.3.3 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 those mixed wastes which are being stored or generated at SRS which (1) meet LDR requirements, regardless of when generated; or (2) mixed wastes which 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 South Carolina Hazardous Waste Management Regulation R.61.-79.268.50. Information pertaining to the status of these mixed wastes, 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.

2.3.4 Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Resource Conservation and Recovery Act (RCRA)

Corrective actions and response actions shall be addressed by the CERCLA Section 120 Federal Facility Agreement (FFA) which was negotiated by EPA, DOE-SR, and SCDHEC effective August 16, 1993, and 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.

2.3.5 *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., Federal Facility Agreement (FFA), mixed aqueous IDW in the SRS IDW Management Plan, mixed waste with a designated treatment listed in RODs/orders), permit or order or modifications thereof. Other environmental restoration mixed waste streams which are not specifically excluded will be dispositioned in accordance with the strategy provided in Volume II, Section 6.1. Any mixed waste for which SRS proposes to be excluded from the STP shall be submitted to SCDHEC for approval.

2.3.6 *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 which exist or may exist at SRS, which are not specifically covered by this plan.

Section 2.4 Funding

2.4.1 *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. DOE-SR's intent is to further explain the process DOE intends to follow in developing, approving, and requesting funding for all STP requirements for this Compliance Plan Volume.

DOE-SR will provide SCDHEC an opportunity to input into formulating the SRS budget and setting the SRS budget priorities. Nothing herein shall affect DOE's authority over its budget and funding level submissions.

2.4.2 *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.

Section 2.5 Changes to STP

2.5.1 *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 Federal Facility Compliance Act 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 Updates. 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.

2.5.2 *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 Sec. 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. The SCDHEC shall ensure that the public notice requirements of the FFCAct are addressed.

2.5.3 *Additional RCRA Permit Identification*

If SRS determines that treatment preparation steps, such as characterization may require RCRA permits or an 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.

2.5.4 *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 following project activity schedules are proposed for the treatment of mixed waste in accordance with Section 2.2 of this volume. Chapter 3.0 identifies mixed low-level waste streams, Chapter 4.0 identifies mixed TRU waste streams, and Chapter 5.0 identifies high level waste.

The table below identifies each mixed waste stream, the preferred treatment option (PO) and the section 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 1996 do not appear in Volume I.

In 1995, DOE Headquarters expanded the scope of the master complex-wide database which is used to maintain mixed waste inventory data and to generate the Mixed Waste Inventory Report (MWIR). Non-mixed TRU data has now been incorporated into the database, which is now also known as the Material Inventory and Tracking Information (MITI) database. In the future, DOE plans to incorporate other types of waste into the system, e.g., low-level waste, sanitary waste, etc. With the expansion of the database, the numbering of new mixed waste streams will no longer be sequential. For example, the non-mixed TRU waste streams have been assigned waste stream numbers SR-W073 through SR-W075. The next number available for assignment to a mixed waste stream is SR-W077.

User's Guide to Chapters 3.0, 4.0, and 5.0 – Plan and Schedules

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W001	Rad-Contaminated Solvents	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.A
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A	2.6.1
SR-W003	Solvent Contaminated Debris (LLW)	Incineration followed by Stabilization – CIF	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	2.6.1
SR-W005	Mark 15 Filtercake	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.A
SR-W006	Mixed TTA/Xylene – TRU	Characterization at SRS – WIPP Disposal	N/A	4.1.1.1.A
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	N/A	2.6.1
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	N/A	2.6.1
SR-W009	Silver Coated Packing Material	Macroencapsulation in a Steel Container – onsite	3.1.3.1	3.1.3.1.A

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	2.6.1
SR-W011	Cadmium-Coated HEPA Filters	Scrap Metal Exclusion	N/A	2.6.1
SR-W012	Incinerable Toxic Characteristic (TC) Material	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.C
SR-W013	Low Level Waste (LLW) Lead – to be Decontaminated	Decontamination by Offsite Vendor	3.1.4.1	3.1.4.1.A & 2.6.1
SR-W014	Tritium-Contaminated Mercury	Amalgamation – Offsite DOE-INEL-WEDF	3.1.5.1	3.1.5.1.A
SR-W015	Mercury/Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	N/A	2.6.1
SR-W016	221-F Canyon High Level Liquid Waste	Stabilization by Vitrification – DWPF	5.1.1	5.1.1.1.A
SR-W017	221-H Canyon High Level Liquid Waste	Stabilization by Vitrification – DWPF	5.1.1	5.1.1.1.B
SR-W018	Filter Paper Take Up Rolls (FPTUR)	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.D
SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	N/A	2.6.1
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) 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	2.6.1
SR-W022	DWPF Benzene	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.E
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a cask, as a 90-day generator	N/A	2.6.1
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	N/A	2.6.1
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization at SRS	3.3.1	3.3.1.1.A
SR-W026	Thirds/TRU Job Control Waste	Characterization at SRS – WIPP Disposal	4.1.1	4.1.1.1.B
SR-W027	Solvent/TRU Job Control Waste	Characterization at SRS – WIPP Disposal	4.1.1	4.1.1.1.C
SR-W028	Mark 15 Filter Paper	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.F
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.B
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	2.6.1

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.C
SR-W032	Mercury Contaminated Heavy Water	D-Area Facility	3.1.1.4	3.1.1.5.A
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization at SRS	3.3.1	3.3.1.1.B
SR-W034	Calcium Metal	Deactivation by Wet Oxidation – DOE Mobile Reactive Metals Unit – Offsite	3.1.5.2	3.1.5.2.A
SR-W035	Mixed Waste Oil – Sitewide	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.G
SR-W036	Tritiated Oil with Mercury	Treatment by aging followed by Incineration	3.4	3.4.1
SR-W037	M-Area Plating Line Sludges	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.D
SR-W038	Plating Line Sump Materials	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.E
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.F
SR-W040	M-Area Stabilized Sludge	Waste stream eliminated	N/A	2.6.1
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	N/A	2.6.1
SR-W042	Paints and Thinners	Incineration followed by Stabilization CIF	3.1.1.1	3.1.1.1.H
SR-W043	Lab Waste w/Tetraphenyl Borate	Consolidated with SR-W012	N/A	2.6.1
SR-W044	Tri-Butyl-Phosphate & n-Paraffin – TRU	Consolidated with SR-W045	N/A	2.6.1
SR-W045	Tri-Butyl-Phosphate & n-Paraffin	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.I
SR-W046	Consolidated Incineration Facility (CIF) Ash	Stabilization – CIF Ashcrete Unit	N/A	3.1.1.1.J
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	Stabilization – CIF Ashcrete Unit	N/A	3.1.1.1.K
SR-W048	Soils from Spill Remediation	Stabilization by Vitrification M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.G
SR-W049	Tank E-3-1 Clean Out Material	Stabilization – Offsite DOE-INEL-WEDF	3.1.5.1	3.1.5.1.B

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	N/A	2.6.1
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.L
SR-W052	Cadmium Contaminated Glovebox Section	Waste stream eliminated	N/A	2.6.1
SR-W053	Rocky Flats Incinerator Ash	Return to Rocky Flats	4.2.1	4.2.1.1.A
SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	2.6.1
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.M
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators	Waste stream eliminated	N/A	2.6.1
SR-W057	D-Tested Neutron Generators	Waste stream eliminated	N/A	2.6.1
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	N/A	2.6.1
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	2.6.1
SR-W060	Tritiated Water with Mercury	Macroencapsulation in a Steel Container – Onsite	3.1.1.3	3.1.3.1.B
SR-W061	DWPF Mercury	Consolidated with SR-W068	N/A	2.6.1
SR-W062	Low-Level Contaminated Debris	Macroencapsulation with Polymer by a Vendor – Onsite	3.1.3.2	3.1.3.2.A
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	Meets Treatment Standard	N/A	2.6.1
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 Personnel Protective Equipment (PPE) Waste	Awaiting ROD, etc.	N/A	6.1
SR-W068	Elemental (Liquid) Mercury - Sitewide	Amalgamation – Offsite DOE-INEL WEDF	3.1.5.1	3.1.5.1.C
SR-W069	Low Level Waste (LLW) Lead – to be Macroencapsulated	Macroencapsulation with Polymer by a Vendor – Onsite	3.1.3.2	3.1.3.2.B
SR-W070	Mixed Waste from Laboratory Samples	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.N
SR-W071	Wastewater Suitable for Treatment in CIF	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.O

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Extraction or Immobilization Alternative Debris Technologies as 90-day Generator	N/A	2.6.1
SR-W073	Plastic/Lead/Cadmium Raschig Rings	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.P
SR-W077	Aqueous Characteristic Wastewater	Ion Exchange in D-Area	N/A	2.6.1
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	Awaiting Characterization Method Department	3.3.2	3.3.1.2.A
CN-W001*	Solids Containing Potassium Chromate	Incineration followed by Stabilization - CIF	3.1.1.1	3.1.1.1.Q
CN-W004*	Organic Debris with Lead and/or Chromium	Incineration followed by Stabilization - CIF	3.1.1.1	3.1.1.1.Q

* Information on Charleston Naval Shipyard waste is also found in Chapter 10.

Section 3.1 Mixed Low Level Waste Treated Onsite

3.1.1 Onsite Treatment in Existing Facilities

3.1.1.1 Consolidated Incineration Facility (CIF)

Incineration followed by stabilization in the CIF is the preferred option for certain mixed waste streams including, but not limited to, the following:

SR-W001, Rad-Contaminated Solvents
SR-W003, Solvent Contaminated Debris (LLW)
SR-W012, Incinerable Toxic Characteristic (TC) Material
SR-W018, Filter Paper Take Up Rolls (FPTUR)
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
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
SR-W073, Plastic/Lead/Cadmium Raschig Rings

Estimated Schedule for this Onsite Facility

Submittal of all applicable permit applications:
Completed

Entering into contracts:
Entering into contracts has been completed

Initiating Construction:
Initiating construction has been completed

Conducting Systems Testing:
Initiate testing has been completed

Commencing Operations:
Operations shall commence no later than June 30, 1997 (Extension approval pending - See modification request letters of 12/4/95 and 2/1/96).

Commence operations shall mean the introduction of waste into the CIF rotary kiln or secondary combustion chamber for treatment.

Processing Backlogged and Currently Generated Mixed Waste:
Submit an LDR waste processing rate at the CIF within 180 days after commencing operations, including the time necessary to prepare or repackage certain mixed waste streams.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the CIF is contingent upon, but not limited to, the following:

- The LDR waste processing rate will include offsite waste identified below
- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule
- No significant technical deficiencies are identified during the trial burn or from an operational readiness assessment
- SCDHEC Resource Conservation and Recovery Act (RCRA) permit modifications, including the trial burn plan, approved to support CIF operation and startup
- No changes in regulations, statutes, or the regulator's interpretations (except for the EPA combustion strategy)
- 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
  - a delay caused by insufficient funding where DOE timely and in good faith requested adequate funding in accordance with the federal appropriations process but Congress failed to appropriate such funding

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

CN-W001, Solids Containing Potassium Chromate
CN-W004, Organic Debris Contaminated with Lead and/or Chromium

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

Note: The previous waste stream identified in this section (SR-W041) has been treated.

Currently, no additional mixed wastes are waiting to be treated by this facility.

3.1.1.3 Miscellaneous Treatability Variance Submittals

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

SR-W060, Tritiated Water with Mercury

Estimated Schedule for this Activity

Submittal of all applicable permit applications:

Submit Treatability Variance by 4Q federal FY 97

3.1.1.4 Recycling

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

SR-W032, Mercury Contaminated Heavy Water

Estimated Schedule for Treatment of these Waste Streams

Submittal of all applicable permit applications:
Completed

Entering into Contracts:
Completed

Initiating constriction:
N/A - existing facility

Conducting Systems Testing:
N/A - existing facility

Commencing Operations:
Treatment of waste has begun

Processing Backlogged and Currently Generated Mixed Waste:
Inventory in mixed waste storage to be recycled by 4Q federal FY 97

3.1.2 Onsite Treatment in New Facilities

3.1.2.1 M-Area Vendor

Stabilization by vitrification in the M-Area Vendor Treatment Process is the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W005, Mark 15 Filter Cake
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

Estimated Schedule for this Onsite Facility

Submit applicable permit applications:
Completed

Entering into Contracts:
Completed

Initiating construction:
Completed

Conducting Systems Testing:
Initiate testing has been completed

Commencing Operations:

Initiate M-Area Vendor Treatment of the LDR waste within 285 days after the effective date of the Industrial Wastewater Construction Permit. This includes mobilization of the vendor's equipment and sufficient time to conduct a formal operational readiness assessment, if determined to be required by DOE-SR, on the vendor's process and equipment.

Commence operations is the start of preparation by the vendor of the initial homogeneous feed batch for the vitrification unit.

Processing Backlogged and Currently Generated Mixed Waste:

Original processing schedule submitted 1/30/94. Submit a revised processing schedule within 60 days of the Commence Operations phase.

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the M-Area Vendor Treatment Process is contingent upon, but not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule
- Compliance by the subcontractor with the terms of the contract
- Approval by SCDHEC of the proposed closure plan for the tank system in time to support processing of the stored sludge. Closure will, by necessity, exceed the normal 180 days allowed for closure after receipt of the final volume of hazardous waste per SCHWMR R.61-79.265.113(b)
- Receipt of an effective Wastewater Operations Permit and an Air Quality Control Operating Permit within 285 days of an effective Wastewater Construction Permit
- Resolution of any technically related finding(s) which might result from an operational readiness self-assessment or the systems testing phase
- No changes in regulations, statutes, or the regulator's interpretations
- 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
  - a delay caused by insufficient funding where DOE timely and in good faith requested adequate funding in accordance with the federal appropriations process but Congress failed to appropriate such funding

3.1.3 Onsite Treatment in Planned Facilities

3.1.3.1 SRS Macroencapsulation

Macroencapsulation is the preferred option for the following waste stream:

SR-W009, Silver Coated Packing Material

Estimated Schedule for treatment of this waste stream

Submit applicable permit application(s):

Submit LDR treatability variance petition to EPA 4Q federal FY 97. A copy of the treatability variance petition also will be submitted to SCDHEC. (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 proposals 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 begin equipment checkout, developing procedures, 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).

Schedule Assumptions

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

- An 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 NEPA documentation
- Approval by EPA of a treatability variance by 1Q FY 99, but no earlier than 4QFY98
- Resolution of any technically related finding(s) which might result from an operational readiness self-assessment or the systems testing phase
- No changes in regulations, statutes, or the regulator's interpretations
- 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
  - 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

3.1.3.2 Vendor Macroencapsulation

Vendor macroencapsulation in an SRS Containment Building is the preferred option for certain mixed waste streams, including, but not limited to, the following:

SR-W062, Low Level Contaminated Debris
SR-W069, Low Level Waste (LLW) Lead – to be Macroencapsulated

Estimated Schedule for Treatment of this Waste Stream

Submit applicable permit application(s):
Submit RCRA Part B permit application to SCDHEC by 4Q federal FY 00
Submit Treatability Variance for lead acid batteries by 4Q federal FY 98

Entering into Contract(s):
Within 90 days of the permit effective date or approval of treatability variance, whichever is later, initiate procurement activities. Initiation of procurement activities shall mean beginning preparation for request for proposals and contract specifications.

Initiating Construction:
Within 90 days of the permit effective date or approval of treatability variance, whichever is later, initiate construction. Initiation of construction shall mean initial equipment ordering.

Conduct Systems Testing:
Initiate systems testing within 27 months of the permit effective date. Initiate systems testing shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 12 months of initiating systems testing. Commence operations shall mean begin preparation of polymer batch.

Submitting Waste Processing Schedule:
Within 90 days after commencing operations, submit schedule for processing backlogged and currently generated mixed waste(s).

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the Containment Building treatment process is contingent upon, but not limited to, the following:

- Receipt by DOE-SR of adequate funding especially identified for this project to support the schedule
- Completion of appropriate NEPA documentation
- An existing SRS building will be refurbished to meet Containment Building requirements.
- Resolution of any technically related finding(s) which might result from an operational readiness self-assessment or the systems testing phase
- No changes in regulations, statutes, or the regulator's interpretations
- 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
  - 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
- Approval of RCRA Part B no earlier than end of federal FY 04

3.1.4 Offsite Vendor Treatment Facilities

3.1.4.1 Decontamination

Decontamination by a commercial vendor in an offsite 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

Issuing Request for Proposal:
Issue Request for Proposal by 4Q federal FY98.

Entering into Contact:
Entering into contract 2Q federal FY99.

Submit shipping schedule:
Submit a shipping schedule 4Q federal FY99

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the Vendor treatment process is contingent upon, but 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
- No changes in regulations, statutes, or the regulator's interpretations
- 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 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
  - 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

3.1.5 Offsite Department of Energy Facilities

3.1.5.1 Idaho National Engineering Laboratory Waste Engineering Development Facility

Amalgamation or stabilization at Idaho National Engineering Laboratory (INEL) Waste Engineering Development Facility (WEDF) is the preferred option for the following waste streams:

SR-W014, Tritium-Contaminated Mercury
SR-W049, Tank-E-3-1 Clean Out Material
SR-W068, Elemental (Liquid) Mercury - Sitewide

Estimated Schedule for treatment of these waste streams

Disposition of these waste streams is contingent upon receipt of shipping schedule from INEL. INEL will provide detailed treatment information. See STP Volume II for additional information.

Completing Shipment of Waste Offsite:
By 4Q FY 97, SRS will provide a schedule for completion of offsite waste shipment.

<u>Schedule Assumptions</u>

The ability to perform in accordance with the estimated schedule for the INEL treatment process is contingent upon, but not limited to, the following:

- Receipt by DOE-SR of adequate funding identified for this project to support the schedule
- Approval by INEL to ship waste
- Completion of appropriate NEPA documentation
- Agreement by the states involved

3.1.5.2 <u>Department of Energy Mobile Treatment Facilities</u>

Treatment by wet oxidation with a DOE Mobile Treatment Facility at Los Alamos National Laboratory (LANL) is the preferred option for the following waste stream:

SR-W034, Calcium Metal

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

Within 90 days of LANL's receipt of a state approved schedule for processing backlogged and currently generated mixed wastes, including offsite SRS waste, SRS will provide a schedule for completion of offsite shipment.

<u>Schedule Assumptions</u>

The ability to perform in accordance with the estimated schedule for the LANL treatment process is contingent upon, but not limited to, the following:

- Receipt by DOE-SR of adequate funding identified for this project to support the schedule.
- Approval by LANL to ship waste.
- Appropriate NEPA documentation.
- Agreement by the States involved.

3.1.6 <u>*Detailed Treatment to be Determined*</u>

Note: The waste streams previously identified in this section (SR-W031, Uranium - Chromium Solution and SR-W048, Soils from Spill Remediation), are proposed to be treated in M Area Vendor Treatment Process, Section 3.1.2.1

Currently, no waste streams are waiting for a treatment method to be determined.

Section 3.2 Waste Stream Requiring Technology Development

3.2.1 <u>*Development of Mobile Unit Technology*</u>

Note: The waste stream previously identified in this section (SR-W036, Tritiated Oil with Mercury), is proposed to change treatment options from the Mobile Unit Technology to Radioactive Aging in a RCRA facility followed by incineration. See new Section 3.4 of this volume.

3.2.2 *Development of Characterization Technology*

Note: The waste stream (SR-W056) previously included in this section has been determined to be non-hazardous. Currently, there are no additional waste streams requiring development of chemical characterization technology.

Section 3.3 Mixed Low Level Waste Streams for Which Technology Development or Further Characterization is Required

3.3.1 *Waste Streams to be Further Characterized*

The following waste streams require further characterization before selecting a preferred option.

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

Estimated Schedule for Characterization of these Mixed Waste Streams

Refer to schedule identified in Volume I, Chapter 4, for characterization activities.

3.3.2 *LDR Hazardous Waste Awaiting Radiological Screening*

The following waste stream is awaiting radiological characterization/method development

SR-W078, LDR Hazardous Waste Awaiting Radiological Screening.

(Note: This is a new waste stream identified to SCDHEC on 1/22/96. In accordance with Consent Order 95-22-HW, a commitment schedule for developing the required radiological characterization/methods will be proposed to SCDHEC on or before 1/22/97).

Section 3.4 Waste Streams Requiring Radionuclides Decay Prior to LDR Treatment

Radioactive aging, followed by incineration 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 12.5 years, and based on present tritium contamination of up to 185 Ci/l, the projected radioactive decay time appropriate to eliminate release of excessive tritium during incineration would be 65 years. A location for incineration and mercury treatment would be selected at a later date. See Volume II, Section 3.4.1, for additional details about this waste stream and its proposed treatment.

CHAPTER 4 MIXED TRU WASTE STREAMS

The following project activity schedules are planned for the treatment of mixed TRU waste in accordance with Section 2.2 of this volume.

Section 4.1 National Strategy for Managing Mixed Transuranic Waste

As discussed in greater detail in Chapter 4 of the Background Volume of this STP, DOE plans to achieve compliance with the requirements of the FFCAct for MTRU destined for WIPP by using the No-Migration Variance petition approach described in 40 CFR Section 268.6. Under this strategy, DOE intends to continue interim storage of such MTRU, continue preparation of such wastes for shipment to WIPP, and then ship and dispose of such wastes in WIPP. After the Secretary's decision to operate WIPP as a disposal facility, the Savannah River Site (SRS) will submit, no later than January 1999, a supplemental plan outlining schedules and additional activities required to prepare the MTRU waste for shipment to WIPP if not already included in this plan or in the event that significant changes transpired as a result of the final permit or the final No-Migration Determination. In addition, at that time, SRS will provide a timetable for submitting a shipment schedule to WIPP for its MTRU waste. SRS will coordinate with the Carlsbad Area Office in developing the shipment schedule to ensure proper throughput and receipt of waste at WIPP.

SRS will begin discussions with the South Carolina Department of Health and Environmental Control (SCDHEC) regarding alternative treatment options for MTRU waste in January 1998 if the Secretary of Energy does not decide to operate WIPP as a disposal facility by that time, or at such earlier time as DOE determines that (1) there will be a delay in the opening of WIPP substantially beyond 1998, or (2) the No-Migration Variance petition is not granted by the EPA. DOE shall propose modifications to the STP for approval by SCDHEC within a time frame agreed upon between the DOE and SCDHEC. These modifications will describe planned activities and schedules for the new MTRU strategy.

DOE shall include information regarding progress of MTRU waste management in the update to the STP required by Chapter 2, Section 2.2. This will include, as applicable and appropriate, the status of the No-Migration Variance petition and information related to characterization, packaging, and/or treatment capabilities or plans for MTRU waste related to WIPP Waste Acceptance Criteria (WAC) and disposal.

4.1.1 Mixed TRU Waste Streams Proposed for Shipment to the Waste Isolation Pilot Plant

Characterization and shipment to WIPP is the proposal for certain MTRU waste streams, including, but not limited to, the following:

SR-W026, Thirds/TRU Job Control Waste
SR-W027, Solvent/TRU Job Control Waste

DOE's current policy is that mixed TRU waste will be characterized and treated to meet WIPP WAC and then shipped to WIPP for disposal. Consistent with this policy, the treatment of mixed TRU waste to meet Land Disposal Restrictions (LDR) standards has not been included in the PSTP.

Estimated Schedule for Characterization of these Waste Streams

Submit applicable permit application(s):
Submit RCRA Part B permit application to SCDHEC by 4Q federal FY 2008.

Entering into Contracts:
Not applicable

Initiating Construction:
Within 90 days of the permit effective date initiate construction. Initiation of construction shall mean equipment ordering.

Conducting Systems Testing:
Initiate systems testing within 30 months of the permit effective date. "Initiate systems testing" shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 15 months of initiating systems testing. "Commence operations" shall mean begin preparation of the first drum.

Submitting Waste Processing Schedule:
Within 120 days after commencing operations, submit schedule for processing backlogged and currently generated mixed waste(s).

Schedule Assumptions

The ability to perform in accordance with the estimated schedule is contingent upon, but 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 and issuance of a Record of Decision.
- Resolution of any technically related finding(s) which might result from an operational readiness self-assessment or the systems testing phase
- No changes in regulations, statutes, or the regulator's interpretations
- WIPP will operate for a period of 35 to 50 years, as described in the Carlsbad Area Office "Strategic Plan", March 1995. (Document DOE/WIPP 93-025) Revision 1, p. 5.
- 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
  - 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 4Q federal FY 2012.

Section 4.2 Mixed Transuranic Waste Stream Proposed for IDOA

4.2.1 Waste Shipped Offsite for Treatment

The preferred treatment for this waste stream is shipment to Rocky Flats for treatment.

SR-W053, Rocky Flats Incinerator Ash

Estimated Schedule for treatment of this waste stream

Schedule for shipment to Rocky Flats for treatment is to be determined, but expected to be no sooner than 2006.

Completing Shipment Offsite:

Within 120 days of Rocky Flats' receipt of an approved schedule for processing backlogged and currently generated mixed wastes, SRS will provide a schedule for completion of offsite shipment.

Schedule Assumptions

Treatment in accordance with the estimated schedule is contingent upon the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project
- Receipt by Rocky Flats of any necessary Colorado permit requirements
- Development by Rocky Flats of treatment capacity for mixed waste residue
- Adequate characterization to verify the acceptability of the waste to the Rocky Flats treatment facility
- Agreement by the states involved

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CHAPTER 5 HIGH-LEVEL WASTE

The following project activity schedules are planned for the treatment of high-level waste in accordance with Section 2.2 of this volume.

Section 5.1 High-Level Waste (HLW) Treated Onsite in Existing Facilities

5.1.1 Defense Waste Processing Facility

Vitrification in Defense Waste Processing Facility (DWPF) is the preferred 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 (target dates – not yet finalized)

Submittal of all applicable permit applications:
Completed

Entering into Contracts:
Completed

Initiating Construction:
Completed

Conducting Systems Testing:
Completed

Commencing Operations:
Completed (Operations Commenced 3/7/96)

Processing Backlogged and Currently Generated Mixed Waste:
Provide schedule for processing backlogged and currently generated mixed waste within 120 days after commencing operations.

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APPENDIX A

CURRENT FISCAL YEAR COMMITMENTS

FEDERAL FISCAL YEAR 1996

Appendix A is a summary of commitments compiled from Volume I for the current federal fiscal year 1996, 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 Current Federal Fiscal Year

Federal Fiscal Year Identified: 1996

No.	Commitment	Schedule Date
1.	Initiate system testing for the M-Area Vendor Treatment Process. (Volume I, Section 3.1.2.1).	03/06/96* (Completed)
2.	Commence operations of the M-Area Vendor Treatment Process. (Volume I, Section 3.1.2.1).	04/20/96*
3.	Submit a revised schedule for recycling elemental lead. (Volume I, Section 3.1.4.1).	04/30/96**
4.	Submit preferred treatment and schedule for the treatment of Uranium/Chromium Solution and Soils from Spill Remediation. (Volume I, Section 3.1.6.1).	04/30/96**
5.	Submit preferred treatment and schedule for the treatment of Supernate or Sludge Contaminated Debris from High Level Waste Operations. (Volume I, Section 3.1.6.2).	04/30/96**
6.	Submit an update on the status of treatment technology development for Tritiated Oil with Mercury. (Volume I, Section 3.2.1).	04/30/96**
7.	Submit a schedule to identify and develop a Treatment Technology for Job Control Waste with Enriched Uranium and Solvent Applicators (Volume I, Section 3.2.2)	04/30/96**
8.	Submit a schedule for the processing of backlogged and currently generated mixed waste at the M-Area Vendor Treatment Process. (Volume I, Section 3.1.2.1).	06/19/96*
9.	Submit schedule for the treatment of High Level Liquid Waste in the DWPF. (Volume I, Section 5.1.1)	07/05/96*

* Projected date based on previous compliance action. See the referenced document section for the actual commitment.

** These commitments are completed with the submission of Approved Site Treatment Plan Rev. 4.

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 upcoming federal fiscal year including the deliverable dates for each commitment. The process used to prepare this Appendix is found in Chapter 2, Volume I of the Approved Site Treatment Plan.

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

Federal Fiscal Year Identified: 1997 and 1998

No.	Commitment	Schedule Date
1.	Submit a schedule for developing the required radiological characterization/methods for wastestream SR-W078. LDR Hazardous Waste Awaiting Radiological Screening. (Volume I, Section 3.3.2.).	01/22/97*
2.	Commence operations of the CIF. (Volume I, Section 3.1.1.1).	06/30/97**
3.	Complete processing of backlogged and currently generated waste to be treated in the D-Area Heavy Water Processing Facility. (Volume I, Section 3.1.1.4).	09/30/97
4.	Submit treatability variance request to the EPA for approval to macroencapsulate Silver Coated Packing Material as debris. (Volume I, Section 3.1.3.1).	09/30/97
5.	Submit treatability variance request to the EPA for approval that Tritiated Water With Mercury meets macroencapsulation as debris and requires no further treatment. (Volume I, Section 3.1.1.3).	09/30/97
6.	Submit the schedule for completion of the shipment of waste for off site treatment at Idaho National Engineering Laboratory in the Waste Engineering Development Facility. (Volume I, Section 3.1.5.1).	09/30/97
7.	Submit schedule for the treatment of mixed waste in the CIF (Volume I, Section 3.1.1.1).	12/27/97*
8.	Begin discussion with SCDHEC regarding alternative treatment options for MTRU. (Volume I, Section 4.1).	01/30/98
9.	Submit a treatability variance request for approval to macroencapsulate lead-acid batteries by a vendor in an on site containment building. (Volume I, Section 3.1.3.2).	09/30/98
10.	Issue Request for Proposal for Low Level Waste (LLW) Lead, to be Decontaminated. (Volume I, Section 3.1.4.1).	09/30/98

*Projected date based on previous compliance action. See the referenced document section for the actual commitment.

**Subject to approval by SCDHEC.

Volume II

Background Volume

CHAPTER 1 INTRODUCTION

Section 1.1 Purpose and Scope

The Department of Energy (DOE) was required by Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facility Compliance Act (the Act), to prepare site treatment plans (STPs or 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 Act as waste containing both a hazardous waste subject to the Resource Conservation and Recovery Act, and a source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954 (42 U.S.C.2011 et seq.). The Savannah River Site Treatment Plan (STP or Plan) has been provided to and approved by South Carolina in accordance with the Act.

The Savannah River Site Treatment Plan (STP) is the result of a "bottom-up" process described in an April 6, 1993, Federal Register notice (58 FR 17875). DOE has followed an iterative process in developing the plans, working closely with state regulatory agencies and EPA at the site and national level throughout the process. This Plan follows three interim versions – a Conceptual Site Treatment Plan (STP) submitted in October 1993, a Draft STP submitted in August 1994, and a Proposed STP submitted in March 1995, which were provided to regulatory agencies and made publicly available. The Conceptual Plan identified a range of preliminary options for treating the mixed waste at SRS. The Draft STP identified site-specific preferred treatment options which had not yet been evaluated for impacts to other DOE sites or to the overall DOE program. The Proposed STP further narrowed the preferred treatment options based upon feedback from the State of South Carolina and the public. DOE initially planned to submit the Proposed STP 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 Proposed STP was submitted to SCDHEC on March 30, 1995. Since that time the Proposed STP has been modified in response to comments from SCDHEC and the public. On September 20, 1995 the Proposed STP was approved by SCDHEC subject to specific modifications which have subsequently been made. The STP and other related information are available at the public reading room at the University of South Carolina-Aiken library.

This approved STP contains DOE's preferred options developed after evaluation and integration of the site-specific treatment options contained in the Draft STP and the Proposed STP 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. DOE believes the treatment options contained in the approved 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 Proposed STP from the regulatory agencies and others.

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 this and other plans reflect those constraints. DOE is providing schedules to support further discussions with the expectation that schedules in the approved plans will require some modifications as these efforts progress.

The schedules contained in this STP are based on funds currently budgeted for and projected to be available for waste management activities. As a result, schedules in the STP 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. As part of its efforts to develop its budget request for FY 1997, 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.

Even after the plans are approved, DOE anticipates that modifications and adjustment to the Plan 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, 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 in accordance with provisions of the approved Site Treatment Plan and/or the Order.

The approved Site Treatment Plan consists of two volumes. Volume II, the *Background Volume* provides a detailed discussion of the preferred option with technical basis, plus a description of the specific waste stream. It provides the background and explanatory information for Volume I, the *Compliance Plan Volume,* which identifies the capacity to be developed and the schedules as required by the FFCAct.

All the waste streams listed in the Mixed Waste Inventory Report (MWIR) have been included in the *Background Volume.* However, only the waste streams which 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 recharacterized, 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 for waste streams not included in such.

SRS Mixed Waste Streams included in Volume I.

SR-W001	Rad-Contaminated Solvents
SR-W003	Solvent Contaminated Debris (LLW)
SR-W005	Mark 15 Filtercake
SR-W009	Silver Coated Packing Material
SR-W012	Incinerable Low-Level Material
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated
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	Filter Paper Take Up Rolls (FPTUR)
SR-W022	DWPF Benzene
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g
SR-W026	Thirds/TRU Job Control Waste
SR-W027	Solvent/TRU Job Control Waste
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-W034	Calcium Metal
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 Line Solution
SR-W042	Paints and Thinners
SR-W045	Tri-Butyl-Phosphate & n-Paraffin
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 Incinerator Ash
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes
SR-W060	Tritiated Water with Mercury
SR-W062	Low Level Contaminated Debris
SR-W068	Elemental (Liquid) Mercury - Sitewide
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated
SR-W070	Mixed Waste from Laboratory Samples
SR-W071	Wastewater Suitable for Treatment in CIF
SR-W073	Plastic/Lead/Cadmium Raschig Rings
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening

Offsite Waste Streams included in Volume I

CN-W001	Solids Containing Potassium Chromate
CN-W004	Organic Debris with Lead and/or Chromium

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-W040	M-Area Stabilized Sludge
SR-W052	Cadmium Contaminated Glovebox Section
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators
SR-W057	D-Tested Neutron Generators

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 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-W006	Mixed TTA/Xylene – TRU	Stored in satellite accumulation area, not covered in Compliance Plan per agreement.
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	To be handled as scrap metal exclusion
SR-W015	Mercury/Tritium Contaminated Equipment	Meets LDR treatment standard Treated as a 90-day generator
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	Meets LDR treatment standard via a treatability variance
SR-W023	Cadmium Safety/Control Rods	Meets LDR treatment standard Treated as a 90-day generator
SR-W024	Mercury/Tritium Gold Traps	Meets LDR treatment standard
SR-W041	Aqueous Mercury and Lead	Treated to meet LDR Standards - May 1995
SR-W046	Consolidated Incineration Facility (CIF) Ash	LDR treatment will be provided as part of the CIF operation
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	LDR treatment will be provided as part of the CIF operation
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treated in 90-day containment building
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treated as a 90-day generator
SR-W060	Tritiated Water with Mercury	Meets LDR treatment standard via treatability variance
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	Meets LDR treatment standard
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Treated in 90-day staging area
SR-W077	Aqueous Characteristic Waste Water	Meets LDR Treatment Standard

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

SR-W064	IDW Soils/Sludges/Slurries
SR-W065	IDW Monitoring Well Purge/Development Water
SR-W066	IDW Debris
SR-W067	IDW Personnel and Protective Equipment (PPE) Waste

Section 1.2 Site History and Mission

1.2.1 *Role of the Savannah River Site*

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, and highly enriched uranium fuel) for national defense, medical use, and space mission heat sources (plutonium-238). 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 Atomic Energy Act (AEA). Figure 1 shows the general location of SRS. The SRS is owned by the Department of Energy and is operated through management and operating contracts.

Recent Site mission changes have reduced the need for nuclear material production at SRS and heightened the need for waste site 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 plutonium-238 dominate anticipated demand for separations operations for nuclear materials processing. SRS is the sole source of tritium, which is 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 plutonium-238, which is used in radioisotopic thermal generators to provide electrical power for space missions.

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

1.2.2 *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. SRS comprises numerous facilities including production, production support, research and development, and waste management.

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 production facilities of M Area and the reactors are not operating at this time and there are no plans to resume their operations. Separations facilities are fully operational but have been selectively operated recently depending on the need. At present, HB Line is in operation to provide plutonium-238 in support of the National Aeronautics and Space Administration (NASA).

Other major facilities are used to manage wastes. The largest, the Defense Waste Processing Facility (DWPF), has recently begun to treat high level liquid waste.

A major contributor of mixed waste generated 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. The process employed lithium, aluminum, and uranium alloys and involved nickel electroplating on slightly enriched or depleted uranium. Aluminum forming and dissolution of aluminum cladding from damaged cores were done. 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.

Plutonium, uranium, neptunium, and tritium are recovered in the Separations areas. The major types of radionuclide recovery are the following: plutonium-239 (Pu^{239})recovery using the Plutonium Uranium Extraction (PUREX) process initiated in the F Canyon and completed in FB Line; plutonium-238 (Pu^{238}) recovery using the Frames ion-exchange process initiated in H Canyon and completed in HB Line; uranium-235 (U^{235}) and neptunium-237 (Np^{237}) recovery in H Canyon using the modified PUREX process; and tritium recovery in the H Area Tritium Facility. In F Canyon, uranium and plutonium recovery involves chemical dissolution of the irradiated components. Uranium and plutonium can be isolated from fission products in the first solvent extraction cycle. The uranium and plutonium are separated and an additional removal of fission products occurs in a second solvent extraction cycle. In H Canyon, U^{235} can be recovered to make new reactor fuel enrichment material. Also in H Canyon, neptunium can be recovered from the U^{235} process and reprocessed into an oxide for reactor targets. Following irradiation and conversion of some fraction of the Np^{237} to Pu^{238}, the Np^{237} can be recovered for recycling in the H-Canyon Frames process. The liquid high-level waste remaining after the nuclear materials are recovered in both 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.

Figure 1 – General Location of Savannah River Site

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Tritium is recovered in a separate complex of buildings in H Area. Tritium is extracted by melting irradiated lithium-aluminum targets, extracting gases under a vacuum, and separating the tritium from other hydrogen and helium isotopes. Reservoirs are filled and sent to other facilities for installation in weapons. 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 2 shows the location of major production, support, and research and development areas at SRS.

SRS 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 Effluent Treatment Facility (ETF), the M-Area Liquid Effluent Treatment Facility (LETF), the M-Area Process Waste Interim Treatment/Storage Facility (PWIT/SF), the Mixed Waste Storage Shed (Building 316-M), the Savannah River Technology Center (SRTC) Mixed Waste Storage Tanks (MWST), Solvent Storage Tanks (29-30), the Transuranic (TRU) Waste Storage Pads, the Mixed Waste Storage Buildings (MWSB) (Buildings 643-29E and 643-43E), the Hazardous Waste Storage Facility (HWSF) (645-2N), the Defense Waste Processing Facility Vitrification Facility, the DWPF Organic Waste Storage Tank (OWST), and the Z-Area Saltstone Processing Facility. Additional treatment and storage is presently under construction at the Consolidated Incineration Facility (CIF) and the M-Area Vendor Treatment Facility. The listed facilities have been proposed, designed or constructed to store and/or treat many of the mixed waste streams generated at SRS.

The M-Area LETF is an industrial wastewater treatment plant which has been designed to precipitate, filter and discharge the treated filtrate from wastewater generated by the target and fuel assembling activities in M Area. The M-Area Vendor Treatment Process, when operational, will stabilize the treated sludge from M Area into a glass matrix by a vendor-operated vitrification process.

Liquid high-level radioactive waste (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-Area and H-Area ETF where they are treated by a series of physical/chemical treatment steps which 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-Area and H-Area ETF processes and the low-level radioactive portion (decontaminated salt solution) of the high-level liquid radioactive wastes in the F- and H-Area Tank Farm are treated in 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 non-hazardous 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 processing. A portion of the incinerator capacity will be used to treat organic mixed waste in solid and liquid form that is generated by various activities at SRS. One waste stream proposed for treatment in the CIF is benzene generated by DWPF. The benzene is stored in the OWST at DWPF for eventual treatment at the CIF. The CIF is virtually complete and operational testing in preparation for start-up is in progress.

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 Tank Farm.

Mixed wastes are stored on the TRU pads, in the MWSB, in the HWSF, in storage tanks, in the PWIT/SF Tanks, and the Mixed Waste Storage Shed until they can be sent to the appropriate treatment and disposal facilities.

The site treatment plan analyzes treatment options for mixed waste using these facilities with and without modifications, and investigates other options for treatment of mixed waste streams generated at SRS.

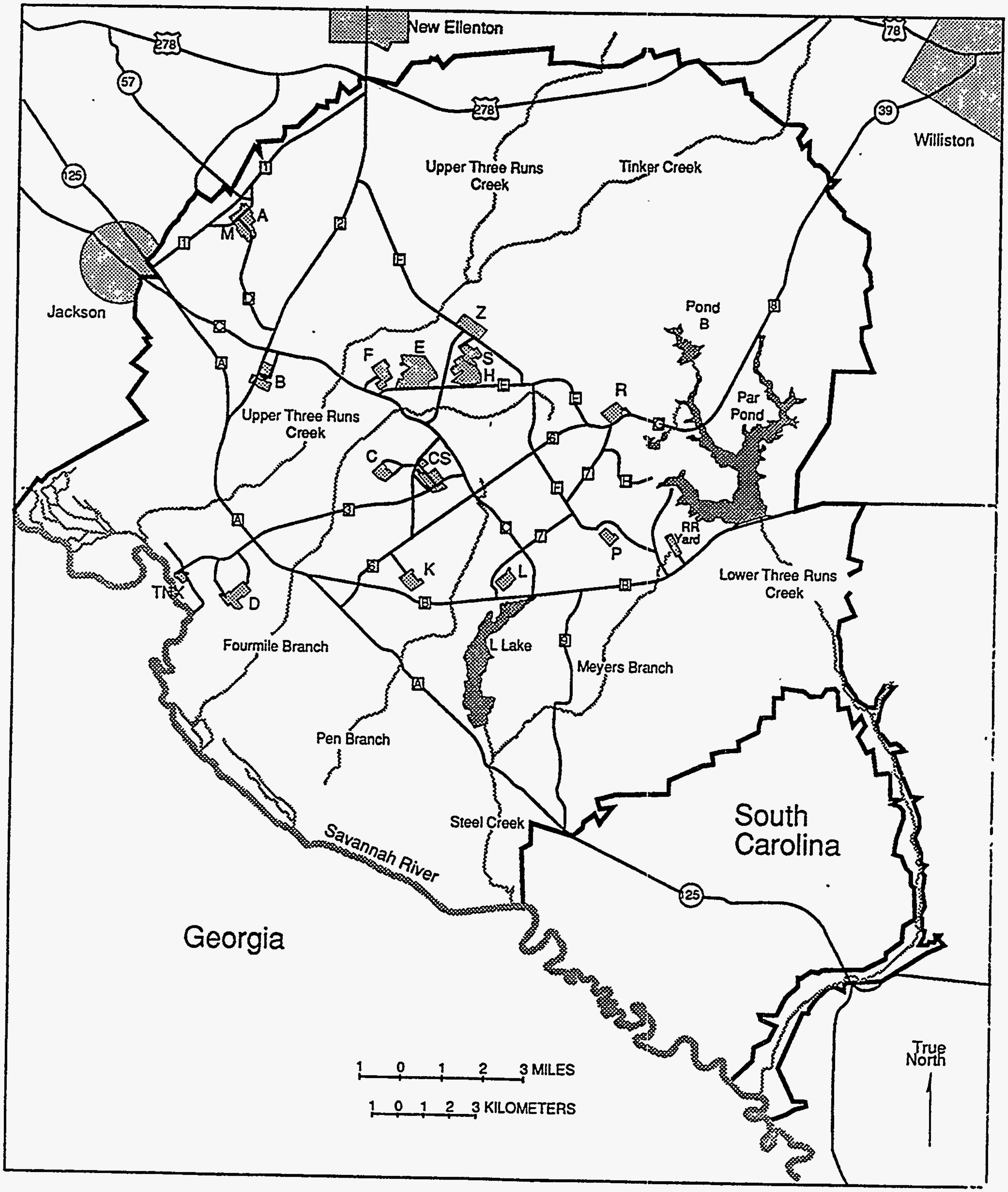

Figure 2 – Location of Major Production, Support, and Research and Development Areas at the Savannah River Site

Section 1.3 Framework for Developing the Department of Energy's Site Treatment Plan

RCRA Land Disposal Restriction (LDR) requirements 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. 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, signed on October 6, 1992, waives sovereign immunity for fines and penalties for RCRA violations at federal facilities. However, the Act postpones the waiver for three years for LDR storage prohibition violations for DOE's mixed wastes and requires 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 Act 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 Act 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 Act also requires the plan to provide certain information where radionuclide separation is proposed. The Act 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 "Schedule for Submitting Plans for the Treatment of Mixed Waste Generated or Stored at Each Site" was published April 6, 1993, in the Federal Register (58 FR 17875). In the notice, DOE committed to providing the site treatment plans in three phases: a conceptual plan completed in October 1993, a draft plan no later than August 1994, and a proposed plan no later than February 1995. This process provides opportunity for early involvement by the states and other stakeholders to discuss technical and equity issues associated with the plans.

The *Conceptual Plan* submitted October 1993, focused on identifying the treatment needs, capabilities, and options for treating the site's mixed waste. The *Draft Plan* focused on identifying site-specific preferred options for treating the site's mixed wastes, wherever possible, as well as proposed schedules for constructing capacity. The options presented represent the site's best judgment of the available information and the states' preferences, and represented a starting point for discussion leading to the development of the proposed plans. The *Proposed Plan* presented preferred options modified by comments submitted by the state and the general public as well as input from DOE. The Proposed Plan was submitted to the regulatory agency for review and approval, approval with modification, or disapproval, as required by the Act on March 30, 1995. The proposed plan was approved with modification by SCDHEC on September 20, 1995. A consent order based on the plan was signed by SCDHEC and DOE-SR. It was effective on 9/29/95.

Section 1.4 STP Organization

Savannah River Site's STP follows the same format as the proposed plans of other DOE sites to facilitate cross-site comparisons. The Proposed Plan is organized in two separate, but integrated, volumes. The *Background Volume* 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 is a short, focused document containing the preferred options and schedules for implementing the options and is intended to contain all the information required by the Act. The *Compliance Plan Volume* also contains a mechanism to implement the plan and establish milestones that will be enforced by the Order. It references, but does not duplicate, details on the options in the *Background Volume.*

Chapters 1.0 and 2.0 in both volumes contain introductory material relevant to the purpose of the volume. The *Background Volume* contains general information on the approved Plan and the site in Chapter 1.0 and provides top-level assumptions and a description of the process used to determine the preferred options in Chapter 2.0.

Chapters 1.0 and 2.0 of the *Compliance Plan Volume* propose certain administrative provisions appropriate for implementing the plan. These include provisions such as project activity schedules describing funding considerations.

Chapters 3.0 through 5.0 discuss the preferred option or options 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 sections. The *Background Volume* discusses the waste streams, technology needs, and uncertainties and other details on the preferred options. In the *Compliance Plan Volume,* the sections include schedules, to the extent feasible, as required under the Act.

Volume II includes eight additional sections that are not included in Volume I. Chapter 6 discusses mixed wastes expected to be generated from future activities such as environmental restoration and decontamination and decommissioning actions. These waste streams will be incorporated into Volume I, and treatment approaches and schedules developed, when the wastes are generated. Chapter 7 discusses storage capacity needs, describes compliant storage provided, and gives information on projected storage needs.

Chapter 8 describes the process that is 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. Also included is a description of all treatment activities necessary for the treatment of SRS mixed waste.

Chapter 10 provides information on offsite waste from the Naval Reactors Program that lists SRS as the preferred 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 two 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.

Chapter 12 is a list of acronyms in the Site Treatment Plan.

Chapter 13 provided a reference list of documents used in the development of the Site Treatment Plan.

Section 1.5 Evolving Technologies

As part of the STP process, SRS has developed a list of evolving technologies. These are technologies that are not currently recommended in the STP. As these technologies mature, they may offer waste treatment alternatives superior to the process treatment methods currently recommended by the STP.

As more emerging technologies are identified they will be included in future revisions/updates of the Site Treatment Plan. Only technologies that are directly applicable to SRS mixed low-level waste streams are discussed here. A more extensive summary of over 80 radioactive waste treatment technologies may be found in WSRC-RP-95-116.

Mixed Waste Focus Area

At the direction of the Assistant Secretary for Environmental Management (EM), Tom Grumbly, a new approach has been formulated to focus the Department of Energy's environmental research and technology development activities on key environmental management problems. Integral to this new approach is the teaming of technology development and technology users. The concept is for DOE, DOE production site contractors, national labs, universities and commercial companies to team up to create integrated R & D plans, avoid redundancy and reduce lead time to field testing of new technology. Five major remediation and waste management problem areas, known as focus areas, have been identified to date. These problem areas have been targeted for action on the basis of risk, prevalence, or need for technology development to meet environmental requirements and regulations. The five focus areas are:

1. Groundwater Plume Containment and Remediation
2. Landfill Stabilization
3. Radioactive Waste Tank Remediation
4. Mixed Waste
5. Facility Transitioning, Decommissioning and Final Disposition

SRS was designated as the lead site for the Groundwater Plume Containment and Remediation and Landfill Stabilization Focus Areas. Idaho National Engineering Laboratory (INEL) has been designated the lead site for the Mixed Waste Focus Area. The stated mission of the Mixed Waste Focus Area is to develop, demonstrate and deliver technologies and treatment systems for treating and disposing of mixed low-level waste and mixed transuranic waste in a safe, timely, and cost-effective manner. These technologies and systems are being developed to be responsive to customer needs, achieve compliance with regulatory requirements, and achieve public acceptability. It is anticipated that the Mixed Waste Focus Area (MWFA) will incorporate elements of existing mixed waste R & D programs funded through the DOE-Headquarters Office of Technology Development (OTD).
The MWFA plans to coordinate three pilot-scale demonstrations of mixed waste treatment systems in the areas of waste destruction (plasma hearth, waste stabilization (transportable vitrification system), and thermal oxidation). The demonstration systems will have potential for treating up to 90% of the current MLLW inventory in the DOE Complex.

The MWFA will build on and incorporate elements of previous mixed waste R&D programs funded through the DOE-Headquarters Office of Technology Development (OTD). Two significant previous R&D programs are the Mixed Waste Integrated Program and the Integrated Thermal Treatment Study.

Vitrification

Vitrification is a waste treatment process in which waste is mixed with glass frit and fused with heat into a solid, glassy (i.e., non-crystalline) solid. The product constituents of concern become part of the matrix in a stable, insoluble, long-lived waste form. Vitrification generally refers to traditional Joule-heated systems. The molten vitreous mass may be stirred or unstirred. Although waste streams with high organic content (such as most job control wastes) may be treated satisfactorily by Joule-heated melter systems, and research is underway to prove this, there is a potential for soot formation due to incomplete combustion or for ignition of the organic components. Organic components are expected to be much more easily treated by high-temperature plasma torch or plasma arc vitrification systems. Discussion in this section is limited to Joule-heated melter systems. The high temperature vitrification systems are described separately below under Plasma Torch, Plasma Hearth, centrifugal Plasma Systems and Graphite Arc Systems.

SRS technical expertise in vitrification technology includes characterization of waste streams, development and characterization of glass formulations, demonstration of waste vitrification using laboratory and pilot-scale melters, and development of large-scale integrated facilities for comprehensive vitrification processing. The analytical capabilities of SRS which support vitrification include a full spectrum of techniques for characterizing waste streams and glasses ranging from chemical analysis to microstructural characterization.

SRS scientists were responsible for development of the Product Consistency Test, which is the DOE-specified High-Level Waste glass leach test for durability, and for the EPA's declaring glass the Best Demonstrated Available Technology (BDAT) for High-Level Waste (HLW). Process control software has been developed by SRS that contains very robust composition-property models for predicting glass durability, viscosity and liquidus temperature. This software has been used successfully to predict glass properties for numerous simulated HLW glasses in crucible studies, on a pilot-plant scale at the Integrated Defense Waste Processing Facility Melter System (IDMS) at TNX and on a large scale at the Defense Waste Processing Facility (DWPF), and for actual HLW glasses on a small scale in the High-Level Caves facility of the Savannah River Technology Center (SRTC). In addition, SRS has been responsible for coordinating all in situ glass testing at the Waste Isolation Pilot Plant (WIPP) in New Mexico.

Status: Building on its high-level waste vitrification expertise, SRS is developing vitrification process limits for joule-heated (cold-top and stirred) melters for processing of mixed low-level waste (MLLW). This effort is being funded primarily by DOE-Headquarters through the Office of Technology Development. The current plans are to (1) demonstrate vitrification on an actual MLLW using a Transportable Vitrification System (TVS) in a field demonstration; (2) provide an up front de-listing petition for vitrified LLMW; (3) demonstrate vitrification of actinide elements for safe permanent storage; and (4) demonstrate vitrification of ashes and reclamation of noble metals from electronic components using a small Envitco Melter System at Clemson Research Park.

This technology might potentially apply to the following waste streams:

- SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g
- SR-W026, Thirds/TRU Job Control Waste
- SR-W027, Solvent/TRU Job Control Waste
- SR-W033, Thirds/TRU Job Control Waste < 100 nCi/g
- SR-W046, Consolidated Incineration Facility (CIF) Ash
- SR-W048, Soils from Spill Remediation
- SR-W049, Tank E-3-1 Clean Out Material
- SR-W064, IDW Soils/Sludges/Slurries
- SR-W067, IDW Personnel Protective Equipment (PPE) Waste
- SR-W072, Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations

Plasma Torch

All plasma torch and arc heating technologies are based on the ability of an ionized gas stream to conduct an electric current. The flowing ionized gas stream or plasma has a resistance to the flow of the electrical current and this resistance generates a significant amount of heat. While the temperatures produced may reach thousands of degrees Celsius, the temperature quickly falls off from the origin to 1500 - 2000°C. Plasma torch systems generate the ionized gas stream in a cylindrical "pipe" and may be used to treat solid or liquid mixed wastes containing metals or organics. The waste form products are the off-gas, metal, and a leach-resistant slag or glass. SRS is actively researching the use of the various high-temperature plasma torch and arc vitrification processes for treating LLMW and TRU wastes.

Plasma Hearth Systems

A simple plasma torch system, the Plasma Hearth Process (PHP) relies on a stationary, refractory-lined primary chamber to contain the thermal energy of the plasma torch and the resulting metal-slag material. The plasma hearth process begins with the waste being fed into the primary plasma reaction chamber where the heat from the plasma torch allows the organic materials in the waste stream to be volatilized, decomposed, oxidized, or pyrolized. Partially combusted gases are oxidized in a secondary combustion chamber. Any remaining inorganic material in the primary reaction chamber is melted or vitrified, producing a molten slag or vitreous material. Pouring, cooling and solidification of the slag produces a non-leachable, high-integrity waste form. Molten metals may be poured separately from the chamber.

Advantages of the plasma hearth technology include the ability to feed high amounts of metal-bearing wastes, including whole drums. The waste materials can include large amounts of paper, plastics, metals, soils, liquids and sludges. The resulting slag should require no additional stabilization. Disadvantages of the system include concerns about the refractory liner wear, excessive metal volatilization, and torch electrode replacement. Safety and fuming during the pouring of molten metals are an additional concern.

Status: The plasma hearth process has undergone small-scale, non-radioactive proof of principle testing at Argon National Laboratory West at INEL. Based on the bench-scale testing and the non-radioactive pilot-scale testing the project will culminate with the construction of a Field-Scale Prototype System to demonstrate full-scale processing of actual mixed waste. SRS has been funded by OTD to install a Plasma/Induction Cold Crucible Melter (PICCM) system at the Georgia Institute of Technology. This system does not require pouring of molten metals, thereby improving safety, and uses a water-cooled crucible to minimize the corrosion of the equipment by the molten glass. A small prototype unit based on Russian technology will be tested during 1996 with non-radioactive materials. Russian Scientists have proposed radioactive testing with plutonium to determine decontamination factors between glass/metal and glass/off-gas.

Centrifugal Plasma Systems

Another type of plasma torch system, the Plasma Arc Centrifugal Treatment (PACT) furnace uses the plasma torch in conjunction with a rotating drum chamber to treat hazardous, mixed, and transuranic wastes. In this process, the waste is fed into the rotating molten bath heated by a stationary plasma torch. The feed material and molten slag are held in the chamber by centrifugal force. Within the plasma furnace, all water and organic waste material are volatilized, oxidized, or pyrolyzed. Off-gas usually requires treatment by a scrubbing system. Non-volatile waste material including the metal is fully oxidized and uniformly melted by the high power plasma torch. The accumulated molten slag is discharged as a non-leachable homogeneous glass material as the rotational speed of the centrifugal drum is reduced.

The advantages of this system are the uniform heating of the internal surface of the rotating drum and the slag, the use of rotational velocity to control the pouring rate of the slag, and the complete combustion of the organic materials. Disadvantages are chiefly the maintainability of the rotating drum, the drum electrode, and the torch electrode.

This technology has been demonstrated to be applicable for the treatment of various waste types and forms, including hazardous, mixed and TRU wastes containing heavy metals and organic fractions. Demonstration results show a minimum destructive removal efficiency greater than 99.9%, organic and inorganic concentrations that meet toxicity characteristic leaching procedure (TCLP) standards, and off-gas treatment that meet regulatory standards.

Status: A six-foot diameter unit is operated at Butte, MT by MSE, Inc. and a smaller unit at Ukiah CA by Retech, Inc. (Retech is now part of Lockhead Martin). A full-scale centrifugal plasma demonstration is being planned for the INEL Site to remediate "Pit 9" soils and debris contaminated with transuranic radionuclides. Construction of this facility at INEL has begun. Current plans are for Commercial Lockhead Martin to conduct the Pit 9 demonstration. Lockhead Martin and SRS are also negotiating the installation of a PACT system for treating the TRU waste streams.

Graphite Arc Melter Systems

Another high-temperature vitrification system is the graphite arc melter system. Graphite arc melter systems generally rely on one to three graphite electrodes to introduce an electric arc above or into the slag melt. The alternating current (AC), three-phase, three-electrode torch melting system is well established and has been employed in the steel industry for decades. In general, when the arc is well above the slag layer, it is similar in concept to a plasma torch heating system. When the electrodes are lowered into the slag layer, the melting is similar to Joule heating. The graphite electrodes can be protected from oxidation by introducing an inert gas over the melt or by using direct current (DC) electricity which increases arc stability and reduces wear of the primary electrode. These melters can be employed with waste streams containing large amounts of metals or organics.

The advantages of graphite arc melting are the ease of electrode replacement, temperature control, and the ability to process metals and organics. The disadvantages include the highly reducing atmosphere produced by the graphite, the refractory crucible corrosion and wear concerns, the relative high height clearance requirements for the electrode, high electrode wear rates, and safety of the molten metal pouring operation.

Status: The DC graphite arc system has been developed by the Pacific Northwest National Laboratory (PNNL), Massachusetts Institute of Technology (MIT), and the Electro-Pyrolysis, Inc. (EPI). PNNL has built on the early development and established a laboratory and pilot-scale radioactive system at Hanford. SRS, with funding through the OTD, has obtained a small (1/100 scale) DC arc melter from INEL for installation in a radioactive glovebox at SRTC. Another DC unit (1/10 scale) from EPI has been installed at the Clemson Research Park for research with non-rad simulated waste.

These high-temperature vitrification technologies might potentially apply to the following waste streams:

- SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g
- SR-W026, Thirds/TRU Job Control Waste
- SR-W027, Solvent/TRU Job Control Waste
- SR-W033, Thirds/TRU Job Control Waste < 100 nCi/g
- SR-W046, Consolidated Incineration Facility (CIF) Ash
- SR-W048, Soils from Spill Remediation
- SR-W049, Tank E-3-1 Clean Out Material

SR-W064, IDW Soils/Sludges/Slurries
SR-W067, IDW Personnel Protective Equipment (PPE) Waste
SR-W072, Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations

Acid Digestion

A mixed-acid oxidation process for organic compounds has been developed at the Savannah River Site to address waste handling issues which face defense-related facilities, private industry, and small-volume generators such as university and medical laboratories. Initially tested to destroy and decontaminate a heterogenous mixture of solid, radioactively contaminated waste, the technology is also suitable for the remediation of various hazardous and mixed-hazardous waste forms. The process, unique to Savannah River, offers a valuable volume-reduction alternative to incineration or other oxidation processes that use high temperatures and/or elevated pressures.

It has been demonstrated that many organic compounds can be oxidized by nitric acid to release water and carbon dioxide above 130-150°C. Below these temperatures, it is common to have stable intermediate compounds form. The technology uses a mixture of nitric and phosphoric acids. The use of phosphoric acid as a holding medium allows appreciable amounts of concentrated nitric acid to be retained in solution at atmospheric pressure well below nitric acid's normal boiling point of 120°C.

To address the broad categories of waste, many different organic compounds which represent a cross-section of the wastes have been successfully oxidized. Materials that have been oxidized to 98-100% at atmospheric pressure below 180°C include neoprene, cellulose, EDTA, tributylphosphate, and nitromethane. Polystyrene ion exchange resins have been effectively destroyed at 175°C and 5-10 psig. More stable compounds such as benzoic acid, polyethylene, and oils have been completely decomposed below 200° C and 10 psig. For organic wastes, all carbon, hydrogen, and nitrogen are converted to gaseous products while nitric acid is reduced to form NOx.

If interfaced with an acid recovery system which converts NOx back to nitric acid, the net oxidizer consumed in this process would be oxygen from air. Commercial acid recovery systems can recover NOx in excess of 99.9% using only air and water. The complete oxidation of the organic components leaves only residual anions and cations in solution. This final liquid waste can then be directly converted in one processing step to a stable solid waste form as either an iron phosphate glass or a magnesium phosphate ceramic, depending on the components in solution and applicable storage requirements.

Status: Although processing rates have not yet been optimized, significant processing rates have been obtained for waste types which are most representative of the target waste streams. Estimated, non-optimized throughputs are as follows: EDTA @ 140°C and 0-5 psig (rate = 142 g/L-hr), cellulose @ 150°C and 0-5 psig (95 g/L-hr), neoprene @ 165°C and 0-5 psig (50 g/L hr), polystyrene resin @ 170°C and 5-10 psig (65 g/L-hr), polyethylene @ 200°C and 10-15 psig (35 g/L-hr). These rates are very sensitive to operating pressure, temperature, and acid concentration.

Work is continuing to immobilize the final phosphoric acid into either an iron phosphate glass or a magnesium phosphate ceramic. Both processes have been successfully demonstrated on a small scale. It is anticipated that volume reductions of up to 20X or more can be realized through this process. Recent test achieved a 6X volume reduction using contaminated ion exchange resin, and demonstrated immobilization of the metal components within a glass matrix. Additionally, a series of studies and subcontracts have been initiated to produce a pilot-scale design and cost estimate by the end of FY96.

This technology might potentially apply to the following waste streams.

SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g
SR-W026, Thirds/TRU Job Control Waste
SR-W027, Solvent/TRU Job Control Waste
SR-W033, Thirds/TRU Job Control Waste < 100 nCi/g
SR-W036, Tritiated Oil with mercury
SR-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
SR-W067, IDW Personnel Protective Equipment (PPE) Waste

<u>Delphi Wet Oxidation Process</u>

Delphi Research, Inc. (Albuquerque, NM) has developed a DETOX^{SM} Wet Oxidation Waste Treatment Process that uses a catalyzed wet oxidation process to destroy organic compounds while containing and concentrating many metals. The process utilizes a patented combination of homogeneous metal catalysts in an acidic water solution. It is currently at the bench-scale level of development in a one gallon oxidation reactor vessel. Organic compounds introduced into the solution are claimed to be oxidized with great efficiency (99.99%+). Many toxic metals are dissolved and concentrated in the solution and can eventually be recovered. Some toxic metals are converted to insoluble forms which may be recoverable, depending on the composition of the waste stream. The DETOX^{SM} process is distinguished from other types of wet oxidation by good organics destruction efficiencies at relatively low temperature (150-250°C) and pressure (20-200 psig). Process efficiency is enhanced by the presence and action of catalysts.

The DETOX^{SM} process is claimed to be highly tolerant of waste composition, form, water content, and particle size. Because DETOX^{SM} is a low temperature process, and can be operated as a closed or confined system, there is less concern with the possible escape of toxic materials in exhaust gases from the process. However, to be implemented routinely, DETOX^{SM} will need to successfully address the potential formation of flammable gases such as hydrogen. In most applications, the DETOX^{SM} process produces no NO_X or SO_X emissions and no dioxins or furans. Mercury, cadmium and lead are oxidized to ionic form and are not expected to be present in exhaust gases. The cited positive environmental attributes of this process should make regulatory permitting of this operation less time consuming and costly.

Status: WSRC and Delphi are involved in a CRADA to conduct a demonstration of this process at SRS. The demonstration at SRS is anticipated to last about nine months. It is planned to commence around July 1996. The equipment being fabricated by Jacobs Applied Technology in Orangeburg, SC, will be installed at TNX and tests will be conducted using hazardous, but non-radioactive wastes or surrogates. Equipment check out is scheduled for July 1996 completion. The simulated waste tests are expected to be completed by the first quarter of 1997.

This technology might potentially apply to the following waste streams:

SR-W014, Tritium-Contaminated Mercury
SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g
SR-W026, Thirds/TRU Job Control Waste
SR-W027, Solvent/TRU Job Control Waste
SR-W033, Thirds/TRU Job Control Waste < 100 nCi/G
SR-W036, Tritiated Oil with Mercury
SR-W044, Tri-Butyl-Phosphate & n-Paraffin-TRU
SR-W045, Tri-Butyl-Phosphate & n-Paraffin
SR-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
SR-W067, IDW Personnel Protective Equipment (PPE) Waste

Molten Metal Catalytic Extraction Processing

Molten Metal Technology (Providence, Rhode Island) has developed a proprietary Catalytic Extraction Process (CEP) technology that can be used to destroy and recycle a number of mixed wastes. Molten Metal Technology several years ago formed a limited partnership with Martin Marietta, known as M4 Environmental, L.P. M4 has been licensed by Molten Metal to use the CEP technology to treat a variety of radioactive and mixed waste streams known to exist at SRS and other federal facilities.

The Catalytic Extraction Process was derived from standard steel making technologies that introduced carbon, oxygen and fluxing materials into the bottom of the molten iron pool. Using this same idea, gaseous, liquid, sludge and particulate solid feed streams can be introduced into a sealed molten metal reactor. The catalytic properties of the liquid metal, at temperatures in the 1315-1750° C range, cause the wastes to dissociate to their atomic elements, destroying hazardous and toxic components in the process. Due to the robustness of the process, diverse materials such as metals, ceramics/soils and organics can all be treated. Also, by controlling process variables and adding reactant chemicals, the process can re-arrange the liberated atomic elements into recoverable products such as high-quality industrial gases, specialty inorganic and metals.

Status: Air Liquide, du Pont and Rollins are among companies that have formed alliances with Molten Metal. Agreements for CEP units include Clean Harbours Environmental Services, Martin Marietta (now Lockhead Martin), Hoechst Celanese and Scientific Ecology Group of Westinghouse. SRS is interested in developing a Cooperative Research and Development Agreement (CRADA) with M4, but discussions have reached a stalemate.

This technology might potentially apply to the following waste streams:

- SR-W014, Tritium-Contaminated Mercury
- SR-W025, Solvent/TRU Job Control Waste < 100 nCi/g
- SR-W026, Thirds/TRU Job Control Waste
- SR-W027, Solvent/TRU Job Control Waste
- SR-W033, Thirds/TRU Job Control Waste < 100 nCi/g
- SR-W036, Tritiated Oil with Mercury
- SR-W046, Consolidated Incineration Facility (CIF) Ash
- SR-W048, Soils from Spill Remediation
- SR-W049, Tank E-3-1 Clean Out Material
- SR-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
- SR-W062, Low-Level Contaminated Debris
- SR-W064, IDW Soils/Sludges/Slurries
- SR-W066, IDW Debris
- SR-W067, IDW Personnel Protective Equipment (PPE) Waste
- SR-W068, Elemental (Liquid) Mercury - Sitewide
- SR-W072, Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations

Tritiated Oil Characterization and Treatment

R&D needs for dealing with Waste Stream SR-W036, (Tritiated Oil with Mercury) are documented in detail in SRT-HTS-94-0235, July 11, 1994. A successful R&D effort may lead to improved disposal methods for two other waste streams: Tritium-Contaminated Mercury (SR-W014) and Tritiated Water with Mercury (SR-W060).

The Tritiated Oil with Mercury waste stream is created as a result of historical SRS use of mercury transfer pumps and oil-based vacuum pumps in the SRS Tritium Facilities (TF). New TF pumps are oil-less and no longer use mercury, but some oil pumps remain in operation. Tritium and mercury bearing vapors flowing through these pumps contaminate the pump oil with tritium to varying degrees. When the oil is removed from the pumps for replacement, the oil is declared waste and must be dispositioned. The waste oil may be divided into four groups according to trigger levels of mercury and tritium activity. Incineration is the preferred treatment for low activity, non-RCRA mercury oil (<0.2 mg Hg/L). Incineration is also the RCRA IMERC specific technology for both high and low tritium activity RCRA oils. There is currently no identified technology for high tritium activity (>5000 µCi/cc) non-RCRA oil. Two fundamental issues need to be addressed in order to successfully dispose of this waste stream: characterization of the waste oil and containment of tritium off-gas from any proposed treatment process.

Many of the high tritium activity oil samples are poorly characterized due to tritium activity limitations placed on the analytical lab facilities. The levels of both mercury and tritium were often estimated using process knowledge. All types of tritium facilities (TF) oils need to be reliably characterized to ensure that (1) the oils are classified and handled properly, (2) processes can be designed to treat these oils, and (3) disposal restrictions on the residual waste are not exceeded. Experience indicates that a standard analytical procedure which gives consistent tritium activity results for high-tritium oil samples still needs to be developed and tested by the different laboratory groups. A more reliable analysis of mercury is also necessary for high tritium samples which have to be diluted for sequential analysis of tritium and mercury under the present procedure.

A potential treatment strategy is to remove mercury from the oil samples to allow the waste stream to exit RCRA. The low-tritium waste oil can then be either incinerated or disposed of as low-level waste in the E-Area Vaults. The high-tritium oil can be processed to remove tritium or stored to allow tritium to decay. Potential mercury-removal technologies include activated carbon treatment, amalgamation with zinc powder and filtration (Pantex Plant), amalgamation with gold/silver/zinc/copper/tin supported on silica/zeolite/alumina substrates. Potential tritium treatment technologies include:

- Incineration or oxidation
- Solidification with macro-encapsulation
- Radiolytic decay to take advantage of the relatively short tritium half life of 12.3 years
- Supercritical oxidation
- Microbial oxidation
- Plasma technology
- Liquid phase catalytic exchange
- Catalytic organic decomposition.

Los Alamos National Laboratory (LANL) is developing a Packed Bed Reactor that may have application in treating SR-W036, Tritiated Oil with Mercury, provided the tritium content issue is successfully addressed. SRS is supporting LANL's research as requested.

Two other potentially viable technologies are the Molten Metal CEP technology and the acid digestion process described earlier.

Successful development of any of the above technologies might potentially apply to the following waste streams:

SR-W014, Tritium-Contaminated Mercury
SR-W036, Tritiated Oil with Mercury

Integrated Thermal Treatment Study

The Integrated Thermal Treatment Study was begun in 1993 to establish information on the technical performance and costs of various options for thermal treatment of waste. When the study is completed, DOE will be able to evaluate incineration, incineration variations and incineration alternatives on a comparable scientific basis, using a consistent yard stick. The most significant or outstanding advantage of incineration is the potential for waste volume reduction. Nineteen (19) incineration variations and alternatives are being explored, including:

Rotary Kiln with Air
Rotary Kiln with Oxygen (for flue gas volume reduction)
Rotary Kiln with Air and Wet Air Pollution Control
Rotary Kiln with Oxygen & Carbon Dioxide Retention Option
Rotary Kiln with Air & Polymer Stabilization
Rotary Kiln with Air & Maximum Recycling (volume reduction)
Slagging Rotary Kiln
Indirectly Heated Pyrolyzer
Plasma Furnace
Plasma Furnace with Carbon Dioxide Retention
Plasma Gasification
Fixed Hearth Pyrolyzer with Carbon Dioxide Retention
Rotary Kiln with Air and Thermal Desorption
Molten Salt Oxidation
Molten Metal Waste Destruction
Steam Gasification
Joule-heated vitrification
Thermal Desorption and Mediated Electrochemical Oxidation
Thermal Desorption and Supercritical Water Oxidation

DOE is pursuing design studies and/or pilot-scale demonstrations for the following units:

- Joule-heated Vitrification
- Molten Metal Destruction
- Molten Salt Oxidation
- Plasma Furnace with Air & Secondary Combustion Chamber

The first two technologies were discussed in detail earlier. DOE will study and document the low-level waste volume reduction capability of each unit demonstrated. Baseline cost and effectiveness (including volume reduction) data from these studies/facilities will be documented and compared to similar data obtained from conventional existing incinerators.

Section 1.6 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.

Mixed Waste Inventory Report

The Mixed Waste Inventory Report, (MWIR), initially required by the FFCAct, provides an inventory of mixed waste currently stored, generated, or expected to be generated over the next five years at each DOE site, and an inventory of 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. At SRS, to reflect the most current information in the STP Annual Update, local MWIR data was updated to reflect inventory data as of September 1995. The SRS MWIR will be updated each year.

The STP reflects the most current and accurate data on the waste streams and technology needs. It includes data generated for the SRS MWIR in September 1995. As a result, there may be some differences in the annual update of STP with the approved STP and the MWIR which has been distributed to the public. 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 have to do with mixed waste streams that have been combined, deleted; or have had waste stream volumes added. Some waste streams or volumes identified in the MWIR have since been treated to LDR standards and no longer need to be addressed.

The National Environmental Policy Act (NEPA)

NEPA requires federal agencies to assess and address environmental impact of their 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.

A number of facilities designed to treat mixed waste are in various stages of planning, design, permitting, or construction at SRS. The CIF construction is virtually complete and operational testing has begun. The M-Area Vendor Treatment Process has completed construction and initiated operational testing.

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 EA 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 EIS was issued in November 1994. Following the public review of this document, a ROD was issued in March 1995.

Consolidated Incineration Facility (CIF): An EA was completed and a Finding of No Significant Impact (FONSI) issued in December 1992.

M-Area Vendor Treatment Process: An EA has been prepared for this project. A FONSI was issued by DOE-HQ on August 1, 1994.

Waste Management Environmental Impact Statement

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 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 were the foundation for EIS evaluations regarding mixed waste.

The final WMEIS was made available to be public in July 1995. A ROD was approved and issued on September 23, 1995. It is anticipated that future RODs will be generated as a result of the strategies outlined in the WMEIS.

<u>The Waste Management Programmatic Environmental Impact Statement (PEIS)</u>

DOE has prepared a Programmatic Environment Impact Statement (PEIS) which will be used to formulate and implement a complex-wide 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 is intended to present 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 the DOE's environmental program. The PEIS is examining the following waste types and activities: high-level, transuranic, mixed low-level, low-level, and hazardous waste. The analysis for the waste management PEIS will evaluate 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 is being coordinated with the preparation of the Site Treatment Plans under the FFCAct. Information being generated to support the WMPEIS (e.g., hypothetical configurations, preliminary risk analyses, and cost studies) is shared with states to support STP discussions. The draft WMPEIS did not identify a preferred alternative (i.e., configuration) for mixed waste facilities since this would be evolving in consultation with the states and EPA through the STP process. However, the WMPEIS analyses of potential environmental risks and costs associated with a range of possible waste management configurations will provide valuable insight as the public, states, EPA, and DOE discuss using existing facilities and constructing new mixed waste facilities to treat mixed waste.

The draft WMPEIS was presented for public comment in October 1995. The final PEIS will be after the public comment period and will reflect responses by the public to Draft PEIS.

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 *Solid Waste Management Plan* 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 which are liquid radioactive wastes and include high-level mixed wastes.

The purpose of the *Solid Waste Management Plan* is to present the 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 Solid Waste Management Plan 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 Solid Waste Management Plan 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 *Solid Waste Management Plan.* The plan will have the capacity to 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 *Solid Waste Management Plan* 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 SRS STP is prepared and approved.

Compliance Agreements

There are two pertinent compliance agreements concerning mixed waste activities that exist between SRS and either the EPA or the South Carolina Department of Health and Environmental Control (SCDHEC).

The Land Disposal Restrictions Federal Facility Compliance Agreement (LDR-FFCA): The LDR-FFCA was entered into by EPA-Region IV (EPA-IV) and DOE-SR to provide a period for SRS to implement a treatment plan to address the generation, storage, and treatment of prohibited mixed waste which is currently stored, or which will be generated, stored, and treated by the operation of the facilities at SRS. The LDR-FFCA established a number of compliance deadlines or deliverables regarding LDR mixed waste treatment activities at SRS. Many of the deliverables involve planning, construction, and treatment schedules for mixed waste streams generated at SRS. As a result, this document served as a driver for some mixed waste treatment now at SRS. To align the LDR-FFCA with the requirements of the Federal Facility Compliance Act, EPA-IV and DOE negotiated a Bridging Amendment (3rd Amendment) to the LDR-FFCA, effective June 20, 1994. The amended LDR-FFCA transitioned SRS commitments regarding mixed waste treatment until the compliance order was in place with the SCDHEC as required in the FFCAct. The LDR-FFCA terminated at the time SCDHEC and DOE-SR signed the Consent Order, 95-22-HW.

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.

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 which 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. As such, treatment must 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
- waste may not be removed from the accumulation area in 90 days
- treatment will not occur in a tank, container, or containment building

Interim Status Unit: Interim status is a relatively short term mechanism which 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 which 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.

A 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 which is operated and discharged in accordance with the requirements of the Clean Water Act. The unit must also meet the regulatory definition of a tank. Eligible wastewater treatment units managing hazardous waste are subject to CWA performance standards and permitting requirements, but may not be subject to RCRA permitting requirements.

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.

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CHAPTER 2 METHODOLOGY

Section 2.1 Assumption and Definitions

2.1.1 Assumptions

Assumptions Used for Preparation of Site Treatment Plans

All sites used the following assumptions to provide a degree of consistency in the preparation of 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.

- High-level waste (HLW) will continue to be managed according to current plans at each site (i.e., Hanford, West Valley, Savannah River Site, Idaho National Engineering Laboratory). Primarily due to potential safety concerns, HLW will not be transported offsite except as a treated, stable waste that is ready for disposal. The STP will not change management strategies for HLW.

- Regarding defense-related transuranic (TRU) waste, the STPs reflect DOE's current strategy on the Waste Isolation Pilot Plant (WIPP) opening and receiving a No-Migration Variance (NMV). A 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 will 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 utilized 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 utilization of facilities in the STP are being considered for managing ER, D&D mixed waste streams.

- The STP addresses all wastes in the updated MWIR. Any changes/corrections to the MWIR waste streams and treatment facility information are explained in the STP.

- 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 complex-wide assumptions, SRS developed site-specific assumptions for use in developing the STP.

- To the extent possible, all waste streams in the Mixed Waste Inventory Report 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 Savannah River Site 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 Processing 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 which 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 which 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 2000).

- 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.

2.1.2 Definitions

To assist the reader in dealing with the specialized language found in the STP, the following definitions are provided. 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 wastes containing mercury, and particularly to wastes containing radioactive mercury isotopes. Mercury is converted into a solid alloy with the amalgamating material, 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.

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 most effective metals removal is achieved with metal complexes. 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) – combustion in incinerators, boilers, or industrial furnaces operated in accordance with the applicable requirements of R.61-79.264, Subpart 0, or R.61-79.266, Subpart H, of SCHWMR.

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.

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 inpoundments, or combinations of them (per SCHWMR R.61-79.260.10).

Federal Facilities 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) – fuel substitution in units operated in accordance with applicable technical operating requirements. Fuel substitution is a hazardous waste treatment process identified in R.61-79.268.42 SCHWMR.

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 rulemaking (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) – (1) the controlled process by which combustible solid, liquid, or gaseous wastes are burned and changed into noncombustible gases and solid ash; or (2) a treatment technology using combustion to destroy organic constituents and reduce the volume of wastes. Per R.61-79.268.42 of SCHWMR incineration is: incineration in units operated in accordance with the technical operating requirements of Part 264 Subpart O and Part 265 Subpart O.

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 0 and 265 Subpart 0 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 rulemaking (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 allows 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 establishes a number of compliance deadlines involving LDR mixed waste treatment activities at SRS. The LDR-FFCA has been 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.

Nonwastewater – waste that does not meet the criteria for wastewater found later in these definitions.

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 rulemaking (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 – means 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.

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 incineration, 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.

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 5820.2A (a) considers TRU waste, as defined above, "without regard to source or form" [The proposed revision to the Order ("DOE Order 5820.2A 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 wasteform 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.

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.*

Section 2.2 Treatment Options Selection Process

Because the Site Treatment Plans (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 following 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 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 high-level waste (HLW) and mixed transuranic waste (MTRU) are also covered by the FFCAct, the strategies for managing these wastes have already been established. However, DOE recognized that modifications of these strategies may 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', and 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.

Section 2.2.1 Preferred Option 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.

Step 3 Perform In-depth Options Analysis

Purpose

To identify a 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.

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) and facilities under construction (e.g., 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
- planned treatment facilities (e.g., HW/MW-TB)
- 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:

- **pre-operating cost** to design and prepare initial documentation for the facility
- **facility cost** to build and equip a new treatment facility or modify an existing one
- **operating and maintenance cost** for the life of the facility
- **disposal cost** of all final wasteforms in compliance with the LDRs
- **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 Waste-form	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 charac-terized 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 (contd)

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.
20%	PERSONNEL PARAMETERS			
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.

Table 2.3 – Attributes and Enabling Statements For Options Analysis (contd)

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.
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.
Wt.	Attribute			
15%	COST CONSIDERATIONS			
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 which combine to identify the preferred treatment option.

Section 2.3 Coordination with Regulatory Agencies and Other Stakeholders

Coordination with Regulatory Agencies

The Act 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 (NAG) 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 Act 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 and Draft Plans 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 affective 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 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 stratagies 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. Activities were designed to meet the overall program objectives, coordinate with other activities, and provide opportunity for meaningful public involvement. 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.

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 D.C. 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 D.C.).

Section 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. 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 Coordinators

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 Coordinator (EC) to advise and assist facility management in developing and maintaining the facility's environmental programs. The ECs are individuals knowledgeable of environmental regulations and how the regulations apply to those facilities for which the ECs are responsible.

ECM 6.03 requires the EC or department representative at the facility or area generating a waste first to determine whether a waste is hazardous. As discussed, knowledge of the process generating the waste and/or existing information on characteristics of the waste can be used to determine whether a given waste material 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 Management (SWM) 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* was prepared by EPD to provide practical guidance to SRS organizations on environmental regulations. It 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.

Sample Management Program Department

The Sample Management Program Department (SMPD) serves as the primary resource to various site waste generators during the preliminary waste identification and characterization phase. SMPD provides hazardous waste sampling services conducted in accordance with a sampling plan 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. SMPD offers consultation services to those organizations. Technical support is available to waste generators for sampling activities involving radioactive wastes. SMPD also is developing sitewide sampling guidance. SMPD administers subcontracts with offsite analytical laboratories to support waste identification/characterization needs. To the extent possible, SMPD 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. Hazardous, radioactively contaminated laboratory residue is returned to the Site for storage. SMPD 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 Management Department

The Solid Waste Management Department (SWMD) is responsible for management of the Low-Level Radioactive Waste Disposal Facility, the Sanitary Landfill, and all interim status and permitted hazardous waste and mixed waste treatment and storage facilities except the SRTC Mixed Waste Tanks, the M-Area Mixed Waste Storage Shed, the Process Waste Interim Treatment/Storage Facility and the Organic Waste Storage Tank. SWMD also coordinates all offsite shipment and disposal of hazardous waste.

SWMD 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 SWMD 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 SWMD reviews and assesses a waste generator's certification plan, characterization methodology, other documentation and procedures to assure compliance with the certification plan. The WSRC Quality Assurance 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 for activities affecting quality.

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." To accomplish this, the generator must first determine if the waste is excluded from RCRA regulation (for example, industrial wastewater discharges regulated under the Clean Water Act). Assuming the waste is not excluded, the generator must determine if the waste is listed as a hazardous waste in 40 CFR 261, Subpart D. If unlisted, the generator is then required to determine if the waste is characteristically hazardous under 40 CFR 261, Subpart C. 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 SMPD for sampling activities involving radioactive wastes. SMPD 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 (e.g., SR-W012, SR-W015, SR-W025, SR-W026, SR-W027, SR-W033, SR-W043, SR-W048, SR-W055, and SR-W056) making it extremely difficult to obtain a sample which 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. This procedure was prepared using other supporting documents including *SRS Waste Analysis Group Sampling Plan Guide; Packaging, Labeling, and Transportation of Waste Samples, Title 49 Code of Federal Regulations; Sampling Radioactive and Nonradioactive Hazardous Waste Drums;*

Packaging of Samples for Transportation; Records Management; and *Analytical Laboratories Waste Analysis Group Procedures Manual WSRC L2.*

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. Examples of waste streams where radioactivity is a significant impediment to representative sampling include: Silver Coated Packing Material (SR-W009), High-Level Waste from F and H Canyons (SR-W016 and SR-W017), Gold Traps (SR-W024), and Tritiated Oil with Mercury (SR-W036). 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 inhalation or ingestion of alpha-emitting radionuclides is of particular concern. Alpha particles are highly energetic, charged particles that can cause significant biological damage and normally have long biological half-lives when deposited internally. Because of these factors, sampling, packaging, and analyzing mixed wastes that contain plutonium and other alpha-emitting radioactive materials often requires personnel to use supplied breathing air and special protective clothing. Analysis of alpha emitting materials is often conducted in glove-box containment systems. 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. Fourteen waste streams that have not been sampled are listed waste, where waste characterization is a matter of knowing the process that generates the waste rather than levels of contaminants. In addition, a number of streams are hazardous for toxic metals that are used for their unique properties, such as Silver Coated Packing Material (SR-W009), Low-Level Waste (LLW) Lead – to be Decontaminated (SR-W013), Mercury/Tritium Gold Traps (SR-W024) and Tritium-Contaminated Mercury (SR-W014), 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) which 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.

Section 2.5 Waste Minimization/Pollution Prevention (WMin/PP)

Programs to reduce the generation of waste have been in existence at SRS for a number of years in response to environmental regulations requiring the establishment of WMin/PP efforts. Such regulations include: the Clean Air Act (CAA); the Clean Water Act (CWA); the Pollution Prevention Act (PPA) of 1990; the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the Resource Conservation and Recovery Act (RCRA); and the Emergency Planning and Community Right-to-Know Act (EPCRA). The Land Disposal Restriction-Federal Facility Compliance Agreement (LDR-FFCA) Bridge Amendment, effective June 20, 1994 but now expired, required a number of actions for WMin/PP. These included establishing general hazardous WMin/PP programs, and requiring the development of a WMin/PP report with yearly updates on the progress of WMin/PP activities. The Secretary of Energy is emphasizing WMin/PP, and on December 27, 1994, issued a Department Policy/Strategic Plan that will lead to a 50% reduction in toxic pollutants by 1999. There are also a number of Department of Energy (DOE) orders and Executive Orders (EO) addressing WMin/PP.

2.5.1 Pollution Prevention Program Accomplishments

The following is a summary of some Pollution Prevention accomplishments in FY95.

SRS significantly increased the scope of its solid waste reduction program through the reorganization and assignment of waste certification program employees to support waste reduction. Technology exchanges were formed to partner with industry, and industry experts were consulted to strengthen the SRS radioactive waste reduction program. SRS achieved a 10% reduction in the volume of Low-level Waste (LLW), TRU Waste, Mixed LLW, and Hazardous Waste generated in FY95 based on FY94 total waste volumes.

In FY95, SRS tripled its recycled product purchasing to nearly $3 million worth of recycled products through SRS contractor affirmative procurement programs. In addition, SRS increased the revenue received from Salvage operations by 28% and increased the amount of office paper and cardboard recycled by 8% from FY94 to FY95 (shipped 1,062 tons of paper and cardboard for recycling in FY95). To enhance energy conservation, the Site requested and received funds through the In-house Energy Management Program for energy conservation retrofits for 50 administrative buildings.

In FY95, SRS initiated its "Green Building" Program. This program encouraged employees to pledge to utilize all available pollution prevention options, including: use of Site recycling programs, elimination of Styrofoam cups, control excess office supplies, energy and water conservation, etc. Eighteen buildings were awarded "Green Building" status in FY95.

Seventy-eight pollution prevention opportunity assessments (PPOAs) were completed using a Department of Energy (DOE) Headquarters recommended format. These assessments identified 124 recommendations that have a potential to avoid the disposal of 336,000 cubic feet of waste.

2.5.2 Waste Minimization Actions

In response to environmental regulations and compliance agreements described in the introductory paragraph, SRS has developed procedures which require waste generators to participate in WMin/PP activities. A Waste Minimization Group coordinates WMin/PP activities, helps waste generators identify opportunities to implement WMin/PP, prepares a sitewide WMin/PP plan and generates the annual waste reduction report, and other regular or periodic reports. To ensure the programs developed by the Waste Minimization Group are initiated by the site facilities, each site organization generating waste supplies a representative to serve on a Pollution Prevention/ Waste Minimization Team. These representatives have the responsibility of advocating and remaining cognizant of opportunities for WMin/PP. Team members advise their organizations on action to comply with regulatory and sitewide WMin/PP requirements and assist with implementation of WMin/PP activities. New training programs and support functions have been developed to keep Pollution Prevention/Waste Minimization representatives updated on WMin/PP concepts and to spread awareness of WMin/PP needs throughout SRS. To assist in developing proactive attitudes toward WMin/PP, major waste generators must develop their own facility specific WMin/PP plans. Generator implementation of WMin/PP is a specific waste certification performance criterion; failure to meet performance objectives could delay generator approval to package and ship mixed waste to SRS TSD facilities. In addition, regulator WMin/PP surveillances and assessments are conducted both within a waste generating organization and sitewide to encourage operation of facilities with an awareness of WMin/PP. For new facilities, design and operation must be conducted with WMin/PP goals in mind.

These actions have helped reduce the generation of mixed low level waste by 85% since 1991. Some specific waste minimization actions that have occurred recently are listed below.

- Nonhazardous substitutes are being used for flux remover and miscellaneous industrial cleaners.
- Disposable rags and wipes for solvent removal have been replaced with reusable ones.
- Chlorofluorocarbon and solvent recycling units have been purchased for use.
- Process water has been substituted for use as flush water in Z-Area, reducing the generation of grout.
- The process in the M-Area Dilute Effluent Treatment Facility (DETF) has been modified such that it increases the particle size in the sludge filtration process, reducing the volume of filtercake generated.
- The disposable filter media at the M-Area DETF has been replaced with reusable filter media.

- Affirmative action procurements programs and procurement initiatives have been developed that encourage purchase of goods made from recycled material and/or products producing less waste that is more likely to be nonhazardous.
- Administrative review has modified the requirements for the development of Radioactive Materials Management Areas (RMMAs) to streamline waste management and further reduce the potential for generating mixed waste.
- Elimination of F-listed decon solvents, replacement of lead counterweights with stainless steel on canyon jumpers, replacement of cadmium plated HEPA filter frames with stainless steel, reduction of lead-lined glovebox gloves, and use of nonhazardous scintillation fluids have significantly reduced mixed waste.

While not all of the actions listed below have a direct effect on the generation rates of mixed waste, they do represent examples of actions SRS has taken to minimize waste generation.

- A Chemical Commodity Management Center (CCMC) has been developed to maintain a database of product users compared with products in excess so that materials that might otherwise become waste can be used. The CCMC will also generate a database to help users discover nonhazardous substitutes for their hazardous chemicals so that waste can be further reduced.
- Analytical techniques are being developed and refined to improve the screening of wastes for the presence of radiological contamination, reducing the generation of mixed waste. Facility permit revisions have also reduced the sampling frequency of analysis requirements resulting in reduced waste volume from analytical activities.
- Use of advanced technology for data gathering in evaluating contamination sites and groundwater contamination has resulted in a reduced generation of contaminated environmental media requiring further management.
- Replacement of mercury Springle pumps and Sargent Welch duo-seal vacuum pumps in the Tritium Facility has reduced tritiated mercury and oil waste streams.
- Use of pre-fabricated radiological containment systems has made decontamination for reuse easier, reducing waste generation.
- A contract for a commercial vendor to treat a mixed waste sludge onsite includes incentives for minimizing waste and penalties to the vendor for generating waste in excess of forecasted volumes.
- Waste generators will be conducting Pollution Prevention Opportunity Assessments (PPOAs) to identify cost-effective opportunities to reduce mixed waste.

Section 2.6 Users Guide for Chapters 3-5 of Volume II of the Approved Site Treatment Plan

The following is provided for guidance in reviewing waste stream information in Volume II of the Approved Site Treatment Plan. Information within the guide describes the function of the charts, lists, and headings within Volume II and provides some explanation to clarify the meaning and purpose of the terminology used in the volume.

2.6.1 Waste Stream Order

At the end of this guide is Table 1 showing the order in which the Savannah River Site Waste streams appear in Chapters 3, 4, and 5 of the STP, Volume II. Waste streams are arranged by radioactivity type: mixed low-level waste (MLLW) streams in Chapter 3, mixed transuranic (MTRU) waste streams in Chapter 4, and high-level waste streams in Chapter 5. Definitions for these terms can be found in Section 2.1.2, "Definitions," of Volume II.

The waste stream order for the STP has been modified from that of the *Draft Site Treatment Plan (DSTP)*, submitted August 30, 1994 and the *Proposed Site Treatment Plan (PSTP),* submitted March 30, 1995.

In the *PSTP* waste streams were ordered under a basic subgroup arrangement by treatment facility. The larger groups are facility status (existing or planned) followed by treatment facility location (onsite or offsite). The arrangement of waste by treatment facility allowed the document to be assembled in a more logical manner. The new arrangement avoided fragmentation created by splitting waste matrix classes among treatment facilities and avoids unnecessary repetition in the document. This new waste stream arrangement made the STP *Compliance Plan Volume* (Volume I) schedule lists simpler and easier to understand, and made the *Background Volume* (Volume II) more logical, simpler, and more readable.

The waste stream numbering system is not consistent among radiological groups because of the lesser number of transuranic and high-level waste streams and the limited treatment choices for these wastes compared to the low-level waste streams.

For the annual update of the STP the streamlining and simplification process has continued. Waste streams have continued to be renamed so that the name is more descriptive of the waste stream. Waste streams have also been renumbered to split waste stream components with different treatment requirements and assign numbers to newly identified waste streams. In as many cases as possible wastes have been consolidated were similarities exist and wastestream names made more generic. Discussions of wastestreams that have been eliminated from the STP, or, are treated in compliance with RCRA LDR regulations have been simplified. These waste streams have been simplified. These wastestreams have been moved into Chapter II of Volume II. It is proposed to eliminate discussion on these wastes in future updates, as well as continue to streamline the STP. Differences in the waste stream list from the DSTP and PSTP are summarized.

- The following waste streams have been eliminated because the waste has not been generated or has been recharacterized and managed in compliance with RCRA regulations so that it no longer needs to be covered in the Site Treatment Plan.

  SR-W021, Poisoned Catalyst Material
  SR-W040, M-Area Stabilized Sludge
  SR-W052, Cadmium Contaminated Glovebox Section
  SR-W057, D-Tested Neutron Generators

SR-W056, Job Control Waste with Enriched Uranium

- Investigation was made into the processes in the Fuels Manufacturing Facility (Naval Fuels) that generated this waste stream. It was discovered that no process in the Naval Fuels operations involved organic materials on the hazardous waste lists which were used for their solvent properties.
- SRS provided documentation to SCDHEC in correspondence dated August 18, 1995 (ESH-FSS-95-0375) which stated that no listed hazardous solvents were used in the generation of waste stream SR-W056 and requested agreement that the waste could be declared non-hazardous.
- SCDHEC agreed with the SRS assessment and approved the removal of hazardous waste labels from the material by correspondence dated 8/23/95 and 11/28/95.
- Since this material has been declared nonhazardous it can be removed from the STP.

South Carolina
DHEC
Department of Health and Environmental Control

Lower Savannah Environmental Quality Control District
George P. Nelson Building, 218 Beaufort Street NE
Aiken, SC 29801
803-641-7670 Fax 803-641-7675

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AUG 30 1995
ENVIRONMENTAL PROTECTION DEPT.
WESTINGHOUSE SAVANNAH RIVER CO.

August 23, 1995

Mr. Hal Morris
Westinghouse Savannah River Company
Building 742-A
Aiken, South Carolina 29808

RE: Removal of labels from 68 B-25 Boxes and 205 55-gallon drums located on TRU Pad 9 in the Solid Waste Management Facility. Request dated August 18, 1995.

Dear Mr. Morris:

Based on the information supplied in your request and the analytical information which was attached, this office has no objections to the removal of the hazardous waste labels from the above referenced material.

Sincerely,

J.M. Burckhalter

James M. Burckhalter
District Program Manager
Solid & Hazardous Waste
& Emergency Response
Environmental Quality Control
Lower Savannah District

JMB:maj

cc: David P. Roberts, 703-47A, DOE
John Cooper, Compliance, Solid/Hazardous Waste, SCDHEC
Shelly Sherritt, Permitting, Solid/Hazardous Waste, SCDHEC
Myra C. Reece, SC DHEC, EQC, Lower Savannah District

Westinghouse
Savannah River Company

P.O. Box 616
Aiken, SC 29802

ESH-FSS-95-0373

August 18, 1995

Mr. James M. Burckhalter
South Carolina Department of Health
and Environmental Control
218 Beaufort Street NE
Aiken, South Carolina 29801

Dear Mr. Burckhalter:

REQUEST TO REMOVE LABELS FROM NAVAL FUELS WASTE (U)

The Savannah River Site (SRS) is asking permission to remove the hazardous waste labels from 68 B-25 boxes and 205, 55-gallon drums of Naval Fuels waste currently on TRU Pad 9 in the Solid Waste Management Facility. This waste is listed in the SRS Site Treatment Plan and in the Mixed Waste Inventory Report as "Job Control Waste with Enriched Uranium and Solvent Applicators". This waste was not considered hazardous waste until the disturbing revelation in 1990 that F-listed solvent rags had been sent to the Burial Ground. At that point SRS personnel became very conservative, and rather than make a mistake, added the "and Solvent Applicators" when the term really did not apply according to the applicable regulations. Review of the process by environmental professionals, including me, found no process chemicals which could result in waste which would be classified as hazardous. The process is classified, and discussion of it has to be in general terms. If this letter does not provide all of the information you need to know on a particular topic, I will arrange a site visit for further discussion.

The Naval Fuels project was a production line process for enriched uranium (EU) forms used in the reactors which power U.S. submarines. The process was completely contained in a series of gloved box lines. The materials which entered the lines were strictly controlled. The lines were designed so that any liquid spills were contained in a safe geometric configuration and returned to the process. Absorbent material was not allowed in the lines because absorption of the liquids allowed in the lines could cause several serious problems, including the potential for an unsafe nuclear configuration. The liquid organic materials used in the process would not result in F-listed solvents. They could result in D001, ignitable waste, if they had been discarded as liquids. As discussed below, no liquids were placed into the boxes and drums of waste in this request.

All liquid wastes from areas outside the process lines, such as laboratory samples, were returned to the process through hard-piped lines for recycle. Liquids free of uranium were collected in sumps and fed to the waste handling equipment, where they were concentrated by an evaporator and made into concrete inside of closed drums. Drums of this concrete material are not included in this request.

MR. JAMES M. BURCKHALTER
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Most of the waste in this request is low density scrap (or "LDS" on the container labels). The remainder is low density waste (LDW). The difference between LDS and LDW was the amount of EU expected to be present. The LDS designation indicates that the material came from within the process lines and was considered to hold recoverable material - until the decision to close the facility. This material was analyzed using non-destructive assay (NDA) equipment. To perform NDA at the accountability level required knowledge of the waste form. No liquids were permitted in the packages submitted for NDA analysis. The procedures for packaging LDW also included the "no liquids" rule. LDW went through a boxed waste monitor to ensure no EU was in the waste.

LDW from the operation aisle consists primarily of paper with some plastic sheeting and wipes. Housekeeping waste, such as mop heads and wipes, from this area were also assayed and disposed of. LDW from the maintenance aisle consists of plastic sheeting, paper, and wipes. Solvents which would have resulted in hazardous waste were not allowed due to incompatibility.

During the Site Treatment Plan development, research on this waste revealed that it is not hazardous waste. It should be managed as low level waste, with specific handling depending upon the EU content.

Please call me at 725-2457 if additional information is needed.

Yours very truly,

Hal W. Morris
Facility Support Section
Environmental Protection Department

HWM:mjm

CC: D. P. Roberts, 703-47A
D. G. Salem, 724-9E
M. F. Tyrrell, 724-21E
A. Gibbs, 724-21E
M. Hawkins, 742-A
A. R. Gough, 922-3W
EPD File, 742-A
Records Administration, 773-52A

- The following waste streams are no longer listed in the Site Treatment Plan preferred option discussion sections because they have been combined with other waste streams that are similar in physical/chemical nature.

  SR-W002, Rad-Contaminated Chlorofluorocarbons – combined with waste stream SR-W001, Rad-Contaminated Solvents
  SR-W004, M-Area Plating Line Sludge from Supernate Treatment combined with Waste Stream SR-W037, M-Area Plating Line Sludges
  SR-W010, Scintillation Solution – Combined with waste stream SR-W001, Rad-Contaminated Solvents
  SR-W019, 244-H, RBOF High Activity Liquid Waste – combined with SR-W017, 221-H Canyon High-Level Liquid Waste
  SR-W030, Spent Methanol Solution – combined with waste stream SR-W001, Rad-contaminated Solvents
  SR-W043, Lab Waste with Tetraphenyl Borate – combines with SR-W012, Incinerable Low-Level Material
  SR-W044, Tri-Butyl-Phosphate and n-Paraffin TRU – combined with SR-W045, Tri-Butyl-Phosphate and n-Paraffin
  SR-W054, Enriched Uranium Contaminated with lead – combined with SR-W037, M-Area High Nickel Plating Line Sludge
  SR-W059, Tetrabutyl Titanate (TBT) – combined with waste stream SR-W001, Rad-Contaminated Solvents
  SR-W061, DWPF Mercury - Combined with waste stream SR-W068, Elemental (Liquid) Mercury - Sitewide

- The following waste streams have been renamed for the PSTP and the STP, split, or expanded to be general for site generation rather than facility-specific waste.

  SR-W014, Tritium-Contaminated Mercury – formerly Tritiated Mercury
  SR-W015, Mercury/Tritium Contaminated Equipment – formerly Mercury Contaminated Equipment
  SR-W020, In-Tank Precipitation (ITP) and Late Wash (LW) Filters – formerly ITP Filters
  SR-W024, Mercury/Tritium Gold Traps – formerly Gold Traps
  SR-W025, Solvent/TRU Job Control Waste <100 nCi/g – formerly Solvent Waste <100 nCi/g
  SR-W026, Thirds/TRU Job Control Waste – formerly Thirds TRU Waste
  SR-W027, Solvent/TRU Job Control Waste – formerly Solvent TRU Waste
  SR-W033, Thirds/TRU Job Control Waste <100 nCi/g – formerly Thirds Waste <100 nCi/g
  SR-W035, Mixed Waste Oil – Sitewide – formerly Freon® 11/Oil Mixture
  SR-W036, Tritiated Oil with Mercury – formerly Radioactive Oil
  SR-W048, Soils from Spill Remediation – formerly Waste Sites/Spill Sites Soil
  SR-W051, Spent Filter Cartridges and Carbon Filter Media – formerly Spent Filter Cartridges
  SR-W061, DWPF Mercury – formerly DWPF Off-Specification Mercury
  SR-W062, Low-Level Contaminated Debris –formerly SR-W041C, Mercury Contaminated Recorder
  SR-W063, Macroencapsulated Low-Level Waste – formerly Macroencapsulated Lead
  SR-W068, Elemental (Liquid) Mercury - Sitewide formerly SR-W041B, Elemental Mercury
  SR-W069, Low-Level Waste (LLW) Lead – to be Macroencapsulated – formerly SR-W013B, Low-Level Waste Lead – Combined

- The following waste streams are being managed in compliance with RCRA LDR requirements:

SR-W007 SRL (SRTC) Low Activity Waste

Volume
- Current volume through 09/30/95 is 48.2 m^3.
- Expected 1996-2000 volume will be 375 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D018 (benzene) nonwastewater

LDR Treatment Standard
- D002 = specified technology = Deactivation
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D018 = concentration based standard = 10 mg/kg

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high
- TCLP results include benzene <5 mg/l, Cr = 0.55 mg/l, Pb = 0.15 mg/l, and Hg = 0.1 mg/l.

Radiological Characterization
- Sampling indicates total activity ≤ 1000 d/m/ml of beta/gamma
- Alpha emitter is <10 nCi/g.
- Waste is contact handled.
- Mixed low-level waste
- Isotopes present include Cs^{137}, H^3, Pu^{239} and U^{235}.

SRL(SRTC) Low Activity Waste is a waste stream generated by laboratory research, development, and analytical programs at the Savannah River Technology Center. The waste comes from laboratories and radiobenches with drains that go to the low activity mixed waste storage tanks and have a total activity of less than 1,000 disintegrations per minute per milliliter (d/m/ml).

Treatment of this aqueous waste stream with ion exchange resins used to remove metals and organics is on-going. The acid in this waste is also neutralized as a normal part of tank processing. The treatment standards are met with this technology. This is a batch operation and each batch may not have all the waste codes in its characterization. The list appearing under "waste code" is a compilation of all the possible waste codes.

The waste stream is treated at an existing treatment facility, the Low Activity Mixed Waste Storage Tanks. The treatment method is by ion exchange probe and neutralization. The ion exchange resin bonds the contaminants and prevents them from leaching, thus removing the hazardous characteristic and rendering the waste non-hazardous. Waste also is neutralized, if applicable. Spent resin has passed TCLP for the hazardous constituents of concern. Because the resins are not hazardous waste, they can be disposed of as low-level radioactive waste. Prior to treatment, waste streams are analyzed. Resins used are specific to the contaminant to be removed. Different resins are used in removing metals versus removing organics. After treatment, the non-hazardous, aqueous stream is sent through a Clean Water Act facility prior to discharge.

The facility is currently operating under RCRA Interim Status.

SR-W008 SRL (SRTC) High Activity Waste

Volume
- Current volume through 09/30/95 is 55.8 m^3.
- Expected 1996-2000 volume will be 375 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D018 (benzene) nonwastewater

LDR Treatment Standard
- D002 = specified technology = Deactivation
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D0018 = concentration based standard = 10 mg/kg

Waste Characterization
- Sampling and analysis used to characterize the waste stream
- Confidence level is high due to availability of TCLP analysis
- Typical value for mercury is 0.076 mg/l

Radiological Characterization
- Radioactive isotopes present may include: Pu^{239}, U^{235}, AM^{241}, Co^{60}, Sb^{125},Cs^{137}, Eu^{154}, Eu^{155}, Cs^{134}, Eu^{154}, and H^3.
- Mixed low-level waste
- Waste is contact handled

This waste stream is generated by laboratory research, development, and analytical programs at the Savannah River Technology Center (SRTC). The waste comes from cupsinks in radiologically controlled hoods or glovesboxes and usually has a total activity of more than 1,000 disintegrations per minute per milliliter (d/m/ml).

Treatment of this aqueous waste stream with ion exchange resins used to remove metals and organics is on-going. The acid in this waste also is neutralized as a normal part of tank processing. The treatment standards are met with this technology. This is a batch operation and each batch may not have all the waste codes in its characterization. The list appearing under "waste codes" is a compilation of all the possible waste codes.

The waste stream is treated at an existing treatment facility the High Activity Mixed Waste Storage Tanks. Treatment method is by ion exchange probe and neutralization. The ion exchange resin bonds the contaminants and prevents them from leaching, thus removing the hazardous characteristics and rendering the waste non-hazardous. The waste also is neutralized if applicable. Spent resin has passed TCLP for the hazardous constituents of concern. Because the resins are not hazardous waste, they can be disposed as low-level radioactive waste. Prior to treatment, waste streams are analyzed. Resins are utilized specific to the contaminant to be removed. Different resins are used in removing metals versus removing organics. After treatment, the non-hazardous, aqueous stream is sent through a Clean Water Act facility prior to discharge. The facility is currently operating under RCRA Interim Status.

SR-W011, Cadmium - Coated HEPA Filters

Volume
- Current volume through 9/30/95 is 100.2 m3
- No future waste is expected to be generated.

Waste Stream Composition
- Cadmium containing metal debris

Waste Code
- D006A (TCLP Cd) nonwastewater

LDR Treatment Standard
- Alternative debris technology may be applied

Waste Chacterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based on analylical results.
- A typical TCLP shows 154 mg/l Cd.

Radiological Characterization
- Tritium - contamination level 10-8 nCi/g
- Waste is contact handled.
- mixed low-level waste

On October 12, 1995 the total volume of Cadmium-Coated HEPA Filters was shipped to SEG of Oak Ridge, Tennessee as scrap metal, exempted from hazardous waste regulation under SCHWMR R.61-79.261.6.

Under an existing contract for the demonstration of metal recycling capability, the vendor will remove any remaining filter media from the frames. Filter frames will be cleaned and melted for recycle. The vendor will retain scrap metal for reuse. Compacted filter media will be returned to SRS as non-hazardous, low-level radioactive waste for disposition at SRS.

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

Volume

- Volume as of 09/30/95 was 83.5 m^3. (19,000 kg of this waste treated since 9/30/95)
- Expected 1996-2000 volume will be 30 m^3.

Note: Volume reduction is not reflected in the remaining elemental lead waste proposed for decontamination discussed in Section 3.1.4.1.A. Volume changes will be reflected in the next Mixed Waste Inventory Report update.

Waste Stream Composition

- Elemental lead

Waste Code
- D008C - (elemental Pb)

LDR Treatment Standard
- D008 - specified technology = Macroencapsulation

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

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

On November 29, 1995 approximately 19,000 kg of elemental lead with radioactive contamination was shipped to SEG of Oak Ridge, Tennessee as scrap metal, exempted from hazardous waste regulation under SCHWMR R.61-79.261.6. An additional shipment of approximately 8000 kg of elemental lead with radioactive contamination was shipped to SEG in March 1996.

Under existing contract for the demonstration of metal recycling capability, the vendor will decontaminate the lead for reuse. Material not meeting the vendors acceptance criteria will be rejected and returned to SRS as non-conforming material.

All material accepted by the vendor will be retained under ownership of the vendor.

If the demonstration of decontamination of the radiologically contaminated lead is successful, a request for proposals to decontaminate the remainder of the elemental lead that is capable of being recycled will be issued per the schedule in Volume I.

SR-W015, Mercury/Tritium Contaminated Equipment

Volume
- Current volume through 9/30/95 is $10.7 m^3$
- Expected 1996-2000 volume will be $263.05\ m^3$.

Waste Stream Composition
- Inorganic debris

Waste Code
- D008A (TCLP Pb)
- D009A (TCLP Hg)

LDR Treatment Standard
- D008 - Concentration based standard = 5.0 mg/l
- D009 - Concentration based standard = 0.2 mg/l
- Alternative debris technology may be applied

Waste Characterization
- Process knowledge used to characterize the waste stream.

- Confidence level is medium because no analytical data collected due to ALARA concerns.

Radiological Characterization
- Tritium - estimate 500 Ci/pump
- Waste is contact handled.
- Mixed lower-level waste

Treatment for the ongoing generation of this waste stream is macroencapsulation by seal welding in stainless steel containers in a 90-day staging area. This process meets the debris technology treatment standard for the waste. Waste is stored in RCRA regulated storage facility pending disposal.

SR-W023, Cadmium Safety/Control Rods

Volume
- Current volume through 09/30/95 is 0.3 m^3.
- No future generation is expected.

Waste Stream Composition
- Inorganic debris
- Cadmium containing metal debris

Waste Code
- D006A (TCLP Cd)

LDR Treatment Standard
- D006 - concentration based standard = 1.0 mg/l Cd
- Alternative debris technology may be applied

Waste Characterization
- Process knowledge and sampling and analysis used to characterize the waste.
- Contaminant level = 1473 mg/l Cd
- Confidence level is high based on knowledge of materials of construction and TCLP analysis.
- TCLP analysis results were on a non-radiated rod

Radiological Characterization
- Calculated radiation rates reported as 10-56 R/hr.
- Activation products and beta/gamma emitters (Co^{60} and Ni^{59}) are present.
- Waste must be remotely handled.
- Mixed low-level waste

As of March 20, 1995, all cadmium safety/control rods in reactor area satellite accumulation areas had been cut and placed in the stainless steel cask and the lid sealed by welding. The cask and its microencapsulated cadmium rods has been stored on TRU Pad 12 until a disposal facility is available.

At the present time, there are no Cadmium Safety/Control Rods installed in SRS reactors. Therefore, it is not anticipated that additional volumes of this waste will be generated in the immediate future.

SR-W024, Mercury/Tritium Gold Traps

Volume

- Current volume through 9/30/95 is 2.3 m^3
- Expected 1996-2000 volume will be 0.2 m^3

Waste Stream Composition
- Elemental mercury contaminated with radioactive materials.

Waste Code
- D009D (Elemental Mercury contaminated with radioactive materials)

LDR Treatment Standard
- D009 = specified technology = Amalgamation

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is high based on knowledge of the process that generates the waste.
- No direct analysis made because of ALARA concerns for tritium.

Radiological Characterization
- Total Activity estimated at 1.6 Ci/g
- Tritium present
- Waste is contact handled.
- Mixed low-level waste

Gold foil is used to trap elemental mercury and remove it from the process tritium gas stream in the tritium facility. The gold traps and bonds the mercury by amalgamation which is also the specified LDR treatment technology standard for radioactive elemental mercury. As a result, the Gold Traps meet the LDR standard without further treatment. Spent gold foil is sealed in stainless steel containers and stored in RCRA regulated storage sites pending disposal.

SR-W041, Aqueous Mercury and Lead

Volume
- Current volume through 09/30/95 is 0.0 m^3
- No future waste generation is expected because waste was generated from a one time cleanout.

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 = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l; or RMERC

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high because sampling and analysis for mercury and lead is available.

Radiological Characterization
- Sampling and analysis indicates the average activity level is 2.9 nCi/g.

- Beta/gamma emitter, alpha emitter, U^{238}, and tritium are present.
- Waste is contact handled.
- Mixed low-level waste

On May 11, 1995 the aqueous mercury and lead waste was introduced into the treatment train of the F and H Effluent Treatment Facility which operates under an NPDES permit. Wastewater flow through ETF can be routed into evaporators or directly to treatment processes. Flow routed to the evaporators is separated into evaporator bottoms or overheads through the evaporator process. Evaporator bottoms are discharged to Tank 50 which serves as a feed tank to the Saltstone Processing Facility, an industrial wastewater facility which mixes waste received with a specially formulated grout mixture to stabilize the waste. The grout mix known as saltstone, is pumped to the Saltstone Vaults, a permitted industrial solid waste disposal facility, where it hardens. Waste from the evaporator overheads flows into the ETF treatment process where it is treated by microfiltration reverse osmosis and ion exchange with discharge via an NPDES permitted outfall. Since treatment occurred in a clean water act or clean water act equivalent facility employing treatment appropriate to treat metals, the waste is excluded from the definition of solid waste by 40 CFR 261.4 (a)(2) and equivalent state regulations. Documentation of this treatment has been placed in the operating records for ETF per 40CFR 268.7 and equivalent state regulations.

SR-W050, Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations

Volume
- Current volume through 9/30/95 is 0 m^3.
- Expected 1996-2000 volume will be 0.4 m^3.

Waste Stream Composition
- Organic sludge - particulate

Waste Code
- D002 Corrosive nonwastewater
- D007B (TCLP Cr)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (benzene) nonwastewater
- D021 (Chlorobenzene)
- D036 (Nitrobenzene)

LDR Treatment Standard
- D002 = Specified Treatment Technology = Deactivation
- D007 = Concentration based standard = 5.0 mg/l
- D009 = Concentration based standard = 0.2 mg/l
- D011 = Concentration based standard = 5mg/l TCLP
- D018 = Concentration based standard = 10 mg/l
- D021 = Concentration based standard = 100 mg/l
- D036 = Concentration based standard = 2 mg/l

Waste Characterization
- Sampling and analysis used to characterize this waste stream
- Confidence level is high because analysis was performed on simulants to indicate waste characterization.

Radiological Characterization
- Beta/gamma emitters present are Cs^{137}, and Sr^{90}.
- Activity level <1000 uCi/g
- Mixed waste is remote handled

- Mixed low-level waste

This future waste will be generated by analytical programs at SRTC to support the DWPF operations. The waste will be process samples from the In-Tank Precipitation (ITP) process. Because of the source of the wastes the samples are highly radioactive and require remote handling. After the analytical procedures are completed, the waste must be managed at SRTC because there is no practical method for reintroducing the waste into the tank farm or the ITP facility until the waste has been dissolved and rendered RCRA nonhazardous. Due to the high radioactive contamination, SRTC shielded cell laboratories are required to perform the analytical work on this waste.

SRTC will treat this waste as a 90-day generator by means of neutralization, chemical oxidation, and ion exchange to meet LDR treatment standards. Since the work will be done in a 90-day generator setting in an SRTC staging area or containment building, no RCRA permits are required. Treatment residues that have been made RCRA nonhazardous will be returned to the tank farm for final processing by vitrification at DWPF.

SR-W058, Mixed Sludge Waste with Mercury from DWPF Treatability Studies

Volume
- Current volume through 9/30/95 is 0.1 m^3.
- No future waste generation is expected (one time generation).

Waste Stream Composition
- Inorganic debris - glass

Waste Code
- D009A (TCLP Hg)

LDR Treatment Standard
- D009 = Concentration based standard = 0.2 mg/l

Waste Characterization
- Process knowledge used to characterize this waste stream
- Confidence level is high.

Radiological Characterization
- Beta/gamma emitters present are Cs^{137}, Eu^{154}, and Sr^{90}.
- Activity level >10,000 nCi/g
- Mixed waste is remote handled
- Mixed low-level waste

The waste consists of small amounts of high-level mercury contaminated waste supernate, sludge and salt samples from the tank farm generated during DWPF treatability studies. The waste mercury sludge has dried and caked on to eight centrifuge tubes and a glass bottle. The waste is stored in a satellite accumulation area metal can in a shielded cell at SRTC in compliance with SCHWMR R.61-79.262.34. Treatment will be in the SRTC Mixed Waste Storage Tanks, a RCRA permitted facility.

Analysis has shown that the mercury contamination level is low enough to allow acid dissolution followed by mercury capture in resin at the SRTC mixed waste storage tanks. In March 1996, the waste sludge was dissolved in acid and discharged to the RCRA permitted High Activity Storage Tanks. Such treatment complies with RCRA regulations and treatment will be to RCRA-LDR standards. Treated, nonhazardous residues will be further processed at DWPF.

SR-W063, Macroencapsulated Toxic Characteristic (TC) Waste

Volume
- Current volume through 09/30/95 is 0 m^3.
- Expected 1996-2000 Volume will be 56 m^3.

Waste Stream Composition
- Metal debris

Waste Code
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D008C (radioactive Pb solids)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)

LDR Treatment Standard
- D004 = Concentration Based Standard = 5.0 mg/l
- D005 = Concentration Based Standard = 100 mg/l
- D006 = Concentration Based Standard = 1.0 mg/l
- D007 = Concentration Based Standard = 5.0 mg/l
- D008 = Concentration Based Standard = 5.0 mg/l
- D009 = Concentration Based Standard = 0.2 mg/l
- D010 = Concentration Based Standard = 5.7 mg/l
- D011 = Concentration Based Standard = 5.0 mg/l
- Alternative debris technology

Waste Characterization
- Process knowledge was used to characterize the waste stream.
- Confidence level is high based on knowledge of the materials of construction.

Radiological Characterization
- Total activity is unknown - future waste
- Waste is contact handled.
- Mixed low-level waste

This future wastestream will consist of various pieces of metal equipment items such as lead counterweights, cesium removal columns, draw off valves, flush valves and various other pieces of discarded equipment which are jacketed in stainless steel. Since these items qualify as debris and already meet the debris treatment technology standard for macroencapsulation, no further treatment is necessary. This material will be containerized and stored in regulated storage sites pending disposal.

SR-W072, Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations

Volume
- Current volume through 9/30/95 is 0 m^3.
- Expected 1996-2000 generated volume is 1,065 m^3.

Waste Stream Composition
- Inorganic debris

Waste Code
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D018 (benzene

LDR Treatment Standard
- D005 = Concentration based standard = 100 mg/l
- D006 = Concentration based standard = 1.0 mg/l
- D007 = Concentration based standard = 5.0 mg/l
- D008 = Concentration based standard = 5.0 mg/l
- D009A = Concentration based standard = 0.2 mg/l
- D0010 = Concentration based standard = 5.7 mg/l
- D0011 = Concentration based standard = 5.0 mg/l
- D0018* = Concentration based standard = 10 mg/l
- Alternative debris technology may be applied.

*D012-D043 nonwastewaters must be treated to meet Universal Treatment Standards (UTS) for any underlying hazardous constituents that may be present.

Waste Characterization
- Process knowledge used to characterize this future waste stream
- Confidence level is medium since this waste has not yet been generated. The sources of contamination on the waste debris stream have been well characterized.

Radiological Characterization
- Beta/gamma emitters are Cs^{137}, I^{129}, and TC^{99}
- Alpha emitters are Pu^{238}, and Np^{237}
- Mixed waste is contact handled
- Mixed low-level waste
- Typical radiation levels
  -Cs^{137} and Sr^{90} 10,000 d/m
  -I^{129} <10 d/m
  -Tc^{99} 50,000 d/m
  -Np^{237} 50,000 d/m
  -Supernate 100,000 nCi/g

This future waste stream will consist of a wide variety of metal debris of various shapes and sizes generated from construction, operation and maintenance, and decontamination-decommissioning activities. The debris is mixed waste because of contamination with salts and sludges from characteristic high level waste in the Tank Farms. Most of the debris will have surface contamination only.

SRS intends to treat this waste debris in a 90 day generator setting. As a waste minimization measure, attempts will be made to decontaminate selected waste debris by using high pressure water spray. Successful decontamination will be measured indirectly by radioactivity levels. Based on knowledge of the waste, associated levels of TCLP metals can be calculated from the level of remaining radioactivity after pressure washing. Contaminated wash water will be returned to the Tank Farm. Decontaminated waste will be containerized and disposed in a low-level radioactive waste disposal facility such as the E-Area Vaults.

Debris that cannot be successfully decontaminated because of the nature of the debris, due to internal contamination that cannot be washed away, or because of ALARA concerns due to high levels of radionuclides, will be macroencapsulated by sealing in containers. The decontamination/macroencapsulation process will occur within a 90 day period of the generation of the waste. In some cases, equipment will be dismantled to salvage reusable components before the equipment is declared waste. As a result, treatment of this waste stream will occur under conditions that comply with RCRA LDR regulations.

SR-W077, Aqueous Characteristic Wastewater

Volume
- Current volume through 9/30/95 is 0.0 m^3
- Expected 1996-2000 volume is 9.0 m^3.

Waste Stream Composition
- Aqueous Wastewater

Waste Code:
- D002A (corrosive) wastewater
- Mercury present but below TCLP action level

LDR Treatment Standard
- D002 - Deactivation

Universal Treatment Standards for underlying hazardous constituents must be met unless managed in a CWA/CWA equivalent/Class 1 SDWA System

Waste Characterization
- Sampling and Analysis used to characterize the waste.
- Confidence level is high.

Radiological Characterization
- Tritium - Contamination level 95 µCi/ml
- Contact handled
- Mixed low-level waste

Note: Future waste streams that may be placed in this waste classification could have other characterizations such as other TCLP metal contamination, toxic organics or other waste components capable of being treated at SRS waste water treatment facilities.

The initial portion of this wastestream was generated on October 5, 1995. The waste was generated from flushing D-Area Heavy Water Processing Facility resin in the course of recycling wastestream SR-W032, Heavy Water Contaminated with Mercury. The resin had become clogged with a biological sludge. The flush water was made corrosive (pH approximately 13 pH units) to cause the biological sludge to break away from the resin. The flush water also released some heavy water trapped in the resin which caused the flush water to be mixed waste due to tritium contamination. SRS treated this waste stream by neutralizing the waste in its containers, reintroducing the waste through the unclogged resin column to insure that permit limits would be met, and discharging the waste via the NPDES permitted outfall at D-Area. To met RCRA storage requirements, this operation was completed within 90 days of the generation date since D-Area is not a permitted TSD.

It is possible that additional volumes of this waste or wastestreams of a similar nature, such as wastewater collected from CIF sumps and found through analysis to be characteristically hazardous, will be generated in the future. If so, SRS intends to use a similar treatment scheme which could include use of other wastewater treatment facilities, such as the F and H-Areas Effluent Treatment Facility, to treat the waste. The future generation rates shown are conservative; actual quantities generated in the future may be significantly lower.

2.6.2 Waste Stream Analysis Information

For each waste stream, the following information is provided in a similar format.

General Information

This section contains a data description for each waste stream. Waste streams that have been deleted or consolidated are noted in Table 2 and have no additional detail provided in Chapters 3-5.

Waste Stream Number: This section 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. The management of these waste streams is discussed in the SRS solid waste management strategy in Chapter 4, Section 4.1.B, of this volume.

Option analyses have been developed for two mixed low-level waste (MLLW) streams (SR-W025 and SR-W033). These streams are currently managed as TRU waste and will need further characterization and treatment to meet Land Disposal Restrictions (LDR) treatment standards. These MLLW streams are discussed further in Section 3.3 and Chapter 4, Section 4.1.B, of this volume.

Background Information: This section provides a brief description of the waste stream along with:

Volume: Both a current storage volume and a future generation volume number in cubic meters (m^3). (More information about volume reporting and convention is provided later in the "Reporting Inventories and Reporting Convention" section.)

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 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 (see Table 3 of this volume).

LDR Treatment Standards: Provides treatment information from the RCRA regulations regarding LDR requirements for the waste stream.

Waste Characterization: Describes the analytical identity 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 which 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 identity of the waste whether the waste is remote handled or contact handled, the radioactivity type (MLLW, MTRU, HLW), and the radionuclides present, if available.

Technology and Capacity Needs

The second part of the discussion on each waste stream in Volume II deals with the treatment technology. Where a technical analysis has been performed, a flow diagram of the process steps is provided. Information is listed concerning the LDR treatment standards for the waste stream. 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 are described with a slightly modified format than that described above. Section 3.2 addresses waste streams which 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 and require further waste characterization.

MTRU in Chapter 4 has a three-part description which includes General Information, Technology and Capacity Needs, and 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.

2.6.3 Reporting Inventories and Reporting Convention

Both the Interim Mixed Waste Inventory Report (IMWIR) and the Final Mixed Waste Inventory Report (FMWIR) were snapshots of the current SRS mixed waste inventory and a five year estimate of waste generation based on best knowledge at the time the data were collected. The data collection effort involved all the generators at SRS and those involved in the storage and treatment of mixed waste; therefore, many individuals contributed the regulatory, technical and physical inventory data. Data from the generators have differences in the use of significant digits, rounding procedures, etc. With the goal of providing consistency in data reporting, the SRS PSTP established a set of guidelines on how the waste volumes would be reported and presented in the text of Volume II. This same procedure was used to determine the 9/30/95 inventory data. The inventory presented in the STP is current as of September 30, 1995, with a 5-year generation window spanning 1996-2000. Volume changes subsequent to 09/30/95 are not reflected in this report. The SRS approach is to report waste volumes (i.e., gross or net volumes) in a way that allows the most accurate prediction of the mixed waste treatment capacity required.

The following guidelines have been applied in reporting the waste stream volumes in all STP tables and waste stream data:

- Volume of mixed wastes stored in tanks will be reported as net volume.
- Volume of containerized waste (drum, box, etc.) will be reported as gross volume with the following exceptions:
  - SR-W009, Silver Coated Packing Material, reported as net volume (14-ton overpacks overstate waste stream volume)
  - SR-W013, Low-Level Waste (LLW) Lead – to be Decontaminated, reported as net volume due to many older boxes in storage filled only partially.
  - SR-W023, Cadmium Safety/Control Rods, reported as net volume. The volume of the storage box is 15.2 m^3.
- All volume numbers will be rounded to the nearest drum (0.2 m^3) with the exception of wastes in satellite accumulation areas, which will be reported as 0.1 m^3 for volumes equal to or less than this value.
- The use of rounding and significant numbers will be appropriately applied considering how the waste is stored. For the high-level waste tanks, the volumes will be expressed to reflect the accuracy of the measurement rather than rounded to the nearest cubic meter.

In addition, a significant volume change to the 1996-2000 projected volume for waste stream SR-W022 (DWPF Benzene) was made in response to new information enabling SRS to better determine the generation of this future SRS mixed waste stream. This change was made after the submittal for the MWIR data call. This number also coincides with the value reported in the Waste Management Environmental Impact Statement (WMEIS).

2.6.4 Land Disposal Restrictions Regulations Summary

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 other waste codes, DOE has assigned a letter suffix to further identify a waste stream matrix (for example, D008A describes a waste that is hazardous for lead content, D008B describes lead in the form of lead/acid batteries, and D008C describes lead in the form of radioactive lead solids). (See Table 3, Chapter 3 Volume II.)

For each waste stream in Volume II, LDR data provides 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 in 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 in 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 which established a Universal Treatment Standard list (UTS) of concentration based standards for almost all characteristic and hazardous waste constituents. Also concentration based treatment standards based on UTS were established for the organic TC wastes (D018 - D043), 10 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 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.

The EPA has proposed additional LDR treatment standards which may become final in 1996. These proposed regulations, called LDR Phase III and Phase IV rules, could affect waste treatment activities at SRS. Briefly, the Phase III rule proposes among other things revising standards for characteristic wastes (excluding D004 - D011) treated in clean water/clean water act equivalent systems. Wastes treated in these facilities must also meet UTS. Phase IV rules propose treatment standards for TC metals D004 - D011.

2.6.5 *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 2 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.

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

FSUBS – fuel substitution in units operated in accordance with applicable technical operating requirements.

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).

INCIN – incineration in units operating in accordance with the technical operating requirements of 40 CFR Part 264 Subpart O and Part 265 Subpart O.

MACRO – 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.

CHAPTER 3 MIXED LOW-LEVEL WASTE STREAMS

Tables with waste stream locations are listed below. Table 1 lists waste streams by treatment facility and location. Table 2 lists waste streams numerically by section location.

Table 1 – STP Volume II Waste Stream Order

Section 3.1 Mixed Low-Level Waste Treated Onsite

3.1.1 Onsite Treatment in Existing Facilities

3.1.1.1 Consolidated Incineration Facility

- 3.1.1.1.A SR-W001, Rad-Contaminated Solvents
- 3.1.1.1.B SR-W003, Solvent Contaminated Debris (LLW)
- 3.1.1.1.C SR-W012, Incinerable Low-Level Material
- 3.1.1.1.D SR-W018, Filter Paper Take Up Rolls (FPTUR)
- 3.1.1.1.E SR-W022, DWPF Benzene
- 3.1.1.1.F SR-W028, Mark 15 Filter Paper
- 3.1.1.1.G SR-W035, Mixed Waste Oil – Sitewide
- 3.1.1.1.H SR-W042, Paints and Thinners
- 3.1.1.1.I SR-W045, Tri-Butyl-Phosphate and n-Paraffin
- 3.1.1.1.J SR-W046, Consolidated Incineration Facility (CIF) Ash
- 3.1.1.1.K SR-W047, Consolidated Incineration Facility (CIF) Blowdown
- 3.1.1.1.L SR-W051, Spent Filter Cartridges and Carbon Filter Media
- 3.1.1.1.M SR-W055, Job Control Waste Containing Solvent Contaminated Wipes
- 3.1.1.1.N SR-W070, Mixed Waste from Laboratory Samples
- 3.1.1.1.O SR-W071, Wastewater Suitable for Treatment in CIF
- 3.1.1.1.P SR-W073, Plastic/Lead/Cadmium Raschig Rings
- 3.1.1.1.Q Charleston Navel Shipyard Waste

3.1.1.2 F and H Effluent Treatment Facility (ETF)
(No waste streams remain in this category)

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 2, Section 2.6.1 of Volume II.

3.1.1.4 Waste Stream Treated in Filter Buildings

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

3.1.1.5 Recycling

- 3.1.1.5.A SR-W032, Mercury Contaminated Heavy Water

3.1.1.6 Waste Streams Meeting the Treatment Standard
(Waste streams in this category are in compliance with RCRA regulations and are found in Chapter 2, Section 2.6.1 of Volume II)

3.1.1.7 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 2, Section 2.6.1 of Volume II.)

3.1.2 Onsite Treatment in New Facilities

3.1.2.1 M-Area Vendor Treatment Facility

- 3.1.2.1.A SR-W005, Mark 15 Filtercake
- 3.1.2.1.B SR-W029, M-Area Sludge Treatability Samples
- 3.1.2.1.C SR-W031, Uranium/Chromium Solution
- 3.1.2.1.D SR-W037, M-Area Plating Line Sludges

3.1.2.1.E SR-W038, Plating Line Sump Material
3.1.2.1.F SR-W039, Nickel Plating Line Solution
3.1.2.1.G SR-W048, Soils from Spill Remediation

3.1.3 Onsite Treatment in Planned Facilities
3.1.3.1 Regulated Storage or Containment Building Treatment Facilities
3.1.3.1.A SR-W009, Silver Coated Packing Material
3.1.3.1.B SR-W060, Tritiated Water with Mercury

3.1.3.2 Vendor
3.1.3.2.A SR-W062, Low-Level Contaminated Debris
3.1.3.2.B SR-W069, Low-Level Waste (LLW) Lead – to be Macroencapsulated

3.1.4 Offsite Vendor Treatment Facilities
3.1.4.1 Decontamination
3.1.4.1.A SR-W013, Low-Level Waste (LLW) Lead – to be Decontaminated

3.1.5 Offsite DOE Facilities
3.1.5.1 INEL Waste Engineering Development Facility
3.1.5.1.A SR-W014, Tritium-Contaminated Mercury
3.1.5.1.B SR-W049, Tank E-3-1 Clean Out Material
3.1.5.1.C SR-W068, Elemental (Liquid) Mercury - Sitewide

3.1.5.2 Offsite DOE Mobile Treatment Facilities
3.1.5.2.A SR-W034, Calcium Metal

3.1.6 Preferred Treatment to be Determined
(No waste streams remain in this category.
All waste streams have been assigned a treatment option)

Section 3.2 Waste Stream Requiring Technology Development

3.2.1 DOE Mobile Treatment Facility Requiring Development
(No waste streams remain in this category. All waste streams formerly placed in this category have been assigned alternative treatment options.)

Section 3.3 Mixed Low-Level Waste Streams for Which Technology Development or Further Characterization is Required

3.3.1 Waste Streams to be Further Characterized
3.3.1.1 Waste Streams Requiring Radiological (Alpha) Characterization
3.3.1.1.A SR-W025, Solvent/TRU Job Control Waste <100 nCi/g
3.3.1.1.B SR-W033, Thirds/TRU Job Control Waste <100 nCi/g

3.3.1.2 Waste Requiring Verification of Radiological Contamination or Development of Analytical Methodology
3.3.1.2.A SR-W078 LDR Hazardous Waste Awaiting Radiological Screening

Section 3.4 Waste Streams Requiring Radionuclides Decay Prior to LDR Treatment

3.4.1 SR-W036, Tritiated Oil with Mercury

Chapter 4.0 Mixed Transuranic (TRU) Waste

Section 4.1 Mixed TRU Waste Streams Management Plan

4.1.1 Mixed TRU Waste Stream Proposed for Shipment to WIPP
4.1.1.1 Mixed TRU Waste Requiring Certification/Characterization for WIPP
4.1.1.1.A SR-W006, Mixed TTA/Xylene – TRU
4.1.1.1.B SR-W026, Thirds/TRU Job Control Waste
4.1.1.1.C SR-W027, Solvent/TRU Job Control Waste

Section 4.2 Mixed TRU Waste Streams Proposed for Offsite Shipment

4.2.1 Waste Shipped Offsite for Treatment
4.2.1.1 Waste Shipped to Rocky Flats
4.2.1.1.A SR-W053, Rocky Flats Incinerator Ash

Chapter 5.0 High-Level Waste

Section 5.1 HLMW Treated Onsite in Existing Facilities

5.1.1 Defense Waste Processing Facility
5.1.1.1 Waste Streams for Vitrification
5.1.1.1.A SR-W016, 221-F Canyon High-Level Liquid Waste
5.1.1.1.B SR-W017, 221-H Canyon High-Level Liquid Waste

Table 2
Comparison of Waste Stream Locations –STP Volumes I & II

Waste Stream No.	Waste Stream Name	Volume I Section Identification	Volume II Section Identification
SR-W001	Rad-Contaminated Solvents	3.1.1.1	3.1.1.1.A
SR-W002	Rad-Contaminated Chlorofluorocarbons	N/A	2.6.1
SR-W003	Solvent Contaminated Debris (LLW)	3.1.1.1	3.1.1.1.B
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	N/A	2.6.1
SR-W005	Mark 15 Filtercake	3.1.2.1	3.1.2.1.A
SR-W006	Mixed TTA/Xylene – TRU	N/A	4.1.1.1.A
SR-W007	SRL (SRTC) Low Activity Waste	N/A	2.6.1
SR-W008	SRL (SRTC) High Activity Waste	N/A	2.6.1
SR-W009	Silver Coated Packing Material	3.1.3.1	3.1.3.1.A
SR-W010	Scintillation Solution	N/A	2.6.1
SR-W011	Cadmium-Coated HEPA Filters	N/A	2.6.1
SR-W012	Incinerable Low-Level Material	3.1.1.1	3.1.1.1.C
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated	3.1.4.1	3.1.4.1.A & 2.6.1
SR-W014	Tritium-Contaminated Mercury	3.1.5.1	3.1.5.1.A
SR-W015	Mercury/Tritium Contaminated Equipment	N/A	2.6.1
SR-W016	221-F Canyon High-Level Liquid Waste	5.1.1	5.1.1.1.A
SR-W017	221-H Canyon High-Level Liquid Waste	5.1.1	5.1.1.1.B
SR-W018	Filter Paper Take Up Rolls (FPTUR)	3.1.1.1	3.1.1.1.D
SR-W019	244-H RBOF High Activity Liquid Waste	N/A	2.6.1
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	N/A	3.1.1.4.A
SR-W021	Poisoned Catalyst Material	N/A	2.6.1
SR-W022	DWPF Benzene	3.1.1.1	3.1.1.1.E
SR-W023	Cadmium Safety/Control Rods	N/A	2.6.1
SR-W024	Mercury/Tritium Gold Traps	N/A	2.6.1
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	3.3.1	3.3.1.1.A
SR-W026	Thirds/TRU Job Control Waste	4.1.1	4.1.1.1.B
SR-W027	Solvent/TRU Job Control Waste	4.1.1	4.1.1.1.C
SR-W028	Mark 15 Filter Paper	3.1.1.1	3.1.1.1.F
SR-W029	M-Area Sludge Treatability Samples	3.1.2.1	3.1.2.1.B
SR-W030	Spent Methanol Solution	N/A	2.6.1
SR-W031	Uranium/Chromium Solution	3.1.2.1	3.1.2.1.C
SR-W032	Mercury Contaminated Heavy Water	3.1.1.4	3.1.1.5.A
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	3.3.1	3.3.1.1.B
SR-W034	Calcium Metal	3.1.5.2	3.1.5.2.A
SR-W035	Mixed Waste Oil – Sitewide	3.1.1.1	3.1.1.1.G
SR-W036	Tritiated Oil with Mercury	3.4	3.4.1

Waste Stream No.	Waste Stream Name	Volume I Section Identification	Volume II Section Identification
SR-W037	M-Area Plating Line Sludges	3.1.2.1	3.1.2.1.D
SR-W038	Plating Line Sump Material	3.1.2.1	3.1.2.1.E
SR-W039	Nickel Plating Line Solution	3.1.2.1	3.1.2.1.F
SR-W040	M-Area Stabilized Sludge	N/A	2.6.1
SR-W041	Aqueous Mercury and Lead	N/A	2.6.1
SR-W042	Paints and Thinners	3.1.1.1	3.1.1.1.H
SR-W043	Lab Waste with Tetraphenyl Borate	N/A	2.6.1
SR-W044	Tri-Butyl-Phosphate & n-Paraffin– TRU	N/A	2.6.1
SR-W045	Tri-Butyl-Phosphate & n-Paraffin	3.1.1.1	3.1.1.1.I
SR-W046	Consolidated Incineration Facility (CIF) Ash	N/A	3.1.1.1.J
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	N/A	3.1.1.1.K
SR-W048	Soils from Spill Remediation	3.1.2.1	3.1.2.1.G
SR-W049	Tank E-3-1 Clean Out Material	3.1.5.1	3.1.5.1.B
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	N/A	2.6.1
SR-W051	Spent Filter Cartridges and Carbon Filter Media	3.1.1.1	3.1.1.1.L
SR-W052	Cadmium Contaminated Glovebox Section	N/A	2.6.1
SR-W053	Rocky Flats Incinerator Ash	4.2.1	4.2.1.1.A
SR-W054	Enriched Uranium Contaminated with Lead	N/A	2.6.1
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	3.1.1.1	3.1.1.1.M
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators	N/A	2.6.1
SR-W057	D-Tested Neutron Generators	N/A	2.6.1
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	N/A	2.6.1
SR-W059	Tetrabutyl Titanate (TBT)	N/A	2.6.1
SR-W060	Tritiated Water with Mercury	3.1.1.3	3.1.3.1.B
SR-W061	DWPF Mercury	N/A	2.6.1
SR-W062	Low-Level Contaminated Debris	3.1.3.2	3.1.3.2.A
SR-W063	Macroencapsulated Low-Level Waste	N/A	2.6.1
SR-W064	IDW Soils/Sludges/Slurries	N/A	6.1
SR-W065	IDW Monitoring Well Purge/Development Water	N/A	6.1
SR-W066	IDW Debris	N/A	6.1
SR-W067	IDW Personnel Protective Equipment (PPE)Waste	N/A	6.1
SR-W068	Elemental (Liquid) Mercury - Sitewide	3.1.5.1	3.1.5.1.C
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	3.1.3.2	3.1.3.2.B
SR-W070	Mixed Waste from Laboratory Samples	3.1.1.1	3.1.1.1.N
SR-W071	Wastewater Suitable for Treatment at CIF	3.1.1.1	3.1.1.1.O

Waste Stream No.	Waste Stream Name	Volume I Section Identification	Volume II Section Identification
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	N/A	2.6.1
SR-W073	Plastic/Lead/Cadmium Raschig Rings	3.1.1.1	3.1.1.1.P
SR-W077	Aqueous Characteristic Wastewater	N/A	2.6.1
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	3.3.2	3.3.1.2.A
CN-W001*	Solids Containing Potassium Chromate	3.1.1.1	3.1.1.1.Q
CN-W004*	Organic Debris with Lead and/or Chromium	3.1.1.1	3.1.1.1.Q

* Information on Charleston Naval Shipyard waste is found in Volume I, Section 3.1.1.1, and in Volume II section 3.1.1.1.Q and Chapter 10.

Table 3

EPA Hazardous Waste Codes with Subcategories

Table 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 Mixed Waste Inventory Report data base and may be subject to change.

EPA Hazardous Waste Codes with Subcategories Defined Under the LDRs Program

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 under goes 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.

EPA Code	Sub Code	Subcategory	Description
D008	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).
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 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 cylohexane, 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.
F005	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.

EPA Code	Sub Code	Subcategory	Description
F005	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-Dichlorethane; 1, 1-Dichloroethylene; Methylene chloride; 1, 1, 2 - Trichlorethane; Tricholoethane or vinyl chloride; plus wastes qualifying as F025 light ends, but characterization information is insufficient to determine specific contaminants.
	B	Spent filter/aids and desicants	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 dessicants, 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-cresel 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.
	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.

EPA Code	Sub Code	Subcategory	Description
P092	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 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.
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.

Section 3.1 Mixed Low-Level Waste Treated Onsite

Section 3.1.1 Onsite Treatment in Existing Facilities

3.1.1.1 CONSOLIDATED INCINERATION FACILITY

3.1.1.1.A SR-W001 Rad-Contaminated Solvents

3.1.1.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W001

The preferred treatment option for the Rad-Contaminated Solvents waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

This waste stream is radioactively contaminated solvent and solvent mixtures used in applications such as 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, organic solutions used in bioassay analysis, and catalyst material for an incinerator which 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. This waste steam is a consolidation of SR-W001, SR-W002, SR-W010, SR-W030, and SR-W059 listed in the Draft Site Treatment Plan. This waste stream also includes moratorium/curtailment waste which the results of radiological analysis has shown to be mixed waste. Additional volume is not included since the determination was made after the 9/30/95 date for inclusion in the Mixed Waste Inventory Report (MWIR) update. Volumes will be included in the next MWIR update. (Volume of moratorium/curtailment waste generated to date in this waste stream is 6m^3).

Volume
- Current volume through 09/30/95 is 15.6 m^3.
- Expected 1996-2000 volume will be 5.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D001A (ignitable high TOC)
- D006A (TCLP Cd)
- D008A (TCLP Pb)
- D010 (TCLP Se)
- D018 (benzene)
- D019 (carbon tetrachloride)
- D022 (chloroform)
- F001, F002, F003, F005A (halogenated and nonhalogenated spent solvents)

LDR Treatment Standard
- D001 = specified technology = Recovery of Organics or Combustion
- D006 = concentration based standard = 1.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D010 = concentration based standard = 5.7 mg/l
- D018* = concentration based standard = 10 mg/kg
- D019* = concentration based standard = 6.0 mg/kg
- D022* = concentration based standard = 6.0 mg/kg

- F001 = concentration based standard = 6.0-30 mg/l
- F002 = concentration based standard = 6.0-30 mg/l
- F003 = concentration based standard = 2.6-180 mg/kg
- F005 = concentration based standard = 10-170 mg/kg except 2-Ethoxyethanol and 2-Nitropropane = Incineration

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

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 2.9 nCi/g.
- Beta/gamma emitters
- U^{238} alpha present in solvent from the tritium facility
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

Utilization of CIF for the treatment of this waste stream represents an appropriate treatment train (incineration followed by stabilization) to destroy the organics and stabilize the metals.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.A.3 TREATMENT OPTION INFORMATION

Thermal Destruction of this waste in CIF followed by Stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, incineration provides organic contaminant destruction and proper volume reduction.

This waste stream is one of the target waste streams on which the design of CIF is based. Continuing action has been taken to reduce the volume of this waste stream through the use of nondisposable, recyclable applicators and the use of nonhazardous solvent substitutes.

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) reevaluated 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluated the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

Preparation for Operation

No preparation is required for CIF to treat this waste. Rad-Contaminated Solvents will be stored at CIF in the liquid hazardous waste blend tanks prior to introduction into CIF.

3.1.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream, as well as waste streams SR-W003, SR-W012, SR-W022, SR-W035, and stabilizing resulting ash is between $100 million and $135 million. The cost estimate includes "to go" costs for completion of the CIF and processing these waste streams. These are included in the CIF base case or design basis feed volume. However, these mixed wastes comprise less than 10% of the total CIF design basis feed volume.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.B SR-W003 Solvent Contaminated Debris (LLW)

3.1.1.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W003

The preferred treatment option for the Solvent Contaminated Debris (LLW) waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

The stream is a collection of similar debris whose LDR treatment standards can be met by incineration followed by stabilization. The waste stream includes spent solvent contaminated rags and wipes are generated sitewide in the clean up of interior spills and for decontamination. The waste codes indicate the components which 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
- Current volume through 09/30/95 is 9.3 m^3.
- Expected 1996-2000 volume will be 3.6 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D012 – D017 (organic pesticides)
- D018 – D043 (characteristic organics)
- F001, F002, F003A, F005A (halogenated and nonhalogenated spent solvents)

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. The CIF RCRA Part B Permit should be consulted for all the waste codes that can be fed to CIF.

For that portion of wastestream 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
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1.0 mg/l
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D010 = concentration based standard = 5.7 mg/l
- D011 = concentration based standard = 5.0 mg/l
- 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 = 10.0 mg/kg
- D017* = concentration based standard = 7.9 mg/kg
- D018* = concentration based standard = 10 mg/kg
- D019* = concentration based standard = 6.0 mg/kg
- D020* = concentration based standard = 0.26 mg/kg
- D021* = 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
- D027* = concentration based standard = 6.0 mg/kg
- D028* = concentration based standard = 6.0 mg/kg
- D029* = 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* = concentration based standard = 7.4 mg/kg
- D038* = concentration based standard = 16 mg/kg
- D039* = concentration based standard = 6.0 mg
- D040* = concentration based standard = 6.0 mg/kg
- D041* = concentration based standard = 7.4 mg/kg
- D042* = concentration based standard = 7.4 mg/kg
- D043* = concentration based standard = 6.0 mg/kg
- F001 = concentration based standard = 6.0-30 mg/kg
- F002 = concentration based standard = 6.0-30 mg/kg
- F003 = concentration based standard = 2.6-180 mg/kg
- F005 = concentration based standards = 10-170 mg/kg, except 2-Ethoxyethanol and 2-Nitropropane = Incineration
- Alternate debris technology may be applied

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 wastestream SR-W003 LDR Treatment Standards are concentration based standards ranging from 0.066 mg/kg to 180 mg/kg or with a specified technology of incineration.

For waste codes D012 through D043 nonwastewaters, underlying constituents must be treated to universal treatment standards.

*D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

Waste Characterization

- Process knowledge 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

3.1.1.1.B.2 TECHNOLOGY AND CAPACITY NEEDS

CIF treatment train of incineration followed by stabilization meets the LDR treatment requirements for this waste stream by sufficiently destroying the organics and reducing the volume in the incineration step and treating the metals through stabilization.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.B.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

This waste stream is one of the target waste streams on which the design of CIF is based.

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) reevaluated the treatment of certain existing and future SRS wastes in 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

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The major permits required for this treatment facility are:

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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 Operating 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 determinded that the CIF NESHAP exemption for benzene is not applicable. SRS has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the CIF has also been performed as part of the Waste Management Environmental Impact Statement (WMEIS). The Record of Decision (ROD) on the final WMEIS was issued in September 1995.

SRS shredded this waste in the Experimental Trasuranic Waste Assay Facility (ETWAF) shredder to facilitate preparation for treatment. Shredding was regulated under the Temporary Authorization (TA) issued for shredding FPTURs and modified on November 3, 1995. Shredding of SR-W003 was completed on December 6, 1995. Repackaging of shredded waste already in storage must be performed in a permitted or interim status facility or via other appropriate regulatory coverage mechanism. Permitting issues will be determined once the location of further treatment preparation has been fully identified, if necessary.

Preparation for Operation

It is necessary to repackage this waste in 21 inch cardboard boxes for treatment in CIF. It was determined that shredding would allow waste allow repackaging with minimum worker exposure.

3.1.1.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of the design basis waste streams for CIF. Operating budget funds will be used to finance the treatment of this waste. The estimated cost to treat this waste stream is included with the cost of SR-W001. The estimated cost to prepare this waste stream and others to meet the CIF WAC is between $5 million and $10 million.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.C SR-W012 Incinerable Low-Level Material

3.1.1.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W012

The preferred treatment option for the Incinerable Low-Level Material waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF). To implement the preferred option, the waste must be prepared to meet the CIF waste acceptance criteria.

Background Information:

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. The waste stream is a collection of similar debris whose LDR treatment standards can be met by incineration followed by stabilization. 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) listed in the Draft Site Treatment Plan (DSTP) has been consolidated into this stream.

Volume
- Current volume through 09/30/95 is 3.2 m^3.
- Expected 1996-2000 volume will be 2283 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D009B (high organic Hg)
- D009C (high inorganic Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D018 (benzene)
- D035 (methyl ethyl ketone)

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. The CIF RCRA Part B Permit should be consulted for all the characteristic 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 mg/l
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1 mg/l
- D007 = concentration based standard = 5 mg/l
- D008 = concentration based standard = 5 mg/l

- D009 = concentration based standard = 0.2 mg/l, or IMERC or RMERC for high organic Hg, or RMERC for high inorganic Hg
- D010 = concentration based standard = 5.7 mg/l
- D011 = concentration based standard = 5.0 mg/l
- D018* = concentration based standard = 10 mg/kg
- D035 = concentration based standard = 36 mg/kg
- Alternate debris technology may be applied.

*D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents 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 wastestream SR-W012, LDR Treatment Standards are concentration based ranging from 0.2 mg/L to 100 mg/L.

Waste from CIF in waste codes D012 through D043 nonwastewaters with underlying constituents must be treated to the Universal Treatment Standards for those underlying constituents.

Waste Characterization

- Some process knowledge used to characterize the waste stream.
- Confidence level is medium because no analytical data is available. Confidence level is based on knowing some information on the nature of the spill and concentration of the liquids cleaned up.

Radiological Characterization

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

3.1.1.1.C.2 TECHNOLOGY AND CAPACITY NEEDS

Two cleanups in the Separations areas that are included in this waste stream involved mercury spill clean ups. The waste was characterized using process knowledge but the amount of total mercury was not analyzed. Further investigation has determined that mercury levels in the spill clean ups do not exceed 260 mg/kg making the waste acceptable for treatment by incineration followed by stabilization.

The capacity limiting CIF subsystem is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.C.3 TREATMENT OPTION INFORMATION

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) reevaluated 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Some components of this waste stream, such as the Laboratory Waste with Tetraphenyl Borate (formerly SR-W043) may require a preparation for treatment step to meet the CIF treatment criteria. The lab waste stream will be crushed. Wood and other large combustible objects require shredding to meet CIF's waste acceptance criteria. Other wastes may be cut or simply repackaged.

<u>Facility Status</u>

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

<u>Regulatory Status</u>

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 <u>Federal Register</u>. An investigation of mixed waste treatment at the 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.

This waste stream is covered in the RCRA Part B Permit application submitted to SCDHEC for the Consolidated Incineration Facility (CIF), which is presently under construction by authority of a RCRA permit.

SRS shredded this waste stream in the Experimental Transuranic Waste Assay Facility (ETWAF) shredder to facilitate preparation for treatment. Shredding was regulated under the Temporary Authorization (TA) issued for shredding FPTURs and modified on November 3, 1995. Shredding of SR-W012 was completed on November 27, 1995. Repackaging of shredded waste already in storage must be performed in a permitted or interim status facility or via other appropriate regulatory coverage mechanism. Permitting issues will be determined once the location for further treatment preparation has been fully identified, if necessary.

Preparation for Operation

It is necessary to repackage this waste in 21 inch cardboard boxes for treatment in CIF. It was determined that shredding would allow repackaging with minimum worker exposure.

3.1.1.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of the design basis waste streams for CIF. The estimated cost to incinerate this waste stream is included with the cost of SR-W001. The estimated cost to prepare this waste and others to meet the CIF waste acceptance criteria is between $5 million and $10 million.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.D SR-W018 Filter Paper Take Up Rolls (FPTUR)

3.1.1.1.D.1 GENERAL INFORMATION

Waste Stream Number: SR-W018

The preferred treatment option for the Filter Paper Take Up Rolls (FPTUR) waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

This waste consists of "tyvek" filter paper contaminated with residual filtercake and filter media from the filtering of M-Area metal plating sludges (F006 waste). The rolls were originally six feet long and two feet in diameter. Also included in this waste stream is F006 job control waste and remediation waste from M-Area operations and remediation activities.

Volume
- Current volume through 09/30/95 is 260 m^3.
- There is no expected future generation. Operations which generated this waste closed on December 31, 1994. However, additional F006 job control waste and remediation waste will be generated as a result of M-Area remediation activities. Volumes are not known at this time.

Waste Stream Composition
- Organic debris

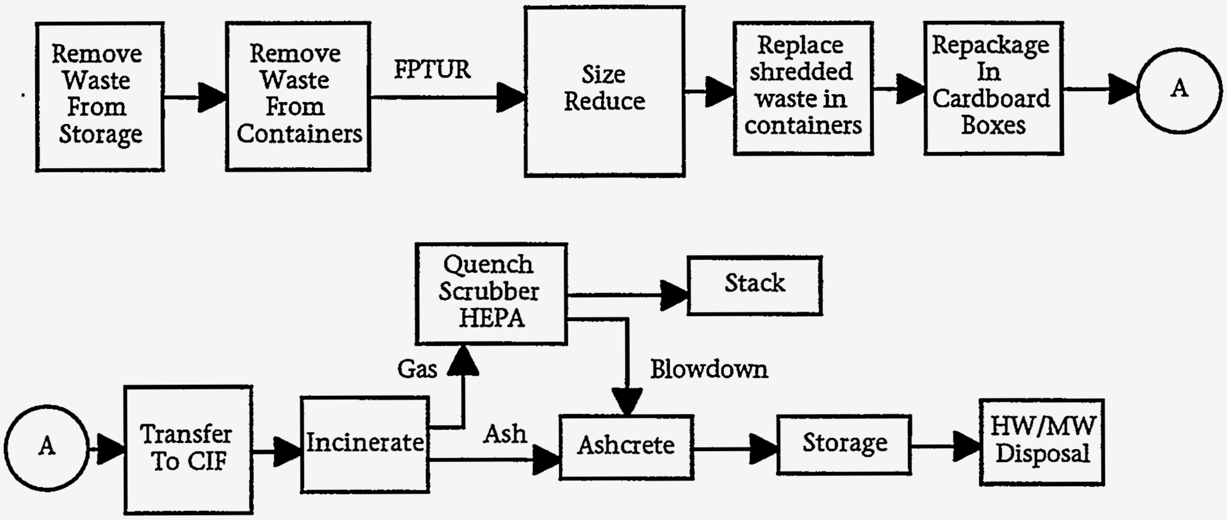
Waste Code
- F006 (metal plating line waste, without cyanide)

LDR Treatment Standard
- F006 = concentration based standards = 0.19-5.0 mg/l

Waste Characterization
- Process knowledge and sampling and analysis 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
- Total activity 7×10^{-7} Ci/kg.
- Alpha emitters are U^{234}, U^{235}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.D.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. This waste stream is significantly different from the waste description for other SRS F006 wastes. The waste description is a wastewater treatment sludge from electroplating operations. It is very different because the small amounts of sludge are deposited on a filter paper media. The waste stream is 50% filtercake and 50% filter media. The contaminant is nickel.

The F006 contaminated FPTUR wastestream also includes incinerable job waste and treatability test waste contaminated with F006 sludge. This material was shredded for treatment in the CIF along with the FPTURs.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.D.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

CIF provides appropriate treatment for all of the waste codes and should be able to meet the concentration standards for this waste stream. The incineration process will reduce the volume of waste which is organic (rags, wipes, etc.) and should increase the efficiency of the stabilization process while reducing the volume of waste for disposal. This treatment train is recognized in regulatory guidance as appropriate treatment for waste streams such as the Filter Paper Take Up Rolls (FPTUR).

<u>Option Support Justification – IDOA Performed</u>

- The preferred option technology is well demonstrated and represents accepted technology for meeting LDR treatment requirements.
- Treatment using the preferred option will result in significant volume reduction after treatment of at least 2:1.
- The preferred option is an existing, onsite facility. Treatment of this waste stream will require no additional equipment or operating personnel at CIF.

- The treatment train minimizes waste handling and exposure concerns. The waste does not require additional treatment for disposal.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

Technology

Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the wastes the CIF was designed to handle.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

The waste codes for this waste stream are covered in the Part B Permit Application submitted to SCDHEC for CIF which is presently under construction by authority of a RCRA permit.

The FPTUR were prepared for CIF treatment by shredding in the Experimental Transuranic Waste Assay Facility (ETWAF). The ETWAF is covered under Part A interim status for storage only. Per discussion with SCDHEC, the preparation for treatment step by shredding is considered treatment as defined in the SCHWMR (R.61-79.260.10). A request for Temporary Authorization per SCHWMR R.61-79.270.42(e) for this activity was submitted to SCDHEC on June 6, 1995. The Temporary Authorization was issued by SCDHEC with an effective date of July 24, 1995. The Temporary Authorization was in effect for a 180 day time period. Shredding was completed for this waste in October 1995. Repackaging of shredded waste already in storage must be performed in a permitted or interim status facility or via other appropriate regulatory mechanism. Permitting issues will be determined once the location for further treatment preparation has been fully identified, if necessary.

Preparation for Operation

It is necessary to repackage this waste in 21 inch cardboard boxes for treatment in CIF. It was determined that shredding would allow waste repackaging with minimum worker exposure.

3.1.1.1.D.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $4 million and $10 million.

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

3.1.1.1.E SR-W022 DWPF Benzene

3.1.1.1.E.1 GENERAL INFORMATION

Waste Stream Number: SR-W022

The preferred treatment option for the Defense Waste Processing Facility Benzene waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

A future waste stream generated from DWPF operations to vitrify high-level waste. Prior to introduction into the vitrification process, feed chemicals containing tetraphenyl borate react with the waste precipitate slurry to remove unwanted radiological constituents. The reaction between the precipitate slurry and the process feed chemicals within the precipitate reactor will liberate benzene from the slurry. The tetraphenyl borate compounds will decompose in the presence of formic acid and copper catalyst to form boric acid, formate salts, and organics (primarily benzene). This offgas will be condensed and transferred to the Organic Waste Storage Tank (OWST). The OWST is solely a storage and transfer facility; no treatment of the benzene occurs in the tank.

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 diphenylmercury (~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.

Volume
- Expected 1996-2000 volume will be 528 m^3.

Waste Stream Composition
- Organic liquid

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

LDR Treatment Standard
- D001 = specified technology = Recovery of Organics or Combustion
- D009 = concentration based standard = 0.2 mg/l
- D018* = concentration based standard = 10 mg/kg

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

Waste Characterization
- Sampling and analysis 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.
- Mixed low-level waste

3.1.1.1.E.2 TECHNOLOGY AND CAPACITY NEEDS

Incineration has an established record of success in meeting the imposed treatment standards for the waste codes listed in this waste stream.

This waste stream is one of the target waste streams on which the design of CIF is based.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates for CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.E.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, incineration provides organic contaminant destruction and proper volume reduction.

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) reevaluated 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

<u>Facility Status</u>

The CIF construction is virtually complete. Operational testing initiated by early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

<u>Regulatory Status</u>

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

This waste stream is covered in the RCRA Part B Permit application submitted to SCDHEC for CIF.

Preparation for Operation

This waste will be fed directly to CIF from the Organic Waste Storage Tank (OWST) of DWPF and does not require preparation prior to treatment.

3.1.1.1.E.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is included with the cost of SR-W001.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.F SR-W028 Mark 15 Filter Paper

3.1.1.1.F.1 GENERAL INFORMATION

Waste Stream Number: SR-W028

The preferred treatment option for the Mark 15 Filter Paper waste stream is treatment by Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

The filter paper is from a plate and frame filter press used in M Area to filter etching solution from nickel plating solutions. The filter paper is contaminated with residual filtercake.

Volume
- Current volume through 09/30/95 is 1.0 m^3.
- No future waste generation expected because the manufacturing process which generated this waste is no longer operational.

Waste Stream Composition
- Organic debris

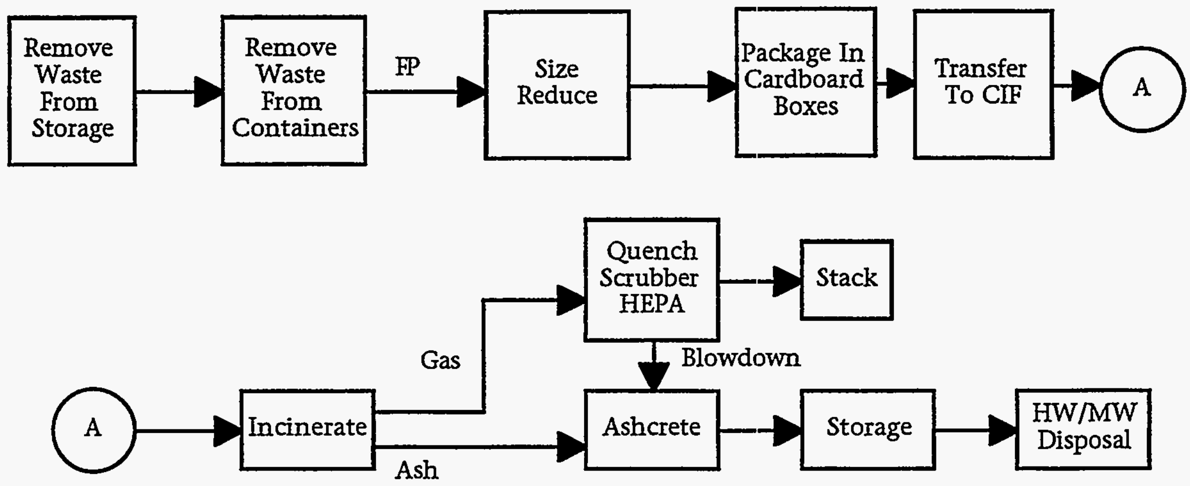
Waste Code
- F006 (metal plating line waste, without cyanide)

LDR Treatment Standard
- F006 = concentration based standard = 0.19-5.0 mg/l

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is high based upon analysis on a similar material and knowledge that the process generates a listed hazardous waste.
- Primary contaminant is Ni. Others included are Cd, Cr, Pb, and Ag, but these are below RCRA LDR concentration standards.

Radiological Characterization
- Total activity is 10-100 nCi/g.
- Alpha emitters are U^{234}, U^{235}, U^{236}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.F.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. The constituent of concern in this F006 waste stream is nickel. The treatment standard for nickel as a component of F006 is 5.0 mg/l. This waste stream is not significantly different from the waste description for SR-W005 since it is a combination of Mark 15 Filtercake and Filter Paper.

The CIF will have spare capacity to treat other SRS wastes in addition to the design basis waste streams. SRS mission changes have reduced the expected quantity of the design basis waste feeds. Newly identified waste can replace some portion of the original design basis waste feeds immediately after CIF startup.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates for the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.F.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDOA Performed

- The preferred option technology is well demonstrated and represents accepted technology for meeting LDR treatment requirements.
- Treatment using the preferred option will result in significant volume reduction after treatment of at least 2:1.
- The preferred option is an existing, onsite facility. Treatment of this waste stream will require no additional equipment or operating personnel.
- The treatment train minimizes waste handling and exposure concerns. Waste does not require additional treatment for disposal.

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

Technology

Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the wastes the CIF was designed to handle.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

The waste code for this waste stream is covered in the Part B Permit Application submitted to SCDHEC for the CIF which is presently under construction by authority of a RCRA permit.

No permits are required for the step to repackage the Mark 15 Filter Paper into 21 inch cardboard boxes required for treatment in CIF. Since the waste is already in storage, repackaging must occur in a permitted or interim status facility or via other appropriate regulatory coverage mechanism.

Preparation for Operation

The Mark 15 Filter Paper will be prepared for treatment in CIF by re-packaging the filter paper from the 55 gallon drums into 21 inch cardboard boxes in the M-Area Container Storage Facility, 316-M

3.1.1.1.F.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is less than $600,000

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

3.1.1.1.G SR-W035 Mixed Waste Oil – Sitewide

3.1.1.1.G.1 GENERAL INFORMATION

Waste Stream Number: SR-W035

The preferred treatment option for the Mixed Waste Oil – Sitewide waste stream is Incineration in the Consolidated Incineration Facility (CIF).

Background Information:

Waste generated from a preventative maintenance programs such as changing refrigeration oil in the Separations Area chillers and waste oil from lubricating and hydraulic oil changeouts from CIF equipment. Routinely, this is a nonradioactive used oil that could be recycled for energy recovery. Current inventory of nine drums has detectable levels of tritium (H^3) which prevented 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 which the results of radiological analysis has shown to be mixed waste. Additional volume is not included since the determination was made after the 9/30/95 date for inclusion in the Mixed Waste Inventory Report (MWIR) update. Volumes will be included in the next MWIR update. (Volume of moratorium/curtailment waste generated in this waste stream is 0.6 m^3).

Volume
- Current volume through 09/30/95 is 2.8 m^3.
- Expected 1996-2000 volume will be 3.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D005 (TCLP Ba)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D019 (carbon tetrachloride)
- D022 (chloroform)
- D039 (tetrachloroethylene)
- D040 (trichloroethylene)

This wastestream 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
- D005 = concentration based standard = 100 mg/l
- D007 = concentration based standard = 5.0 mg/kg
- D008 = concentration based standard = 5.0 mg/kg
- D019* = concentration based standard = 6.0 mg/kg
- D022* = concentration based standard = 6.0 mg/kg
- D039* = concentration based standard = 6.0 mg/kg
- D040* = concentration based standard = 6.0 mg/kg

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents 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 used to characterize the waste stream.
- Confidence level is high because of TCLP results.
- TCLP has been run on nonradioactive Freon® 11 but not on radioactive Freon® 11.

Radiological Characterization
- Typical activity is 8.75×10^{-2} nCi/g.
- Tritium is present in waste stream.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.G.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream is one of the target waste streams on which the design of the CIF is based.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.G.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, incineration provides organic contaminant destruction and volume reduction.

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) reevaluated 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter of FY 97 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

Preparation for Operation

No preparation is required for CIF to treat this waste. Mixed waste oil will be stored at CIF in the liquid hazardous waste blend tanks prior to introduction with CIF.

3.1.1.1.G.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is included with the cost of SR-W001.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.H SR-W042 Paints and Thinners

3.1.1.1.H.1 GENERAL INFORMATION

Waste Stream Number: SR-W042

The preferred treatment option for the Paints and Thinners waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

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

Volume
- Current volume through 09/30/95 is 5.4 m^3.
- Expected 1996-2000 volume will be 7.0 m^3.

Waste Stream Composition
- Organic sludge/particulate

Waste Code
- D001A (ignitable high TOC)
- 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)
- F003 (xylene, acetone)
- F005A (nonhalogenated spent solvents)

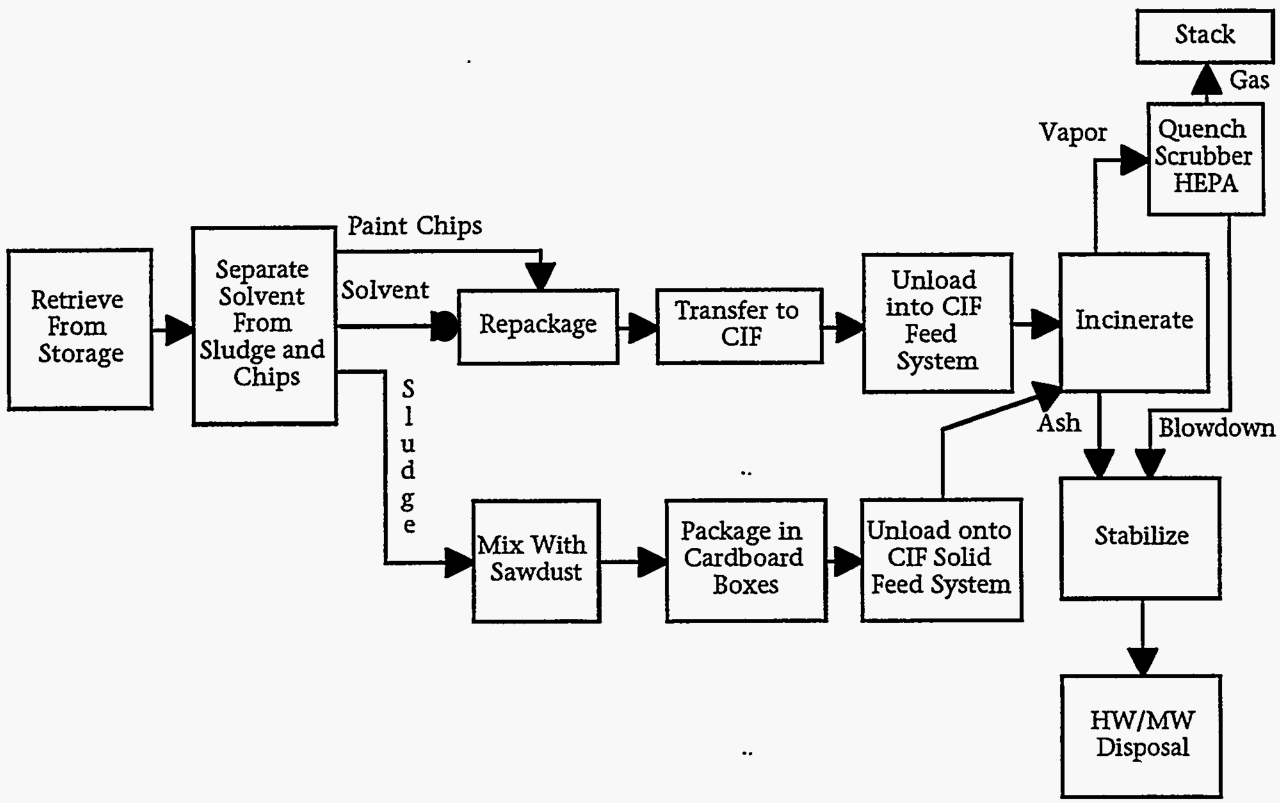
LDR Treatment Standard
- D001 specified technology = Recovery of Organics or Combustion
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1 mg/l
- D007 = concentration based standard = 5 mg/l
- D008 = concentration based standard = 5 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D011 = concentration based standard = 5 mg/l
- D018* = concentration based standard = 10 mg/kg
- D035* = concentration based standard = 36 mg/kg
- D038* = concentration based standard = 16 mg/kg
- F003 = concentration based standards = 2.6-180 mg/kg
- F005 = concentration based standards = 10-170 mg/kg, except 2-Ethoxyethanol and 2-Nitropropane = Incineration

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high because sample and analysis available.

Radiological Characterization
- Total activity is 0.45 nCi/g.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.H.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Utilization of the CIF for the treatment of this stream represents an appropriate treatment train (incineration followed by stabilization) to destroy the organics and stabilize the metals.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.H.3 TREATMENT OPTION INFORMATION

The CIF is made up of two distinct treatment processes, thermal destruction and stabilization of the resulting residues. This waste stream, with mainly an organic fraction, but also with metal contaminants is well suited to the treatment train provided by the CIF. The organic portion of the waste will be destroyed, metal will be captured in the residues from the incineration process and will be stabilized in the ashcrete process. This treatment train is well developed and demonstrated for similar waste streams.

<u>Option Support Justification – IDOA Performed</u>

- The waste stream is similar to waste used as the design basis for the preferred option.
- The technology is well known and accepted as capable of meeting LDR standards.

- Treatment train represents best method for properly treating waste codes in this waste stream with minimum handling and worker exposure.
- Treatment utilizing the preferred option will result in significant volume reduction and produce a wasteform suitable for disposal without additional treatment.
- The treatment option is an existing, onsite facility and will require no additional equipment or personnel to treat this waste stream.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

Technology

Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the wastes the CIF was designed to handle.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

There are no expected permitting issues related to incineration of this waste at CIF. The waste codes in this waste stream are covered in the RCRA Part B Permit Application submitted to SCDHEC for the CIF, which is presently under construction by authority of a RCRA permit.

Preparation for Operation

A preparation for treatment step to source separate and repackage the waste to meet the CIF WAC is required. It is anticipated that preparation for treatment of this waste can be done in a mixed waste storage building such as 645-2N under the Part B permit renewal effective October 5, 1995.

3.1.1.1.H.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $400,000 and $900,000.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.I SR-W045 Tri-Butyl-Phosphate and n-Paraffin

3.1.1.1.I.1 GENERAL INFORMATION

Waste Stream Number: SR-W045

The preferred treatment option for the Tri-Butyl-Phosphate and n-Paraffin is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

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 has been combined with this waste stream.

Volume
- Current volume through 09/30/95 is 149.7 m^3.
- Expected 1996-2000 volume will be 15.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018 (benzene)
- D040 (trichloroethylene) nonwastewater

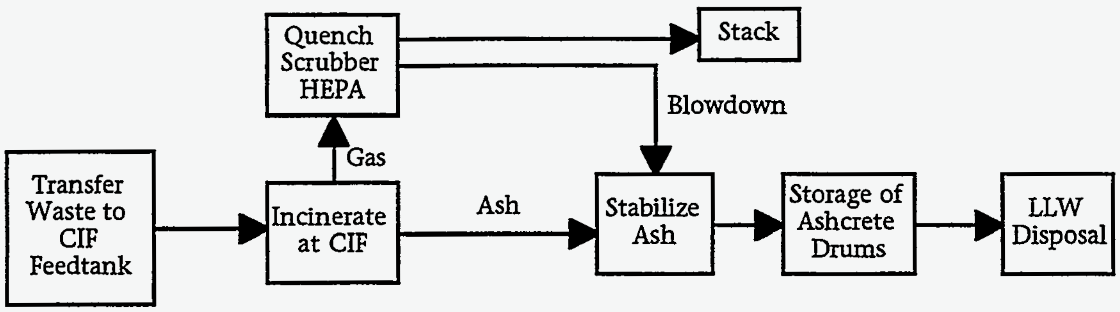
LDR Treatment Standard
- D008 = concentration based standard = 5 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D011 = concentration based standard = 5 mg/l
- D018* = concentration based standard = 10 mg/kg
- D040* = concentration based standard = 6 mg/kg

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

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

Radiological Characterization
- Total activity is 8-16 nCi/g.
- Cm^{244}, Am^{241}, Pu^{239}, Eu^{154}, Eu^{155}, and Pu^{238}; lesser amounts of Zr^{95}, Sb^{125}, Cs^{137}, and Co^{60}.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.I.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Utilization of the CIF for the treatment of this waste stream represents an appropriate treatment train (incineration followed by stabilization) to destroy the organics and to stabilize the metals.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.I.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, incineration provides organic contaminant destruction and proper volume reduction.

This is a large volume waste stream which must be phased into the treatment plan for utilization of the CIF. Due to the high alpha activity displayed by this waste stream, it will be necessary to blend with other lower activity streams rather than incinerate directly. An alternative to the blending process is to remove a major portion of the radioactivity via an adsorption column before blending.

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) reevaluated 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

<u>Option Support Justification – IDOA Performed</u>

- The preferred option technology is well known, demonstrated and represents technology capable of meeting LDR requirements. This treatment train represents the best method to adequately treat all the waste codes in this waste stream to meet LDR standards.
- Treatment of the waste stream using the preferred option will result in significant volume reduction and a wasteform suitable for disposal without additional treatment.

- The preferred option is an existing, onsite facility. Treatment of this waste stream at the preferred option will require no additional equipment or operating personnel.
- No additional permit actions will be needed to treat this waste stream at the preferred option which could result in faster treatment times.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

There are no expected permitting issues related to incineration of this waste at CIF. The waste codes for this waste stream are covered in the RCRA Part B Permit Application submitted to SCDHEC for the CIF which is presently under construction by authority of a RCRA Construction Permit.

Preparation for Operation

A blending program to reduce the radionuclide content of this waste stream needs to be developed and approved. No other preparation steps are required to treat this waste stream in CIF.

3.1.1.1.1.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

CIF is not funded at present to treat this specific waste. This large volume waste stream is not likely to be handled by CIF until after the design basis wastes have been treated.

The estimated cost to treat this waste stream is less than $150,000.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream, except for decisions on the waste to reduce the radioactivity of the stream to meet the CIF's WAC concerning radioactivity.

3.1.1.1.J SR-W046 Consolidated Incineration Facility (CIF) Ash

3.1.1.1.J.1 GENERAL INFORMATION

Waste Stream Number: SR-W046

The preferred treatment option for Consolidated Incineration Facility (CIF) Ash is Stabilization using the Consolidated Incineration Facility Ashcrete Process.

Background Information:

A future waste stream composed of ash generated from the incineration of mixed waste in the CIF.

Volume
- Expected 1996-2000 volume will be 155 m^3.

Waste Stream Composition
- Inorganic sludge/particulate

Waste Code
- The waste codes describing the CIF ash waste stream depend on the feed stream into CIF. The ash waste stream will contain all of the listed waste codes that are fed into the CIF. Consult the RCRA Part B Permit Application for a complete listing.

LDR Treatment Standard
- 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.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is medium based on the fact that this is a future waste stream and no analysis is available.

Radiological Characterization
- Radiological hazards are unknown at this time.
- Remote handled by design of the facility
- Mixed low-level waste

3.1.1.1.J.2 TECHNOLOGY AND CAPACITY NEEDS

Stabilization of the CIF ash not only provides the recommended treatment (BDAT) for TC metals, but serves as a cost-effective and environmentally sound method for stabilization of the ash prior to disposal.

CIF ash is a future waste stream. The ashcrete process is under construction as part of the CIF. Capacity has been determined based on projections of volumes of waste at SRS projected to require treatment by incineration. The capacity-limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of the CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.J.3 TREATMENT OPTION INFORMATION

SRS committed to reassess the evaluation of waste streams for which incineration originally had been determined to be the best and most practical treatment technology. 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) reevaluated the treatment of certain existing and future SRS wastes in the CIF. The review was structured to generally 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

Technology

Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the wastes the CIF was designed to handle.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

Preparation for Operation

CIF Ash is a future waste stream generated from the operation of CIF. Until CIF is operational, no preparation for operation to treat this waste is required.

3.1.1.1.J.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost for operation of the ashcrete system is $6 million to $11 million. This cost is already included in the estimate for SR-W001 and should not be added to that cost.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.1.K SR-W047 Consolidated Incineration Facility (CIF) Blowdown

3.1.1.1.K.1 GENERAL INFORMATION

Waste Stream Number: SR-W047

The preferred treatment option for the Consolidated Incineration Facility (CIF) Blowdown waste stream is Stabilization in the Consolidated Incineration Facility Ashcrete Unit.

Background Information:

This is a future waste stream composed of scrubber blowdown water (wastewater) from the Consolidated Incineration Facility (CIF) offgas emission control system.

Volume
- Expected 1996-2000 volume will be 1000 m^3.

Waste Stream Composition
- Aqueous liquid

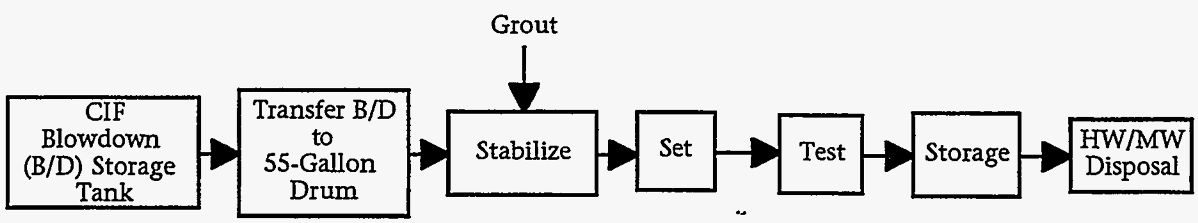
Waste Code
- The waste codes describing the CIF blowdown waste stream depend on the feed stream into CIF. Blowdown waste stream will contain all of the listed waste codes that are fed into the CIF. Consult the RCRA Part B Permit Application for a complete listing.

LDR Treatment Standard
- 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.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is medium based on the fact this is a future waste stream and no analysis is available.

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

3.1.1.1.K.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. The CIF Blowdown is the scrubber water from the CIF air pollution control equipment. Analysis of this waste stream should show contaminants of a similar nature to that of the CIF Ash with much the same treatment needs. As a result, treatment of this waste by stabilization should meet the LDR requirements for this waste stream.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. Currently, the ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown based on the permitted solid and liquid feed rates granted by SCDHEC. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.K.3 TREATMENT OPTION INFORMATION

This treatment option was selected as the preferred option even though it did not have the highest score from the In-depth Option Analysis (IDOA) Process. 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.

Option Support Justification – IDOA Performed

- Treatment by the preferred option will produce a well accepted wasteform which has been repeatedly demonstrated to meet LDR requirements.
- No secondary waste is generated. Wasteform is ready for disposal.
- Treatment process is a well understood technology.
- Preferred option utilizes existing, onsite facility, requires no extra equipment or additional personnel, minimizes worker exposure, and reduces waste handling as compared with other options.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. The start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

The CIF blowdown stream will be generated during the operation of the incinerator and will be placed in 55-gallon (0.2 m^3) drums to be stabilized in the ashcrete portion of the facility using cement stabilization.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

Preparation for Operation

CIF Blowdown is a future waste stream generated from the operation of CIF. Until CIF is operational, no preparation for operation to treat this waste is required.

3.1.1.1.K.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $4 million and $9 million. This cost is included in the estimate for SR-W001 and should not be added to that cost.

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

3.1.1.1.L SR-W051 Spent Filter Cartridges and Carbon Filter Media

3.1.1.1.L.1 GENERAL INFORMATION

Waste Stream Number: SR-W051

The preferred treatment option for the Spent Filter Cartridges and Carbon Filter Media waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

The waste stream consists of incinerable filters and filter media. Examples of this wastesteam 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 will be CIF feed tank and offgas HEPA filters.

Volume
- Current volume through 09/30/95 is 0.8 m^3.
- Expected 1996-2000 volume will be 4.5 m^3.

Waste Stream Composition
- Heterogeneous debris

Waste Code
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (low TCLP Hg)

Waste from CIF will contain all the listed waste codes that are fed to CIF and any characteristic waste codes determined by analysis. The CIF RCRA Part B Permit should be consulted for a complete listing.

LDR Treatment Standard
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- Alternative debris technology may be applied

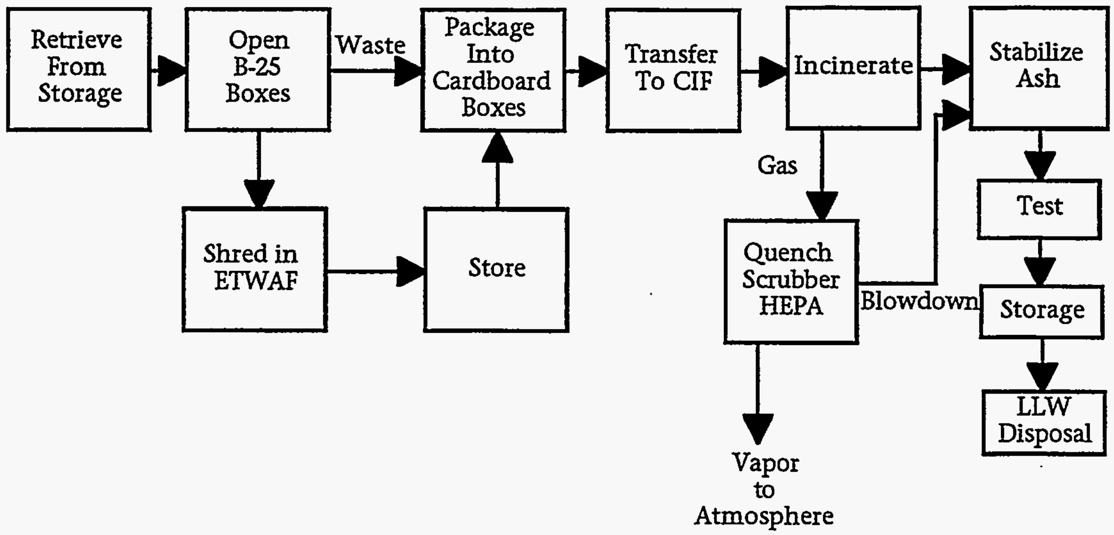
CIF waste will have treatment standards that are reflected in the latest waste fed to CIF and any applicable characteristic waste. Specific information on treatment standards can be acquired by looking at specific wastes in Volume II, Section 3.1.1.1 proposed to be treated at CIF.

For waste codes D012 through D043 nonwastewaters, underlying constituents must be treated to universal treatment standards.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is high based upon knowledge that mercury is present. No direct analytical data is available; concentration of mercury is unknown.

Radiological Characterization
- Total activity is 6.6 x 10^{-4} Ci/kg.
- Alpha emitters (U^{235} and U^{238}) are present.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.1.L.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. This waste stream qualifies as debris. It can be treated by one of the seventeen alternative debris technologies or be treated to the concentration based treatment standard of 0.2 mg/l mercury TCLP. This material qualifies as debris under the land disposal regulations because its particle size is larger than 60 mm and it is a manufactured material. One debris treatment method available for mercury contaminated waste is Thermal Destruction, the addition of waste to an incinerator, boiler, or industrial furnace which complies with applicable RCRA regulations.

The preferred treatment option for this waste stream utilizes the debris treatment alternative of thermal destruction by means of incineration. Treatment of the waste stream in this manner complies with land disposal requirements for the proper management of this waste code. This choice offers the most efficient treatment method for the waste stream and utilizes existing, onsite facilities.

CIF will have spare capacity to treat other SRS wastes in addition to the design basis waste streams. SRS mission changes have reduced the expected quantity of the design basis waste feeds.

The capacity-limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.L.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

SRS committed to reassess the evaluation of waste streams for which incineration originally had been determined to be the best and most practical treatment technology. 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) reevaluated the treatment of certain existing and future SRS wastes in the CIF.

The review was structured to generally 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Option Support Justification – IDOA Performed

- Incineration/Stabilization treatment train represents demonstrated technology which is known to be capable of meeting LDR treatment requirement for the mercury waste listed for this waste stream.
- Treatment process results in significant volume reduction for disposal after treatment (filter is a composite of PVC and filter media).
- Treatment option is an existing, onsite facility. No extra equipment or personnel required for waste processing.
- Utilization of existing treatment facility may minimize permit requirements resulting in faster treatment turn around time.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

It is believed that a RCRA Part B Permit modification is not necessary to incinerate this waste at the CIF because the waste codes listed for this waste stream already are in the existing RCRA Part B Permit application.

SRS shredded this waste stream in the Expermental Transuranic Waste Assay Facility (ETWAF) shredder to facilitate preparation for treatment. Shredding was regulated under the Temporary Authorization (TA) issued for shredding FPTURs and modified November 3, 1995. Shredding of SR-W051 was completed on November 21, 1995. Repackaging of shredded waste already in storage must be performed in a permitted or interim status facility or via other appropriate regulatory coverage mechanism. Permitting issues will be determined once the location for further treatment preparation has been fully identified, if necessary.

Preparation for Operation

It is necessary to repackage this waste in 21 inch cardboard boxes for treatment in CIF. It was determined that shredding would allow waste repackaging with minimum worker exposure.

3.1.1.1.L.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is less than $500,000.

Uncertainty Issues

This technology has been determined suitable for treating the organic and inorganic constituents of the waste stream. However, the character of the waste in relation to the CIF WAC has not been fully analyzed.

3.1.1.1.M SR-W055 Job Control Waste Containing Solvent Contaminated Wipes

3.1.1.1.M.1 GENERAL INFORMATION

Waste Stream Number: SR-W055

The preferred treatment option for the Job Control Waste Containing Solvent Contaminated Wipes waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility (CIF).

Background Information:

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

Volume
- Current volume through 09/30/95 is 739 m^3.
- No future waste generation is expected due to the solvent rag minimization program.

The 9/30/95 volume was revised downward by 212 m^3. The change resulted from a re-inventory in connection with preparation of radionuclide data for processing of this waste stream. The re-inventory resulted in the re-assignment of 212 m^3 to waste stream SR-W056.

The volume does not reflect the reduction due to the separation of nonincinerable metal components during the shredding process. Volume will be reflected in the next Mixed Waste Inventory Report update.

Waste Stream Matrix
- Organic debris

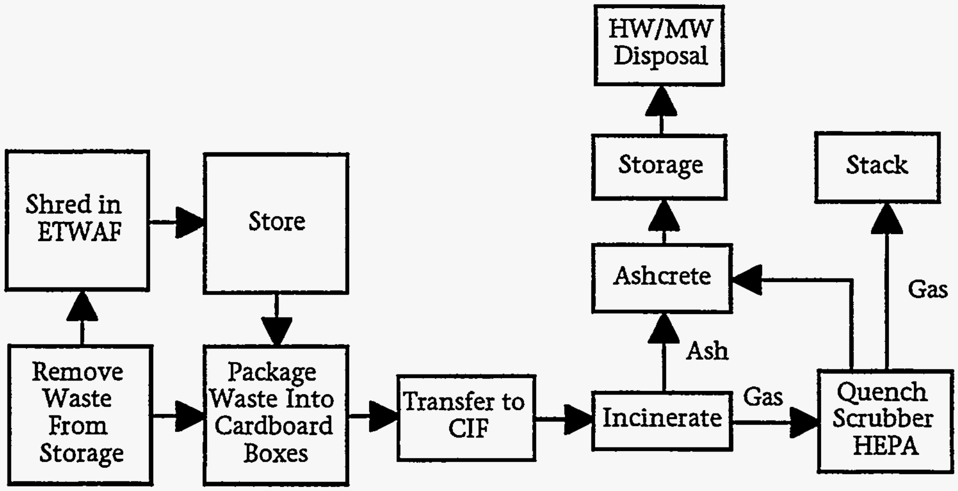
Waste Code
- F001-F002, F003A, F005A (halogenated and nonhalogenated spent solvents)

LDR Treatment Standard
- F001 = concentration based standards = 6-30 mg/kg
- F002 = concentration based standards = 6-30 mg/kg
- F003 = concentration based standards = 2.6-180 mg/kg
- F005 = concentration based standards = 10-170 mg/kg, except for 2-Ethoxyethanol, and 2-Nitropropane = Incineration
- Alternate debris technology may be applied.

Waste Characterization
- Process knowledge 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

3.1.1.1.M.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. This waste stream meets the LDR definition for debris and can be treated by one of the debris technologies or it can be treated to the concentration based treatment standard. The CIF treatment train of incineration followed by stabilization meets the LDR treatment requirements for the waste stream by sufficiently destroying the organics and reducing the volume in the incineration step and treating the metals through stabilization.

The CIF will have spare capacity to treat other SRS wastes in addition to the design basis waste streams. SRS mission changes have reduced the expected quantity of the design basis waste feeds. Newly identified wastes can replace some portion of the original design basis waste feeds immediately after CIF startup.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates for the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

This is a large volume waste stream which must be phased into the treatment plan for utilization of the CIF. The waste must be repackaged to meet the CIF WAC and, at that time, any metal tools will be segregated and decontaminated and/or managed as scrap metal under the exemption provided by R.61-79.261.6 of SCHWMR.

3.1.1.1.M.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDQA Performed

- The preferred option technology is well known, demonstrated and represents technology capable of meeting LDR requirements. This technology is the BDAT for the waste codes listed in this waste stream.
- Treatment of the waste stream using the CIF will result in significant volume reduction and a wasteform suitable for disposal without additional treatment.
- The preferred option is an existing, onsite facility. Treatment of this waste stream at the CIF will require no additional equipment or operating personnel.
- No additional permit actions will be needed to treat this waste stream at the CIF resulting in a shorter time period for treating the waste compared with other options.

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and volume reduction in preparation for stabilization of the metals in the waste stream.

Facility Status

CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

There are no significant permitting issues related to incineration of this waste at CIF. The waste codes for this waste stream are covered in the Part B Permit Application submitted to SCDHEC for the CIF which is presently under construction by authority of a RCRA permit.

A treatment preparation step to repackage the waste to meet the CIF WAC is required. The repackaging step includes sorting to separate any material unacceptable to CIF. SRS was shredding this waste to facilitate preparation for treatment. Shredding was being done in the Experimental Trausuranic Waste Assay Facility (ETWAF). Shredding was regulated under the Temporary Authorization (TA) issued for shredding FPTURs and modified on November 3, 1995. The TA expired on January 20, 1996. Not all the waste was shredded by 1/20/96. SRS has requested a 180 day extension of the TA to complete the shredding of the waste.

Preparation for Operation

It is necessary to repackage this waste in 21 inch cardboard boxes for treatment in CIF. It was determined that shredding would allow waste repackaging with minimum worker exposure.

3.1.1.1.M.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Actual cost to treat the waste stream must be determined. CIF is not funded at present to treat this specific waste. This large volume waste stream is not likely to be handled by CIF until after the design basis wastes have been treated.

The estimated cost to treat this waste stream is between $4 million and $10 million.

Uncertainty Issues

If the TA extension is not approved to complete the shredding of this waste in ETWAF, SRS must explore alternative steps to prepare the remainder of this waste for treatment in CIF.

3.1.1.1.N SR-W070 Mixed Waste from Laboratory Samples

3.1.1.1.N.1 GENERAL INFORMATION

Waste Stream Number: SR-W070

The preferred treatment option for the Mixed Waste from Laboratory Samples is Incineration followed by Stabilization at the Consolidated Incineration Facility (CIF).

Background Information:

Future waste stream consisting of lab waste from the analytical testing of ground water and soil samples taken from the site and processed at commercial, offsite laboratories.

Volume
- Current volume through 09/30/95 is 2.5 m^3
- Expected 1996-2000 volume will be 41.8 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D001C(Ignitable, Low TOC)
- D004 (TCLP As)
- D005 (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010 (TCLP Se)
- D011 (TCLP Ag)
- D015 (Toxaphene)
- D018 (Benzene)
- F001, F002, and F005A (spent solvents – these waste codes pertain only to samples that may contain a listed waste)

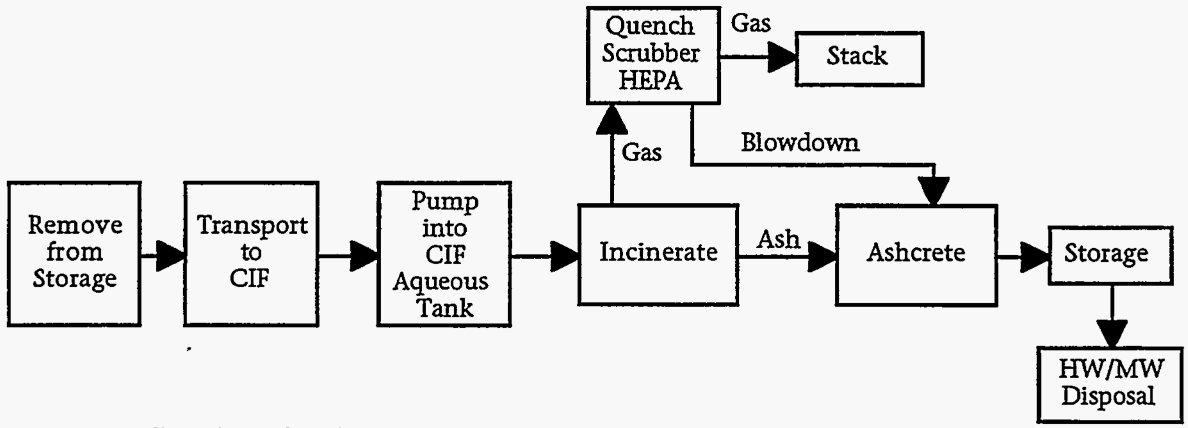
LDR Treatment Standard
- D001 = DEACT and meet 268.48 standards, or RORGS or CMBST
- D004 = concentration based standard = 5 mg/l
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1.0 mg/l
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D010 = concentration based standard = 5.7 mg/l
- D011 = concentration based standard = 5.0 mg/l
- D015 = concentration based standard = 2.6 mg/l
- D018 = concentration based standard = 10 mg/l
- F001, F002, and F005 = concentration based standards = 6.0-170 mg/kg, except for 2-Ethoxyethanol and 2-Nitropropane = Incineration
- D015 and D018 nonwastewater must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents which may be present.

Waste Characterization
- Sampling and Analysis 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}, Pu^{240}, Pu^{241}, Sr^{90}, U^{234}, U^{235}, U^{236}, U^{237}, U^{238}
- Activity unknown
- Contact handled

3.1.1.1.N.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Incineration followed by stabilization at the CIF will be an appropriate treatment to destroy organics entrained in the aqueous and treat the metals. If portions of the waste are determined to contain hazardous metals above an LDR standard, then CIF would be prohibited from treating the waste unless one or more organic hazardous constituent is present at significant levels. Alternative treatment would need to be applied if this situation occurs. The presence of hazardous metals and organic hazardous constituents will be verified.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.N.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is expected to carry F listed waste codes, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

SRS committed to reassess the evaluation of waste streams for which incineration originally had been determined to be the best and most practical treatment technology. 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) reevaluated the treatment of certain existing and future SRS wastes in the CIF. The review was structured to generally 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Option Support Justification – IDOA Performed

- Incineration/Stabilization treatment train represents demonstrated technology which is known to be capable of meeting LDR treatment requirement for the waste codes listed for this waste stream.
- Treatment process results in significant volume reduction.
- Treatment option is an existing, onsite facility. No extra equipment or personnel required for waste processing.
- Utilization of existing treatment facility may minimize permit requirements resulting in faster treatment turn around time.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to approval by SCDHEC.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

It is believed that a RCRA Part B Permit modification is not necessary in order to incinerate this waste at the CIF because the waste codes listed for this waste stream already are in the existing RCRA Part B Permit Application.

Preparation for Operation

No preparation of this work for treatment in CIF is required. Waste will be introduced into the Aqueous Waste Tank for feed to CIF.

3.1.1.1.N.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is less than $400,000.

Uncertainty Issues

This technology has been determined suitable for treating the hazardous constituent of the waste stream. However, the character of the waste in relation to the CIF WAC has not been fully analyzed. Proposed regulatory modifications to LDR treatment standards could prevent this waste from being treated in the CIF in compliance with RCRA LDR requirements.

3.1.1.1.O SR-W071 Wastewater Suitable for Treatment in CIF

3.1.1.1.O.1 GENERAL INFORMATION

Waste Stream Number: SR-W071

The preferred treatment option for the Wastewater Suitable for Treatment in CIF is Incineration followed by Stabilization at the Consolidated Incineration Facility (CIF).

Background Information:

This waste is generated by the removal of rainwater from the space between the metal TRU waste storage drum and the drum's plastic liner. The TRU waste stored in the drums is assumed to contain solvent contaminated wipes. When analysis of water recovered from the space between the drum and the liner indicates the presence of radionuclides, the water is presumed to have been in contact with the solvent-contaminated wipes. Thus, the water is conservatively assumed to be a mixed waste.

Future waste streams to be incorporated into this waste category included other aquerous wastes with listed organic constituents such as wastewater collected form CIF sumps.

Volume
- Current volume through 09/30/95 is 24.9 m^3.
- Expected 1996-2000 volume will be is 250 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Codes
- F001, F002, F003A, F005A (halogenated and nonhalogenated spent solvents)
- 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 listing.

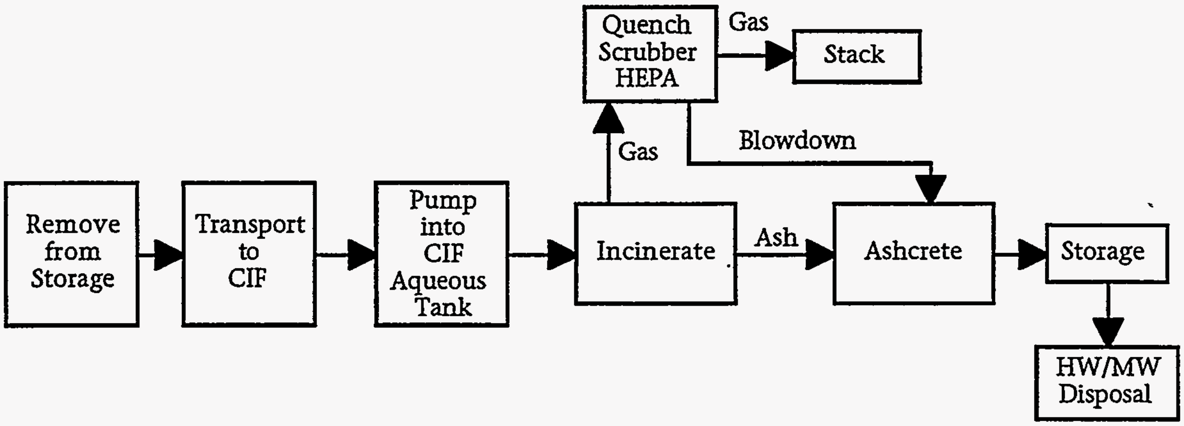
LDR Treatment Standard
- F001 = concentration based standards = 6-30 mg/kg
- F002 = concentration based standards = 6-30 mg/kg
- F003 = concentration based standards = 2.6-180 mg/kg
- F005 = concentration based standards = 10-170 mg/kg, except 2-Ethoxyethanol, 2-Nitropropane = Incineration
- Waste from CIF will have treatment standards that are reflected in the listed 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
- Radiological analysis of water recovered from the space between the drum and the liner has been done. Water screened and found to have a radionuclide contamination is assumed to have come in contact with the TRU waste (containing solvent rags) and characterized as hazardous under the mixture rule. Confidence level about the radionuclide analyses is high. Process knowledge has been used to characterize waste from a RCRA standpoint. Chemical analysis will be necessary to further characterize this waste for treatment in the CIF.
- Chemical analysis will be necessary to quantify contamination levels of CIF wastewater and other aqueous waste streams for which initial technical analysis determines suitable for treatment in CIF. Analysis will be needed to verify that proper treatment can be provided by CIF.

Radiological Characterization

- 10 to 100 nCi/g alpha emitters
- Contact handled
- Mixed low-level waste
- Radiological characterization of future waste streams such as CIF wastewater can not be determined at this time.

3.1.1.1.O.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Future wastestreams of this category may not be stored but transferred directly to the CIF aqueous waste tank. Incineration followed by Stabilization at CIF will be an appropriate treatment to destroy the organics. If portions of the waste are determined to contain hazardous metals above an LDR standard, then CIF would be prohibited from treating the waste unless one or more organic hazardous constituent is present at significant levels. Alternative treatment would need to be applied if this situation occurs. The presence of hazardous metals and organic hazardous constituents will be verified.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.O.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the radionuclides in the waste stream.

SRS committed to reassess the evaluation of waste streams for which incineration originally had been determined to be the best and most practical treatment technology. 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) reevaluated the treatment of certain existing and future SRS wastes in the CIF. The review was structured to generally 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Option Support Justification – IDOA Performed

- Incineration/Stabilization treatment train represents demonstrated technology which is known to be capable of meeting LDR treatment requirement for the waste codes listed for this waste stream.
- Treatment process results in significant volume reduction.
- Treatment option is an existing, onsite facility. No extra equipment or personnel are required for waste processing.
- Utilization of existing treatment facility may minimize permit requirements resulting in faster treatment turn around time.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operations. Start date to treat mixed waste is anticipated to be third quarter 1997 subject to SCDHEC approval.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

It is believed that a RCRA Part B Permit modification is not necessary in order to incinerate this waste at the CIF because the waste codes listed for this waste stream already are in the existing RCRA Part B Permit Application.

Preparation for Operation

No preparation of this waste for treatment in CIF is required. Waste will be introduced into the aqueous waste tank for feed to CIF.

3.1.1.1.O.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is less than $500,000.

Uncertainty Issues

This technology has been determined suitable for treating the hazardous constituent of the waste stream. However, the character of the waste in relation to the CIF WAC has not been fully analyzed. Proposed regulatory modifications to LDR requirements could prevent this waste from being treated in the CIF.

3.1.1.1.P SR-W073 Plastic/Lead/Cadmium Raschig Rings

3.1.1.1.P.1 GENERAL INFORMATION

Waste Stream Number: SR-W073

The preferred treatment option for Plastic/Lead/Cadmium Raschig Rings is Incineration followed by Stabilization at the Consolidated Incineration Facility (CIF).

Background Information:

This waste stream is composed of approximately 78% plastic material, 10% lead, and 12% cadmium (by volume). These raschig rings were used as a criticality prevention measure in certain sumps in the Separations H-Area facility. These raschig rings were reported under Low-Level Waste Lead (SR-W013B) in the DSTP, but were segregated into their own waste stream after reexamining the stream.

Volume
- Current volume through 09/30/95 is 1.8 m^3.
- Future generation is not anticipated.

Waste Stream Composition
- Other organic particulates

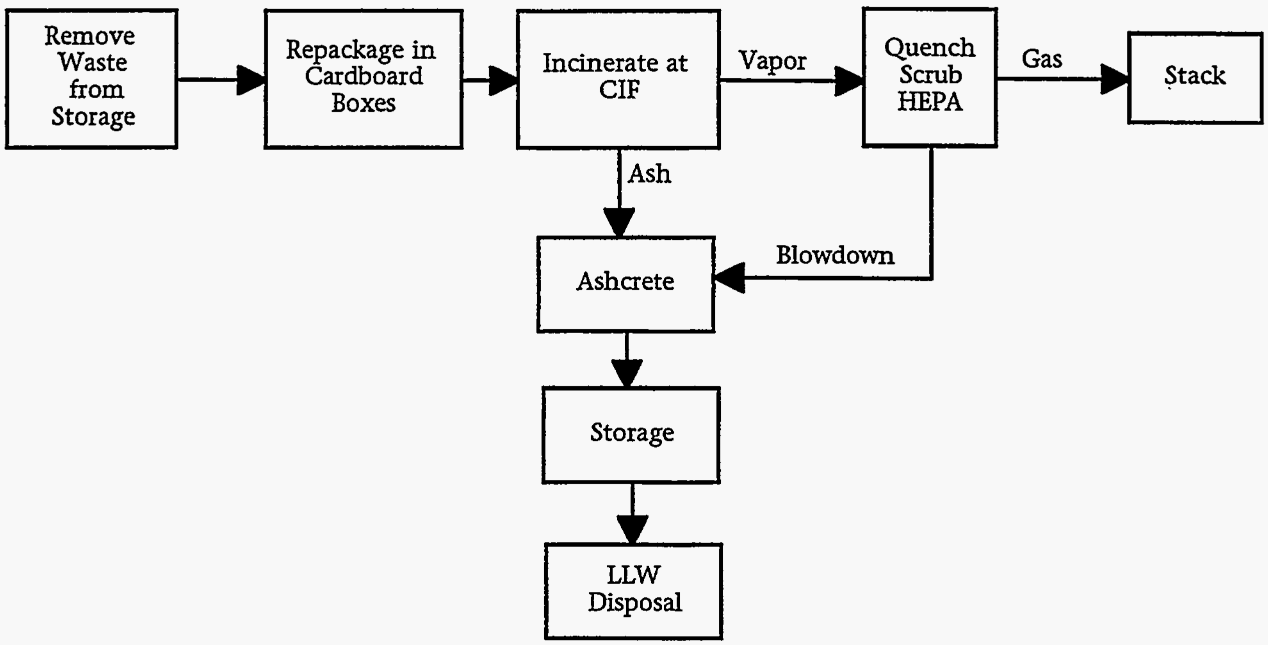
Waste Codes
- D006A (TCLP Cd)
- D008A (TCLP Pb)

LDR Treatment Standard
- D006 = concentration based standard = 1.0 mg/kg
- D008 = concentration based standard = 5.0 mg/kg

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is high since materials of construction are inherently hazardous. TCLP tests will be performed to verify hazardous characteristic.

Radiological Characterization
- Radioactive contamination for alpha and beta/gamma have been detected in analysis.
- Material was generated in a contamination area.

3.1.1.1.P.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Incineration at the CIF will be an appropriate treatment to destroy the plastic matrix (volume reduce) and stabilize the metals in ashcrete.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.P.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in the CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminant destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

SRS committed to reassess the evaluation of waste streams for which incineration originally had been determined to be the best and most practical treatment technology. 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) reevaluated the treatment of certain existing and future SRS wastes in the CIF. The review was structured to generally 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 are 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 groups originally designated for CIF and the additional mixed waste groups are most effectively treated by incineration.

Option Support Justification – IDOA Performed

- Incineration/Stabilization treatment train represents demonstrated technology which is known to be capable of meeting LDR treatment requirement for the waste codes listed for this waste stream.
- Treatment process results in significant volume reduction.
- Treatment option is an existing, onsite facility. No extra equipment or personnel required for waste processing.
- Utilization of existing treatment facility may minimize permit requirements resulting in faster treatment turn around time.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter 1997 subject to SCDHEC approval.

Technology

CIF is capable of treating this waste stream via volume reduction in the rotary kiln followed by stabilization of the metal in ashcrete. However, limits on the feed rate of cadmiun into the rotary kiln may make the treatment of this waste in CIF impractical. Analysis is ongoing.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

It is believed that a RCRA Part B Permit modification is not necessary in order to incinerate this waste at the CIF because the waste codes listed for this waste stream already are in the existing RCRA Part B Permit Application.

A treatment preparation step to repackage the waste to meet the CIF WAC is required. SRS does not believe the repackaging step is an activity requiring a permit; however, repackaging of waste already in storage must be performed in a permitted or interim status facility or via other appropriate regulatory coverage mechanism. Options for accomplishing this operation are being analyzed. One alternative may be to utilize mixed waste storage buildings for the repackaging step.

Preparation for Operation

A treatment preparation step to repackage the waste to meet the CIF Waste Acceptance Criteria is required. Further detail on where this operation will be accomplished is being analyzed.

3.1.1.1.P.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $2 million and $5 million.

Uncertainty Issues

This technology has been determined suitable for treating the hazardous constituent of the waste stream. However, the character of the waste in relation to the CIF WAC has not been fully analyzed.

3.1.1.1.Q Charleston Navel Shipyard Waste

3.1.1.1.Q.1 GENERAL INFORMATION

Waste Stream Numbers: CN-W001 and CN-W004

The preferred treatment option for the Charleston Navel Shipyard Waste (CNS) is Incineration followed by Stabilization at the Consolidated Incineration Facility (CIF)

Background Information

This waste stream is composed of Incinerable solids and debris containing potassium chromate and/or contaminated with chromium and/or lead generated from ship overhaul, decommissioning, and routine shipyard maintenance.

Volume
- Current volume $1.7m^3$.
- No future generation is expected as waste was generated in connection with base closure activities.

Throughout this document, waste volumes have been reported as of 9/30/95. However, for Charleston Naval Shipyard waste, the volume reported is the final volume generated by CNS and shipped to SRS in December 1995. The December (final) volume is reported to simply the status update for this waste.

Waste Codes
- D007 (TCLP Cr)
- D008A (TCLP Pb)

LDR Treatment Standard
- D007 = Concentration Based Standard = 5.0 mg/1
- D008 = Concentration Based Standard = 5.0 mg/l

Waste Characterization
- Process knowledge

Radiological Characterization
- Beta/Gamma emitters present
- Primary radionuclide constituent = Co^{60}
- Contact handled

3.1.1.1.Q.2 TECHNOLOGY AND CAPACITY NEEDS

The determination that the CIF is an appropriate treatment technology was a joint effort made during the draft phase of STP development by CNS and SRS personnel. Once it was decided that CIF was a viable option for the treatment of the CNS waste, SRS personnel evaluated the capability for CIF to actually treat the CNS waste based on chemical and radiological characterization compared with the CIF waste acceptance criteria.

Evaluation was also made to ensure that storage capacity was available for the CNS waste until CIF was ready to accept the waste for treatment.

Because the waste has a significant amount of combustible material present, the CIF treatment of incineration followed by stabilization is appropriate treatment meeting regulatory treatment standards by reducing the volume of the waste by incineration and treating the metals through stabilization.

The capacity limiting CIF subsystem for the entire CIF is the ashcrete unit. The ashcrete unit will have spare capacity even with the proposed addition of CIF blowdown. However, waste treatment rates at the CIF must be established so that volumes of ash and blowdown do not exceed the operating capacity of the ashcrete unit.

3.1.1.1.Q.3 TREATMENT OPTION INFORMATION

Thermal destruction of this waste in CIF followed by stabilization in the ashcrete process provides a treatment that is capable of meeting the treatment standards for the waste codes found in this waste stream. Since the waste is highly organic, initial incineration provides organic contaminate destruction and proper volume reduction in preparation for stabilization of the metals in the waste stream.

Facility Status

The CIF construction is virtually complete. Operational testing initiated in early 1995 continues, leading to the trial burn and commencement of operation. Start date to treat mixed waste is anticipated to be third quarter FY 97 subject to SCDHEC approval.

The Charleston Naval Shipyard currently is being closed. Completion of closure activities is anticipated by April, 1996. The CNS mixed waste was shipped to SRS on December 14, 1995. CNS waste is stored at a mixed waste storage building while SRS mixed waste is being treated in CIF. The schedule for treatment of CNS waste could be moved up, however, if it is found to be practical to treat this waste coincidentally with similar SRS mixed wastes.

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 Operating 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 has requested that SCDHEC evaluate the benzene NESHAP exemption issue.

Under the NEPA process, an Engineering 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 the 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.

NEPA activities associated with the shipment of the waste to SRS are the responsibility of CNS and must be completed prior to shipment. However, the SRS Waste Management

Environmental Impact Statement has addressed the impact of transportation of waste from offsite.

SRS is storing the waste from CNS at a mixed waste storage building (643-43E). Prior to the receipt of waste SRS modified its Interim Status Waste Analysis Plan for these buildings.

In preparation for the acceptance of other offsite mixed waste from Naval Reactors, SRS has submitted a RCRA Part B Permit modification to allow acceptance of other offsite wastes covered in the Site Treatment Plan and as provided in the Consent Order, 95-22-HW.

A preparation step to repackage the waste to meet the CIF WAC is required. If a size reduction step is necessary to enable waste components to fit into the 21 inch boxes for CIF, analysis will be performed to identify options and locations for accomplishing the work.

Preparation for Operation

Before waste from CNS was accepted at SRS, certification was made by SRS personnel that the CNS waste characterization is complete and in compliance with the CIF Waste Acceptance Criteria.

CNS waste will be repackaged into 21 inch cardboard boxes to facilitate treatment in CIF.

3.1.1.1.Q.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Cost for management and treatment of this waste stream will be charged back to CNS.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc) are identified or anticipated for this waste at this time.

3.1.1.2 F and H EFFLUENT TREATMENT FACILITY (ETF)

At the present time there are no new mixed waste streams awaiting treatment at 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 2, Section 2.6.1 of Volume II.

3.1.1.4 WASTE STREAM TREATED IN FILTER BUILDINGS

3.1.1.4.A SR-W020 In-Tank Precipitation (ITP) and Late Wash (LW) Filters

3.1.1.4.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W020

The preferred treatment option for In-Tank Precipitation (ITP) and Late Wash (LW) Filters is in situ treatment using an Acid Wash technology followed by placement in engineered stainless steel boxes under a treatability variance.

Background Information:

A future debris waste stream generated from the In-Tank Precipitation (ITP) and Late Wash (LW) processes which treat and separate radioactive 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 absorb strontium and plutonium. This precipitate is filtered by the ITP filters and refiltered in the LW process and is expected to eventually foul the filters, requiring their removal, treatment, and disposal. The filter consists of 144 sintered metal tubes. Each tube is 10 feet long and sits in an assembly measuring 14 feet long by 1.5 feet in diameter. The Late Wash process employs a filter identical to that in ITP, but functions to remove nitrates from the feed to DWPF.

Volume
- Expected 1996-2000 volume will be 48.9 m^3.

Waste Stream Composition
- Inorganic debris

Waste Code
- D009A (TCLP Hg)
- D018 (benzene)
- D036 (nitrobenzene)

LDR Treatment Standard
- D009 = concentration based standard = 0.2 mg/l
- D018* = concentration based standard = 10 mg/kg
- D036* = concentration based standard = 14 mg/kg
- Alternate debris technology may be applied.

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents may be present.

Waste Characterization
- Process knowledge 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 3400 Ci/filter per ITP filter, and 64 Ci per LW filter.
- Beta/gamma emitters are Cs^{137}, Cs^{134}, Sr^{90}, Tc^{99}, $Rü^{106}$, Sb^{125}, and I^{129}.
- Waste is remote handled.
- Mixed low-level waste

3.1.1.4.A.2 TECHNOLOGY AND CAPACITY NEEDS

Because of the radiological nature of the filter in its failed state, meeting LDR requirements was not feasible. As a result, SRS submitted a treatability variance for the ITP filters' portion of this stream. LW filters were incorporated into the design of the DWPF process after the ITP treatability variance was developed so an amendment to include the LW filters was required. A revision to add the LW filter to the treatability variance is was submitted to EPA-Region IV on September 28, 1995.

Since the ITP Facility has only recently started its normal operations, 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. The failure rate of the Late Wash filters is expected to be minimal since the composition of the stream is less turbid than the waste stream filtered through the ITP filter.

3.1.1.4.A.3 TREATMENT OPTION INFORMATION

The EPA approved treatment process for the ITP wastes includes; (1) acid leaching prior to disposal, to treat the 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 LW filters will be submitted to the EPA and a copy provided to SCDHEC.

Since the treatability variance was granted in October 1993, new information, based on simulant testing, has shown the waste to 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 to EPA Region IV. If approval is granted to amend the variance to include nitrobenzene, a general revision of the variance will be made, incorporating both the nitrobenzene and the LW filter and updating the regulatory citations and interpretations.

3.1.1.4.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

The ITP and LW Filters are a 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.

<u>Budget Status</u>

The conservative estimated cost to treat this waste stream is between $12 million and $27 million. The cost estimate has been prepared with more conservative assumptions in order to understand the full impact of treating all existing mixed waste. It is assumed that the ITP process will support the workoff of the entire current inventory and the five-year forecast generation of high-level mixed waste (SR-W016 and SR-W017). With this assumption, ITP and LW filters would be generated well beyond the five-year forecast generation period.

Uncertainty Issues

Uncertainties exist in regard to the waste generation rate of this future waste stream and its impact on budget requirements since the quantity of stainless steel containment boxes to be fabricated is not known. Also, the treatability variance must be amended to include information on the Late Wash Filters.

3.1.1.5 RECYCLING

3.1.1.5.A SR-W032 Mercury Contaminated Heavy Water

3.1.1.5.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W032

The preferred treatment option for Mercury Contaminated Heavy Water is recycling in the D-Area Heavy Water Operations Facility through utilization of an Ion Exchange resin.

Background Information:

This waste was generated in the Heavy Water Operations Laboratory during analytical testing where mercury (II) chloride was used in the testing procedure.

Volume

- Current volume through 09/30/95 is 6.6 m^3.
- No future waste generation is anticipated. However, similar waste may be generated through future decontamination and decommissioning work.

Waste Stream Composition

- Aqueous liquid

Waste Code

- D009A (TCLP Hg) wastewater

LDR Treatment Standard

- D009 = concentration based standard = 0.2 mg/l

Waste Characterization

- Sampling and analysis used to characterize the waste stream.
- Confidence level high is due to sample analysis results.

Radiological Characterization

- Calculated activity varies. Average reading is 290 nCi/g.
- Tritium is present.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.5.A.2 TECHNOLOGY AND CAPACITY NEEDS

The technology exists and the equipment is presently available at SRS to remove the mercury from this heavy water stream and allow the heavy water to be recycled for reuse. This not only provides a waste minimization solution for the management of this material, but meets the LDR standard for mercury treatment in a cost-effective manner.

This is a one-time waste treatment, and the heavy water component will be placed in the heavy water inventory at SRS. The D-Area Heavy Water Operations Facility has the capacity to handle, on the average, 55 gallons per day of the mercury-contaminated heavy water through the ion exchange equipment. The mercury-loading capacity of the ion exchange probe is directly related to the concentration of the contaminant to be removed.

Ion exchange and heavy water recycling processes exist in the D-Area facilities. SRS has been treating SR-W032 to take advantage of the facility's processing capability prior to shutdown (scheduled for FY 97). As of March 20, 1996, 21 drums of Mercury Contaminated Heavy

Water had been processed in the D-Area facilities. The number of drums of this waste stream remaining to be processed total approximately 30.

3.1.1.5.A.3 TREATMENT OPTION INFORMATION

Mercury will be removed through utilization of an ion exchange resin developed by the Savannah River Technology Center (SRTC). The resin chemically bonds metals including mercury so that they do not leach. The resin itself, because the metals do not leach, passes a TCLP test and can be disposed as nonhazardous, low-level radioactive waste when it is exhausted.

Some drums of Mercury Contamination Heavy Water contain a sludge that makes recycling of the heavy water more difficult. It is possible that a volume of heavy water will be accumulated that has a level of particulates high enough to make recycling in D-Area impractical. In the event a volume of Mercury Contaminated Heavy Water cannot be recycled in D-Area, SRS will re-evaluate treatment options and incorporate into STP as applicable.

Since the mercury-contaminated heavy water is being recycled rather than treated for disposal, a treatment permit is not required under RCRA regulations. However, storage of this material prior to recycling will be in a RCRA facility.

To avoid any difficulties associated with compliant storage of Mercury-Contaminated Heavy Water in D-Area only the number of drums capable of being processed in an operating day are being moved to D-Area. The current processing rate is one drum per day.

3.1.1.5.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The operational cost of this facility is variable. Its cost is based on the level of contamination that must be removed by the ion exchange probe. The probe itself has an operational capacity of one drum or 55 gallons of heavy water processed by ion exchange per day. It may be necessary in time to replace resin. The D-Area Heavy Water regeneration facility has done only a small amount of recycling activity through ion exchange. As a result, estimates are preliminary. Cost of treating the mercury-contaminated heavy water would come from the operating budget of the waste generator, Reactors Division.

The estimated cost to treat this waste stream is less than $100,000.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

3.1.1.6 WASTE STREAMS MEETING THE TREATMENT STANDARD.

All waste streams in this category are discussed in Chapter II of the Background Volume, Section 2.6.1.

3.1.1.7 WASTE STREAMS TREATED IN 90-DAY STAGING AREAS OR CONTAINMENT BUILDINGS

All the waste streams in this category are discussed in Chapter 2 of the Background Volume, Section 2.6.1.

Section 3.1.2 *Onsite Treatment in New Facilities*

3.1.2.1 M-AREA VENDOR TREATMENT

3.1.2.1.A SR-W005 Mark 15 Filtercake

3.1.2.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W005

The preferred treatment option for Mark 15 Filtercake is Stabilization by Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste stream is filtercake from the precipitation and filtration of slightly enriched uranium solution in M-Area. Waste was generated by treatment and precipitation of etching solution from metal plating operations on slightly enriched uranium slugs.

Volume
- Current volume through 09/30/95 is 15.4 m^3.
- There will be no future generation of this waste because the manufacturing process which generated this waste is no longer operational.

Waste Stream Composition
- Inorganic sludge/particulate

Waste Code
- F006 (metal plating waste sludge without cyanide), nonwastewater

LDR Treatment Standard
- F006 = concentration based standards = 0.19-5.0 mg/l

Waste Characterization
- Process knowledge and sampling and analysis used to characterize the waste.
- Confidence level is high based upon knowledge that the process generated a listed hazardous waste. Primary components are Ni 6.6% by weight, U 50% by weight (1.1% of the U is U^{235}).
- No direct TCLP result was performed on this waste stream but TCLP was performed on a similar waste stream.

Radiological Characterization
- Sampling results indicate total activity is 3.05 Ci.
- Alpha emitters are U^{234}, U^{235}, U^{236}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

The treatment standards for the F006 waste code in this waste stream are concentration based standards. The F006 constituent of concern in this waste stream is nickel. F006 often contains cyanides; however, SRS has never used cyanides, cadmium, silver, lead, or chromium in its metal plating activities.

This waste stream is one of the six original streams which served as a basis for the M-Area Vendor Treatment Facility design. The total volume of these wastes projected to need treatment is approximately 2.8 million kilograms. This waste type is not anticipated to be generated in the future since the source of the waste, M-Area Plating operations, has been shut down and is not expected to operate again at SRS. The vitrification facility will be designed to treat waste at a rate of 5000 kilograms per day of glass.

3.1.2.1.A.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area Sludge by the SRTC determined that either a cementatious matrix or a vitrification process was capable of producing a final wasteform capable of meeting the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process was the most cost-effective method and that it would create the most stable wasteform with the least volume generated.

<u>Facility Status</u>

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996.

<u>Technology</u>

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards.

<u>Regulatory Status</u>

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater Permit, with a March, 1995, SRS revision request, was issued July 10, 1995. SCDHEC approved an Air Quality Construction permit in September, 1994, and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit with a minor revision to the wastewater permit for the Liquid Effluent Treatment Facility
b. Closure of the M-Area PWIT/SF under wastewater regulations
c. RCRA Part A revision for Container Storage
d. SCDHEC Air Quality Permit for process emissions with modification

The NEPA documentation has been prepared and an EA conducted. A Finding of No Significant Impact (FONSI) was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. Approval of the transfer of storage capacity to M-Area was given by SCDHEC on 1/31/96.

<u>Preparation for Operation</u>

All required wastewater treatment permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994, for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment Facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 285 days of permit approvals. SCDHEC must approve commencement of operation through upgrading the M-Area Vendor Treatment Facility construction permits to operating permits. Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of six design basis waste streams intended to be treated by the M-Area Vendor Treatment Facility, and the Annual Operating Plan identifies sufficient funding to support the M-Area activities for fiscal years 96 and 97. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost to treat this waste stream is between $18 million and $24 million.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.B SR-W029 M-Area Sludge Treatability Samples

3.1.2.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W029

The preferred treatment option for M-Area Sludge Treatability Samples is Stabilization by Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste stream consists of stabilized sludge samples from the Process Waste Interim Treatment/Storage Facility of M Area that has been stabilized with cement, cement/fly ash/blast furnace slag, or by vitrification. Samples are generated during waste treatability studies to determine the formulation of the stabilized wasteform.

Volume
- Current volume through 09/30/95 is 1.0 m^3.
- Expected 1996-2000 volume will be 0.4 m^3. DSTP reported no future waste generation. Additional testing because of the STP process has been identified.

Waste Stream Composition
- Cemented solids/vitrified solids, contaminated crucibles, and glassware.

Waste Code
- F006 (metal plating waste, without cyanide)

LDR Treatment Standard
- F006 = concentration based standards = 0.19-5 mg/l

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based on total constituent analysis performed on the sludge and knowledge that the process generates a listed waste.
- The primary contaminant is Ni with Pb and Cr.

Radiological Characterization
- Typical activity is 11.3 nCi/g.
- Alpha emitters are U^{234}, U^{235}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.B.2 TECHNOLOGY AND CAPACITY NEEDS

SRS has never used cyanides, cadmium, silver, lead, or chromium in its metal plating activities. Cyanide, silver, and cadmium have not been detected while lead and chromium have been detected at about 100-2000 mg/kg (total constituent analysis).

This waste stream is one of the six original streams which served as a basis for the M-Area Vendor Treatment Process design. The total volume of these wastes projected to need treatment is approximately 2.8 million kilograms. This waste type is not anticipated to be generated in the future since the source of the waste, M-Area Plating operations, has been shut down and is not expected to operate again at SRS. The vitrification facility will be designed to treat waste at a rate of 5000 kilograms per day of glass.

3.1.2.1.B.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area Sludge by SRTC determined that either a cementatious matrix or a vitrification process was capable of producing a final wasteform capable of meeting the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process was the most cost-effective method and that it would create the most stable wasteform with the least volume generated.

Facility Status

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996.

Technology

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater Permit with a revision requested by SRS in March 1995, was issued July 10, 1995. SCDHEC approved an Air Quality Construction permit September 1994 and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to the wastewater permit in the Liquid Effluent Treatment Facility.
b. Closure of the M-Area PWIT/SF under wastewater regulation.
c. RCRA Part A revision for Container Storage
d. SCDHEC Air Quality Permit for process emissions with modifications.

The NEPA documentation has been prepared and an EA conducted. A FONSI was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. Approval of the transfer of storage capacity to M-Area was given by SCDHEC on 1/31/96.

Preparation for Operation

All required wastewater treatment permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994, for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment Facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 285 days of permit approvals. SCDHEC must approve commencement of operations through upgrading M-Area Vendor Treatment Facility construction permits to operating permits.

Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of six design basis waste streams intended to be treated by the M-Area Vendor Treatment Facility and the Annual Operating Plan identified sufficient funding to support the M-Area activities for FY 96 and 97. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost to treat this waste stream is included with the cost of SR-W005.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.C SR-W031 Uranium/Chromium Solution

3.1.2.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W031

The preferred treatment option for the Uranium/Chromium Solution waste stream is Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste stream is a combination of two one-time waste generations. A portion of the waste stream was generated by the Naval Fuels laboratory to assay uranium content by scintillation/Davis Gray procedure. It is a 2% solids solution in a glass container overpacked in a 55 gallon drum. Another portion of the waste stream is sludge which accumulated in stainless steel air ducts in the Naval Fuels Facility where uranium in the sludge caused a reaction with the stainless steel, liberating leachable chromium. This waste sludge is in two lined 55-gallon drums.

Volume
- Current volume through 09/30/95 is 0.6 m^3.
- No future waste generation expected because the manufacturing process (Naval Fuels) which generated this waste, is no longer operational.

Waste Stream Composition
- Aqueous liquid
- Inorganic sludge particulate

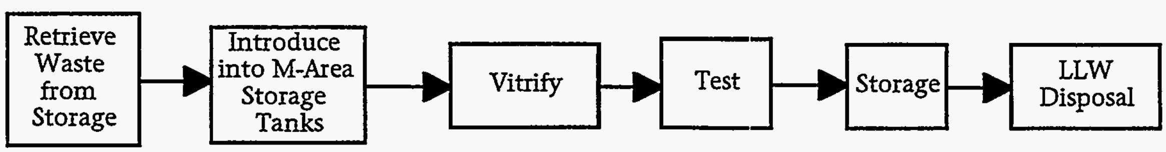
Waste Code
- D007 - (TCLP Cr)

LDR Treatment Standard
- D007 = Concentration based standard = 5.0 mg/l

Waste Characterization
- Process knowledge and sampling and analysis used to characterize the waste.
- Process knowledge was used to characterize laboratory waste stream via mass balance calculation.
- Confidence level is high because analysis was performed on the duct cleaning waste from Naval Fuels.

Radiological Characterization
- Total activity is 0.4 nCi/g.
- Alpha emitter is U^{235}
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.C.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. The treatment standard for chromium contaminated wastewater is 5.0 mg/l total composition, and 5.0 mg/l by TCLP test for the non-wastewater.

The M-Area Vendor Treatment Facility will be designed to treat waste at a rate of 5,000 kg/day of glass.

Since this waste stream was not generated in M-Area, it will be necessary to request a permit modification in order to treat this waste stream in the M-Area Vendor Treatment process. As part of a future permit application, it may be necessary to perform a treatability study on the waste streams as evidence of the acceptability of treatment in the vitrification process.

Since this waste stream is not on the original list for treatment in the M-Area Vendor Treatment Process, it was necessary to evaluate the impact of the addition of the uranium/chromium solution waste stream on the NEPA documentation. Because of its small volume and similar chemical characteristics it was determined that the addition of this waste to the M-Area Vendor Treatment Facility created no impact on the NEPA documentation.

This waste stream has been given a preliminary analysis by the M-Area project team and identified as being able to feed into the vitrification unit without modification to its construction or configuration.

3.1.2.1.C.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area waste streams by the Savannah River Technology Center determined that either a cementatious matrix of a vitrification process was capable of producing a final waste form which would meet the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process would create the most stable waste form, with the least volume and was the most cost effective.

In addition to the volume of this waste stream, there are six original waste streams at M-Area which have vitrification in the M-Area Vendor Treatment Facility as the preferred treatment option. The total volume of these wastes projected to need treatment is approximately 2.8 million kg. This waste type is not anticipated to be generated in the future since the source of the waste, Naval Fuels, has been shut down and is not expected to operate again.

<u>Option Support Justification - IDOA Performed</u>

- Treatment option produces a very stable waste form that requires no additional treatment for disposal.
- Treatment results in extensive waste volume reduction of greater than 5:1.
- Treatment option utilizes an existing on site treatment facility.

<u>Facility Status</u>

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996. However. the vendor contract will need to be modified to include this as well as the other additional wastes identified for treatment in M-Area.

Technology

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards. Due to the similar nature of this waste stream, technical analysis has determined that M-Area Vendor treatment is a suitable treatment method for this waste and the resulting treatment residual will meet LDR treatment standards.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater permit was issued July 10, 1995. The permit contained a revision requested by SRS in March 1995 that included provision for introducing the Uranium/Chromium Solution into the M-Area waste streams. SCDHEC also approved the Air Quality Construction permit in September 1994 and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to the wastewater permit for the Liquid Effluent Treatment Facility.
b. Closure of the M-Area PWIT/SF under wastewater regulation
c. Container Storage Permit (either expansion under SRS Part A Interim Status, or a Part B Permit)
d. SCDHEC Air Quality Permit for Process Emissions with modifications

The NEPA documentation has been prepared and EA conducted. A FONSI for the M-Area Vendor Treatment Facility was issued on August 1, 1994.

Preparation for Operation

All required permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994 for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on 3/27/95. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 285 days of permit approvals. SCDHEC must approve commencement of operation through upgrading the M-Area Vendor Treatment Facility construction permits to operating permits. Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Negotiations will need to be reopened with the vendor to address the additional waste streams identified by the DSTP. Funding for treating the M-Area wastes via vitrification has already been budgeted.

The estimated cost to treat this waste stream is $20,000.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.D SR-W037 M-Area Plating Line Sludge

3.1.2.1.D.1 GENERAL INFORMATION

Waste Stream Number: SR-W037

The preferred treatment option for M-Area Plating Line Sludges is Stabilization by Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste stream is an inorganic sludge generated from the treatment of M-Area production wastewaters and supernate containing elevated quantities of metals (mostly nickel) in the M-Area Dilute LETF. The sludge is currently stored in the Process Waste Interim Treatment/Storage Facility (PWIT/SF). On June 28, 1994, waste stream SR-W054, Enriched Uranium Contaminated with Lead, was added to this waste stream. A study has shown that M-Area Vendor Treatment Process can treat the SR-W054 waste to meet treatment standards for lead. However, since the lead in SR-W054 is also a component that is found in F006, and since the F006 treatment standard for lead is lower, the waste code for SR-W054 is not listed here. SR-W004 M-Area Plating Line Sludge from Supernate Treatment has been combined with this waste stream. Since they are stored in common tanks the two waste streams are inseparable. In addition this stream will include sludges from decontamination of M-Area remediation equipment.

Volume
- Current volume through 09/30/95 is 2503 m^3.
- No new plating line sludge will be generated, but additional waste volume will be added in FY 96 and 97 due to rinsing and cleaning of the storage tanks and decontamination of M-Area remediation equipment. Expected 1996 to 1997 volume will be 40 to 80 m^3.

Waste Stream Composition
- Inorganic sludge/particulate

Waste Code
- F006 (metal plating line waste without cyanide) nonwastewater

LDR Treatment Standard
- F006 = concentration based standards = 0.19-5.0 mg/l

Waste Characterization
- Process knowledge and sampling and analysis used to characterize the waste.
- Confidence level high based on availability of analytical results and knowledge that the process generates a listed hazardous waste.

Radiological Characterization
- Total activity is 3.79 uCi/kg.
- Alpha emitters are U^{234}, U^{235}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.D.2 TECHNOLOGY AND CAPACITY NEEDS

The treatment standards for the F006 waste code in this waste stream are concentration based standards. They include 0.37 mg/l for lead, 0.86 mg/l for chromium, and 5.0 mg/l for nickel. F006 often contains cyanides. However, SRS has never used cyanides, cadmium, silver, lead, or chromium in its metal plating activities. Cyanide, silver, and cadmium have not been detected while lead and chromium have been detected at about 100-2000 mg/kg (total constituent analysis).

This waste stream is one of the six original streams which served as a basis for the M-Area Vendor Treatment Facility design. The total volume of these wastes projected to need treatment is approximately 2.8 million kilograms. This waste type is not anticipated to be generated in the future since the source of the waste, M-Area Plating operations, has been shut down and is not expected to operate again at SRS. The vitrification facility will be designed to treat waste at a rate of 5000 kilograms per day of glass.

3.1.2.1.D.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area Sludge by SRTC determined that either a cementatious matrix or a vitrification process was capable of producing a final wasteform capable of meeting the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process was the most cost-effective method and that it would create the most stable wasteform with the least volume generated.

Facility Status

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996.

Technology

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater Permit with a revision requested by SRS in March 1995, was issued July 10, 1995. SCDHEC approved an Air Quality construction permit September 1994, and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to the wastewater permit for the Liquid Effluent Treatment Facility
b. Closure of the M-Area PWIT/SF under wastewater regulations
c. RCRA Part A Permit for Container Storage
d. SCDHEC Air Quality Permit for process emissions with modifications

The NEPA documentation has been prepared and an EA conducted. A FONSI was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. Approval of the transfer of storage capacity to M-Area was given to SCDHEC on 1/31/96.

Preparation for Operation

All required wastewater treatment permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994, for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment Facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 225 days of permit approvals. SCDHEC must approve commencement of operation through upgrading the M-Area Vendor Treatment Facility construction permits to operating permits. Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.D.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of six design basis waste streams intended to be treated by the M-Area Vendor Treatment Facility, and the Annual Operating Plan identifies sufficient funding to support M-Area activities for FY 96 and 97. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost to treat this waste stream is included with the cost of SR-W005.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.E SR-W038 Plating Line Sump Material

3.1.2.1.E.1 GENERAL INFORMATION

Waste Stream Number: SR-W038

The preferred treatment option for M-Area Plating Line Sump Material is Stabilization by Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

A mixed waste stream generated as a one time clean out of the sump at a building in M Area.

Volume
- Current volume through 09/30/95 is 0.4 m^3.
- No future waste generation is expected because manufacturing process which generated this waste is no longer operational.

Waste Stream Composition
- Inorganic sludge

Waste Code
- D007 (TCLP Cr) nonwastewater

LDR Treatment Standard
- D007 = concentration based standard = 0.86 mg/l

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based on availability of analytical results.

Radiological Characterization
- Total activity is less than 10 nCi/g.
- Alpha emitters are U^{234}, U^{235}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.E.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream is one of the six original streams which served as a basis for the M-Area Vendor Treatment Process design. The total volume of these wastes projected to need treatment is approximately 2.8 million kilograms. This waste type is not anticipated to be generated in the future since the source of the waste, M-Area Plating operations, has been shut down and is not expected to operate again at SRS. The vitrification facility will be designed to treat waste at a rate of 5000 kilograms per day of glass.

3.1.2.1.E.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area Sludge by SRTC determined that either a cementatious matrix or a vitrification process was capable of producing a final wasteform capable of meeting the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process was the most cost-effective method and that it would create the most stable wasteform with the least volume generated.

Facility Status

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996.

Technology

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater Permit with a revision requested by SRS in March 1995, was issued July 10, 1995, SCDHEC approved an Air Quality construction permit September 1994, and approved a revision on July 28, 1995

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to the wastewater permit for the Liquid Effluent Treatment Facility
b. Closure of the M-Area PWIT/SF under wastewater regulations
c. RCRA Part A revision for Container Storage
d. SCDHEC Air Quality Permit for process emissions with modifications

The NEPA documentation has been prepared and an EA conducted. A FONSI was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. Approval of the transfer of storage capacity to M-Area was given by SCDHEC or 1/31/96.

Preparation for Operation

All required wastewater treatment permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994, for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment Facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 285 days of permit approvals. SCDHEC must approve commencement of operation through upgrading the M-Area Vendor Treatment Facility construction permits to operating permits. Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.E.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of six design basis waste streams intended to be treated by the M-Area Vendor Treatment Facility, and the Annual Operating Plan identifies sufficient funding to support the M-Area activities for FY 96 and 97. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost to treat this waste stream is included with the cost of SR-W005.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.F SR-W039 Nickel Plating Line Solution

3.1.2.1.F.1 GENERAL INFORMATION

Waste Stream Number: SR-W039

The preferred treatment option for M-Area Nickel Plating Line Solution is Stabilization by Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste is plating line solution generated by the shut down of the M-Area process line.

Volume
- Current volume through 09/30/95 is 5.0 m^3.
- No future waste generation is expected because the manufacturing process which generated this waste is no longer operational.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002B (corrosive nonwastewater)
- D008A (TCLP Pb) wastewater

LDR Treatment Standard
- D002 = specified technology = Deactivation
- D008 = concentration based standard = 0.37 mg/l
- California list = render non-liquid

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high because EP toxicity test was run.
- No TCLP was performed.
- The primary contaminant is Ni with trace amounts of Pb.

Radiological Characterization
- Total activity is 6.56×10^{-5} Ci.
- Alpha emitters are U^{234}, U^{235}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.F.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream is a California list waste due to high nickel content. Treatment by vitrification will render the waste non-liquid thereby satisfying the California list restriction.

This waste stream is one of the six original streams which served as a basis for the M-Area Vendor Treatment Facility design. The total volume of these wastes projected to need treatment is approximately 2.8 million kilograms. This waste type is not anticipated to be generated in the future since the source of the waste, M-Area Plating operations, has been shut down and is not expected to operate again at SRS. The vitrification facility will be designed to treat waste at a rate of 5000 kilograms per day of glass.

3.1.2.1.F.3 TREATMENT OPTION INFORMATION

Treatability studies performed on the M-Area Sludge by SRTC determined that either a cementatious matrix or a vitrification process was capable of producing a final wasteform capable of meeting the LDR requirements. Requests for bids were made to vendors capable of treating the waste stream using either method. It was determined that the vitrification process was the most cost-effective method and that it would create the most stable wasteform with the least volume generated.

Facility Status

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996.

Technology

Treatability demonstrations on the originally identified M-Area wastes have proven the technology to be reliable and able to treat the physical waste matrix types identified to meet LDR treatment standards.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater permit with a revision requested by SRS in March 1995, was issued July 10, 1995. SCDHEC approved an Air Quality construction permit September 1994 and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to wastewater permit for the Liquid Effluent Treatment Facility
b. Closure of the M-Area PWIT/SF under wastewater regulations
c. RCRA Part A revision for Container Storage
d. SCDHEC Air Quality Permit for process emissions and modifications

The NEPA documentation has been prepared and an EA conducted. A FONSI was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. Approval of the transfer of storage capacity to M-Area was given by SCDHEC on 1/31/96.

Preparation for Operation

All required wastewater treatment permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994, for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the Vendor Treatment Facility. SCDHEC approved revised wastewater construction permit application on July 10, 1995. Treatment of the M-Area LDR wastes (i.e., preparation of the initial homogeneous feed batch for the stabilization unit) is targeted to begin within 285 days of permit approvals. SCDHEC must approve commencement of operation through upgrading the M-Area Vendor Treatment Facility construction permits to operating permits. Delay in approval of any of the required operating permits could delay the startup of the treatment process.

3.1.2.1.F.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This waste stream is one of six design basis waste streams intended to be treated by the M-Area Vendor Treatment Facility and the Annual Operating Plan identifies sufficient funding to support the M-Area activities for FY 96 and 97. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost to treat this waste stream is included with the cost of SR-W005.

Uncertainty Issues

No uncertainties (technical, budgetary, permitting, etc.) are identified for this waste stream at this time.

3.1.2.1.G Soils From Spill Remediation

3.1.2.1.G.1 GENERAL INFORMATION

Waste Stream Number: SR-W048

The preferred treatment option for the Soils From Spill Remediation waste stream is Vitrification in the M-Area Vendor Treatment Facility.

Background Information:

This waste consists of soils, sand, and associated debris (rocks, wood, etc.) resulting from cleanup activities of spills surrounding operations. This waste stream does not include any soils to be addressed in the Environmental Restoration program.

Volume

- Current volume through 09/30/95 is 16.8 m^3.
- No future waste generation expected; however, if a spill occurs, current volume would increase.

Waste Stream Composition

- Uncategorized soils

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 (Silvex)
- D018 (Benzene)
- D019 (Carbon Tetrachloride)
- D020 (Chlordane)
- D021 (Chlorobenzene)
- D022 (Chloroform)
- D023 (o-Cresol)
- D024 (m-Cresol)
- D025 (p-Cresol)
- D026 (Cresylic Acid)
- D027 (p-Dichlorobenzene)
- D028 (1, 2-Dichloroethane)
- D029 (1, 1-Dichlorethylene)
- D030 (2, 4-Dinitrotoluene)
- D031 (Heptachlor & Heptachlor Epoxide)
- D032 (Hexachlorobenzene)
- D033 (Hexachlorobutadiene)
- D034 (Hexachloroethane)
- D035 (Methyl Ethyl Ketone)
- D036 (Nitrobenzene)

- D037 (Pentachlorophenol)
- D038 (Pyridine)
- D039 (Pentachloroethylene)
- D040 (Trichloroethylene)
- D041 (2, 4, 5-Trichlorophenol)
- D042 (2, 4, 6-Trichlorophenol)
- D043 (Vinyl Chloride)

LDR Treatment Standard

- D004 = concentration based standard = 5.0 mg/l
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1.0 mg/l,
- D007 = concentration based standard = 5.0 mg/l,
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D010 = concentration based standard = 5.7 mg/l
- D011 = concentration based standard = 5.0 mg/kg
- 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 = 10.0 mg/kg
- D017* = concentration based standard = 7.9 mg/kg
- D018* = concentration based standard = 10 mg/kg
- D019* = concentration based standard = 6.0 mg/kg
- D020* = concentration based standard = 0.26 mg/kg
- D021* = 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
- D027* = concentration based standard = 6.0 mg/kg
- D028* = concentration based standard = 6.0 mg/kg
- D029* = 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* = concentration based standard = 7.4 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
- D041* = concentration based standard = 7.4 mg/kg
- D042* = concentration based standard = 7.4 mg/kg
- D043* = concentration based standard = 6.0 mg/kg

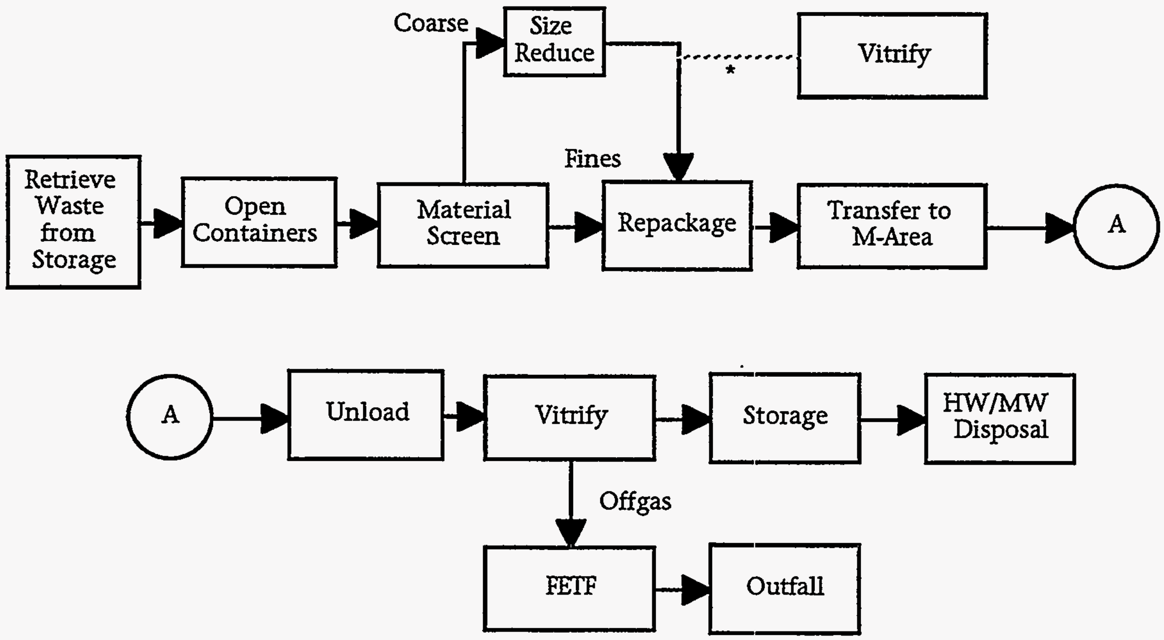
*D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards (UTS) for any underlying constituents that may be present.

Waste Characterization

- Process knowledge used to characterize the waste stream.
- Confidence level is high based on process knowledge of what was spilled or located at a particular site.

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

3.1.2.1.G.2 TECHNOLOGY AND CAPACITY NEEDS



* It may be possible to transfer waste as a slurry directly to the vitrification unit.

3.1.2.1.G.3 TREATMENT OPTION INFORMATION

Option Support Justification - IDOA Performed

- The preferred option represents known, demonstrated technology capable of treating waste to comply with LDR requirements.
- Treated waste results in a highly stable waste form suitable for disposal.
- The treatment option produces a significantly volume reduced waste form with a volume reduction of between 5:1 and 1:1.
- The treatment option is an existing, onsite facility. Treatment of this waste stream will not require additional equipment or operating personnel.
- The treatment represents a cost effective option.

Facility Status

The M-Area Vendor Treatment Facility is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. Construction under the approved Industrial Wastewater Permit started July 14, 1995. Systems testing was initiated in December 1995. Construction was completed in January 1996. The additional stream has been given a preliminary analysis by the M-Area project team and identified as being able to feed into the vitrification melter without modification to the melter's construction or configuration. However, the Vendor contract will need to be modified to include this as well as the other additional wastes identified for treatment in M-Area.

Technology

Treatability demonstrations on the original M-Area wastes have proven the technology to be reliable and able to facilitate the physical waste matrix types identified. Technical analysis has shown that the soils waste stream is amenable to treatment in compliance with RCRA-LDR requirements in the M-Area Vitrification facility. However, additional treatability studies will be needed for soils to verify feasibility and validate loading rates. Additional characterization will also be necessary to establish specific containment levels.

Regulatory Status

SCDHEC has permitted the treatment of waste in the M-Area Vendor Treatment Facility by an industrial wastewater permit. The vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and a part of that treatment train is permitted as an industrial wastewater facility. The Industrial Wastewater permit was issued July 10, 1995. The permit contained a revision requested by SRS in March, 1995 that included provisions for introducing additional wastes. Further revision will be needed in the wastewater permit to include processes to size reduce or homogenize the waste stream and transport it, probably by slurry, to the vitrification unit.

SCDHEC also approved the Air Quality Construction permit in September, 1994 and approved a revision on July 28, 1995.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit and minor revision to the wastewater permit for the Liquid Effluent Treatment Facility.
b. Closure of the M-Area PWIT/SF under wastewater regulation.
c. Container Storage Permit (either expansion under SRS RCRA Part A Interim Status, or a Part B Permit)
d. SCDHEC Air Quality Permit for process emissions with modification

The NEPA documentation has been prepared and an EA conducted for the design basis M-Area mixed waste streams. A FONSI was issued on August 1, 1994 for these wastestreams. Further evaluation will be needed to determine if the treatment of the soils wastestream in the M-Area Facility Vendor Treatment Facility creates an impact on the original NEPA analysis.

Since this waste stream was not identified in the original industrial wastewater permit application made for the M-Area Vendor Treatment Facility, it will be necessary to request a permit modification in order to treat this waste stream in the M-Area Vendor Treatment Process. As a part of the permit application, or in place of a formal permit modification, it will be requested that SRS perform a treatability study on the waste stream as evidence of the acceptability of treatment in the vitrification process.

Preparation for Operation

All required permit applications for treating the M-Area plating sludges and solutions were submitted on June 24, 1994 for the original scope (six streams). A revised wastewater permit application was submitted to SCDHEC on March 27, 1995. The revised wastewater permit application included a modified off-gas treatment process for the treatment facility. SCDHEC approved the revised wastewater construction permit application on July 10, 1995. Additional permit modifications are required if the soils waste is to be treated in the M-Area Vendor Treatment Facility.

3.1.2.1.G.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Negotiations will need to be opened with the Vendor to address the additional waste streams. Funding for characterization, documentation and permitting has already been budgeted. Funding for treatment has not been authorized.

The estimated cost to characterize and treat this waste stream is approximately $500,000 to $1,000,000.

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

Applicability of additional evaluation under NEPA creates uncertainty related to budget and schedule for this treatment option.

Until characterization and treatability work is complete, uncertainty exists regarding the suitability of vitrification in the M-Area Vendor Treatment Facility as a preferred treatment option for the waste stream.

Uncertainty exists regarding approval for treatment of this waste stream under the industrial wastewater permit for M-Area. SRS must demonstrate to the satisfaction of SCDHEC that this waste stream can be treated in M-Area facilities to meet the regulatory standards. If approval is denied budget and schedules for the treatment of this waste stream will be impacted while alternative permitting strategies are being developed and submitted.

Section 3.1.3 Onsite Treatment in Planned Facilities

3.1.3.1 REGULATED STORAGE OR CONTAINMENT BUILDING TREATMENT FACILITIES

3.1.3.1.A SR-W009 Silver Coated Packing Material

3.1.3.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W009

The preferred treatment option for Silver Coated Packing Material is Macroencapsulation in a steel box at one of the existing regulated storage facilities by means of a treatability variance.

Background Information:

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 iodine^{129} and iodine^{131} 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 elevate 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
- Current volume through 09/30/95 is 9.86 m^3.
- Expected 1996-2000 volume will be 3.1 m^3.

The volume as of 9/30/95 has been revised downward by .3 m^3. The revision is due to an in-depth review of the documentation concerning this waste stream. The review was performed pursuent to a DOE assessment and involved only a re-calculation. There was no physical change in the prior year's inventory.

Waste Stream Composition
- Uncategorized inorganic particulate

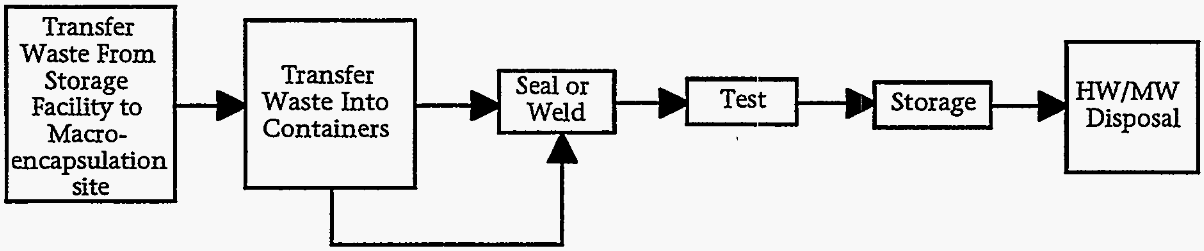
Waste Code
- D011 (TCLP Ag) Nonwastewater
- D008C (Elemental Pb)

LDR Treatment Standard
- D011 = concentration based standard = 5.0 mg/l
- D008 = specified technology = Macroencapsulation

Waste Characterization
- No analysis due to ALARA concerns but silver value calculated.
- Process knowledge used to characterize waste stream.
- Confidence level high due to knowledge of silver content on the saddles

Radiological Characterization
- Beta/gamma emitters present.
- Volatile Radionuclides iodine^{129} and iodine^{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

3.1.3.1.A.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. Lead present in the boxes for shielding purposes is radioactive elemental lead and will be disposed of along with the silver coated packing material. Although both canyon facilities used mercuric nitrate in some of their metal dissolution, it is highly improbable the silver coated packing material would fail for TCLP mercury. Calculations show that under very worst case conditions, the H-Canyon silver coated packing material saddles approach a value for mercury that might fail TCLP. Since this calculation did not take the operating parameters of the iodine reactor into account, technical assessment concludes the packing material failing for TCLP mercury is highly improbable. To qualify as a debris, the material must be in excess of 60-mm in size. The silver coated packing material does not meet the size criteria although they meet other requirements to be considered as debris (i.e., manufactured product). The preferred option selection includes the need for a treatability variance. Other preferred options were not relying on a treatability variance since one of the DSTP assumptions is that the treatment will meet the LDR standards. However, in this instance, preparation of a variance had already been initiated to allow for macroencapsulation. Because of the high-level of radioactive contamination, it is not practical to handle this waste stream directly. The radioactive lead will also be included in the treatability variance application. The lead had been declared waste prior to inclusion as shielding. As a result, the lead shielding and the silver coated packing material require the treatability variance. Approval of a treatability variance to manage this waste stream would allow immobilization of a highly radioactive waste to be recognized as meeting a RCRA LDR treatment.

3.1.3.1.A.3 TREATMENT OPTION INFORMATION

The treatability variance request will ask for approval to treat the Silver Coated Packing Material 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.

<u>Option Support Justification – IDOA Performed</u>

- 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 be performed. Since welding will be required on some containers, fire hazards and ventilation may be concerns.

Technology

Macroencapsulating in a steel container is a simple function which can be performed at a regulated storage facility safely and easily.

Regulatory Status

A treatability variance is being prepared to petition EPA that silver coated packing material 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 of 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 given treatment. 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.

Preparation for Operation

Macroencapsulation 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.

3.1.3.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Presently there is no funding allocation for the treatment of this waste stream. Development of line item funding will be required before waste treatment can be performed.

The estimated cost to treat this waste stream is between $2 million and $3 million.

Uncertainty Issues

This waste does 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 this waste stream. 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 the treatability variance will have a significant impact on the preferred option, budget, and schedule for the treatment of this waste.

Uncertainty exists regarding the location for macroencapsulation 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 Silver Coating 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 this waste in an existing building under the Containment Building option.

3.1.3.1.B SR-W060 Tritiated Water with Mercury

3.1.3.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W060

The preferred treatment option for the Tritiated Water with Mercury is the submittal of a variance request to the EPA for approval that the waste in its present condition, seal welded in a stainless steel container, is properly treated and no further action is required to meet treatment standards.

Background Information:

Waste is highly tritiated heavy water with a small amount of mercury that has been adsorbed on silica gel. Waste resulted from a single incident of a weld failure in a retired thermal diffusion column. Waste is contained in a welded stainless steel container, known colloquially as a "fat boy" and is characterized as 17 liters of highly tritiated water, 3 or 4 ml of elemental mercury, and 50 kg of silica gel. However, there are no free liquids in this container.

Volume
- Current volume through 09/30/95 is 0.2 m^3
- No future waste generation expected; this waste resulted from a spill incident.

Waste Stream Composition
- Inorganic particulate

Waste Code
- D009A (TCLP Hg)

LDR Treatment Standard
- D009 = concentration based standard = 0.2 mg/l

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

Radiological Characterization
- 13,200 Ci of tritium

3.1.3.1.B.2 TECHNOLOGY AND CAPACITY NEEDS

The tritiated water and the 3 to 4 droplets of mercury are adsorbed on silica gel. Because the heavy water is highly tritiated, a TCLP would not have been run on the waste at the time of generation. Heating to desorb the water for wastewater treatment or mercury separation techniques is hindered due to the high-level of tritium that will be released, once the container is opened.

Current technology does not have a method which tritium can be released from the waste and recaptured without the high risk of a tritium release to the atmosphere, once the container is opened. Tritium has a half life of 12 years and given the high tritium level of 13,200 curies would take almost 100 years to have the tritium decay to under 50 curies. Discussion was held with SCDHEC concerning the capability of approving a treatment alternative of macroencapsulation for this waste stream through the Site Treatment Plan approval process. It was determined that approval of a treatability variance request by the EPA will be required.

Facility Status

The waste presently meets macroencapsulation. No other treatment is required, if the SRS treatability variance for this waste is approved.

Technology

Welding stainless steel is a well-known technology.

3.1.3.1.B.3 TREATMENT OPTION INFORMATION

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 will develop a treatability variance request for macroencapsulating the current package in place of the concentration based standard of 0.2 mg/l. The request will be submitted to the EPA for review and approval per the schedule in Volume I of the PSTP.

3.1.3.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The cost estimate for treating this waste stream is less than $760,000.

Uncertainty Issues

If the treatability variance is not approved for this waste stream, the preferred option is no longer valid. Additional technical analysis will be required.

3.1.3.2 VENDOR

3.1.3.2.A SR-W062 Low-Level Contaminated Debris

3.1.3.2.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W062

The preferred treatment option for the Low-Level Contaminated Debris is Macroencapsulation in Polymer by a Vendor. This option will share facilities with the preferred option of waste stream SR-W069.

Background Information:

This waste stream consists of non-combustible debris (metal, floor tiles, fluorescent light bulbs, broken thermometers, instruments, and other equipment including nonincinerable 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. Future generation may include wastes generated by CIF.

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 other waste streams shredded in preparation for treatment by incineration, during the shredding of the job control waste. No volume has been added for this waste stream component yet because the shredding process began after the 9/30/95 Mixed Waste Inventory Report Update. The sorting/shredding process is incomplete and accurate figures concerning the volume of waste to be transferred form SR-W055 to SR-W062 are unavailable.

Volume
- Current volume through 09/30/95 is 6.2 m^3.
- Expected 1996-2000 generation volume will be 81 m^3.

Waste Stream Composition
- Inorganic debris

Waste Code
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg) Nonwastewater
- F006 (metal plating waste without Cyanide) Nonwastewater

Waste from CIF could contain any or all of the waste codes that are fed to CIF. The CIF RCRA Part B permit should be consulted for the complete listing.

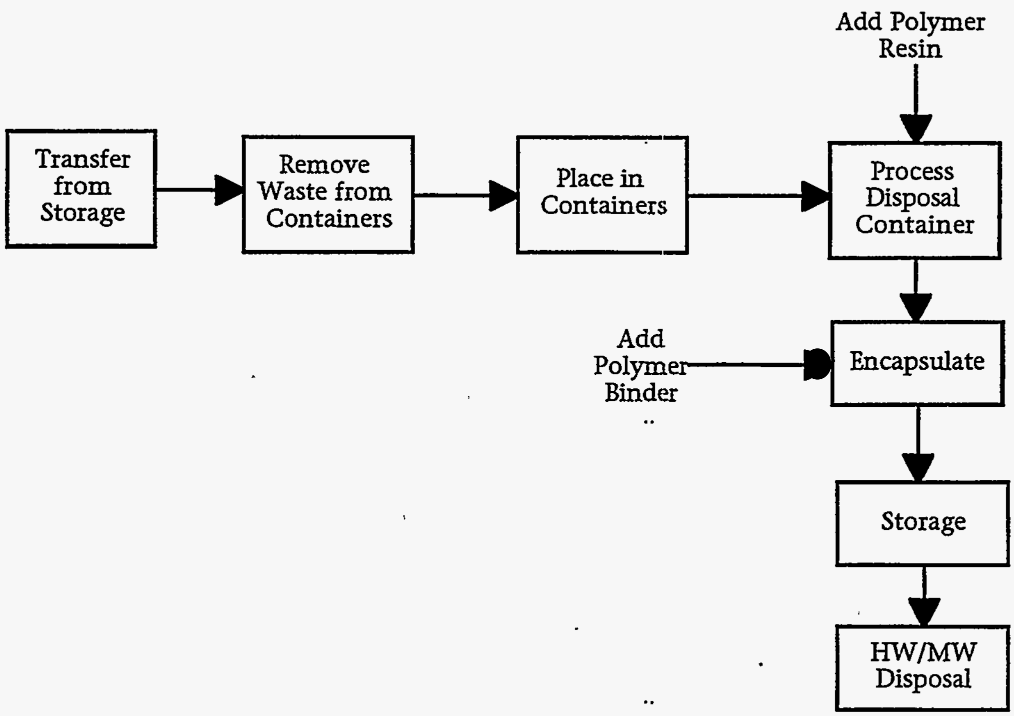
LDR Treatment Standard
- D006 = concentration based standard = 1.0 mg/l
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- F006 = concentration based standard = 0.19-5.0 mg/l
- Alternative debris technology may be applied.

Waste Characterization
- Process knowledge 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

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.

3.1.3.2.A.2 TECHNOLOGY AND CAPACITY NEEDS



This material qualifies as debris under the land disposal regulations because its particle size is larger than 60 mm and it is a manufactured object. The preferred option of Macroencapsulation meets the Debris Rule LDR treatment standard.

3.1.3.2.A.3 TREATMENT OPTION AND SUPPORT DATA

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

Treatment of this waste stream in an onsite containment building requires compliance with 40 CFR Part 264 or 265 Subpart DD of the RCRA regulations.

This option is preferred because:
- Few or no secondary wastes 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.
- Treatment is cost-effective.

NOTE: All or part of this waste stream is being considered by SRS for inclusion in a polymer macroencapsulation demonstration project at Envirocare of Utah. SRS anticipates that by late FY 96 a decision will be made concerning specific SRS wastes that will be provided for the Envirocare demonstration. SRS will keep SCDHEC informed of the status of the Envirocare demonstration project.

Facility Status

For waste in permitted storage, a containment building at a minimum must be identified, the refurbishments specified, the construction work completed, and permits granted.

Technology

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

Regulatory Status

SCDHEC will be requested to approve a RCRA Part B permit application for a containment building to house the polymer macroencapsulation process.

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.

3.1.3.2.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream in the same facility as waste SR-W069 is between $1.6 million and $3.6 million.

Uncertainty Issues

No technical uncertainties were identified for either waste treatment or radiological concerns.

Future wastes, similar to this stream, are anticipated to be generated as a result of Environmental Restoration, Transition, and D&D activities.

3.1.3.2.B SR-W069 Low-Level Waste (LLW) Lead – to be Macroencapsulated

3.1.3.2.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W069

The preferred option for the Low-Level *Waste (LLW) Lead – to be Macroencapsulated waste stream is Macroencapsulation in polymer onsite by vendor treatment.*

Background Information:

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 and aprons and equipment containing lead solder.

Volume
- Current volume through 09/30/95 is 74.1 m^3.
- Expected 1996-2000 volume will be 15 m^3.

Waste Stream Composition
- Elemental lead
- Non-elemental lead
- Lead acid batteries from radiological areas (less than 1% of the waste stream)

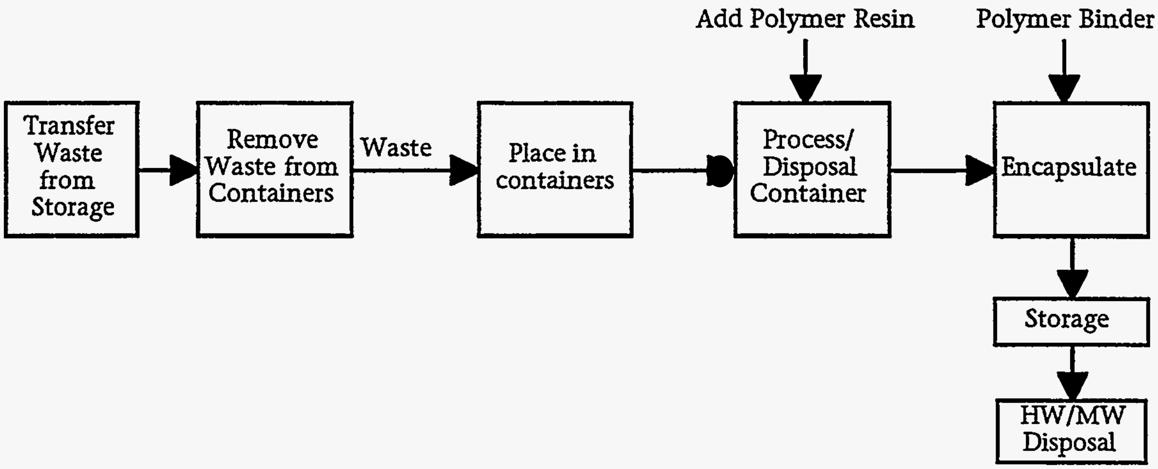
Waste Code
- D008A (TCLP Pb)
- D008B (lead acid batteries)
- D008C (elemental Pb)

LDR Treatment Standard
- D008 = concentration based technology = 5 mg/l; or specified technology = Thermal recovery of lead in secondary lead smelters for lead acid batteries or macroencapsulation for radioactive elemental lead

Waste Characterization
- Process knowledge 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

3.1.3.2.B.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. The lead in this waste stream 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 the waste stream's volume is drained lead batteries from RMMAs. The specified technology for this portion of the waste stream is recovery of lead. Due to potential contamination of the batteries, it is uncertain that recovery of lead from this waste stream is a viable option. SRS will be seeking approval to macroencapsulate the lead acid batteries along with the other waste lead by means of a request for treatability variance submitted to EPA.

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

3.1.3.2.B.3 TREATMENT OPTION INFORMATION

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.

The location for vendor treatment is to be determined.

SRS proposes to treat this waste in a containment building that complies with 40 CFR part 264 or 265 Subpart DD of the RCRA regulations. SRS anticipates treatment and storage for macroencapsulation of this waste stream will be covered by a RCRA Part B permit.

NOTE: All or part of this waste stream is being considered by SRS for inclusion in a polymer macroencapsulation demonstration project at Envirocare of Utah. SRS anticipates that by late FY 96 a decision will be made concerning specific SRS wastes that will be provided for the Envirocare demonstration. SRS will keep SCDNEC informed on the status of the Envirocare demonstration project.

3.1.3.2.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $13 million and $30 million.

Uncertainty Issues

SRS will request EPA approval for the proposed option to macroencapsulate the batteries portion of this waste stream. Budget and scheduling uncertainties may arise regarding regulatory activities until final approval and permitting is received.

Section 3.1.4 *Offsite Vendor Treatment Facilities*

3.1.4.1 DECONTAMINATION

3.1.4.1.A SR-W013 Low-Level Waste (LLW) Lead – to be Decontaminated

3.1.4.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W013

The preferred treatment option for the Low-Level Waste (LLW) Lead – to be Decontaminated waste stream is Decontamination in an offsite vendor treatment facility.

Background Information:

This waste stream consists of elemental lead which can be decontaminated and reused. SR-W013 was identified as SR-W013A in the Draft Site Treatment Plan.

Volume
- Current volume through 09/30/95 is 83.5 m^3.
- Expected 1996-2000 volume will be 30 m^3.

Note: Volume does not reflect the reduction due to the shipment of 27,000 kg of elemental lead to SEG as a decontamination demonstration. The volume reduction will be entered into the next Mixed Waste Inventory Report Update.

Waste Stream Composition
- Elemental lead

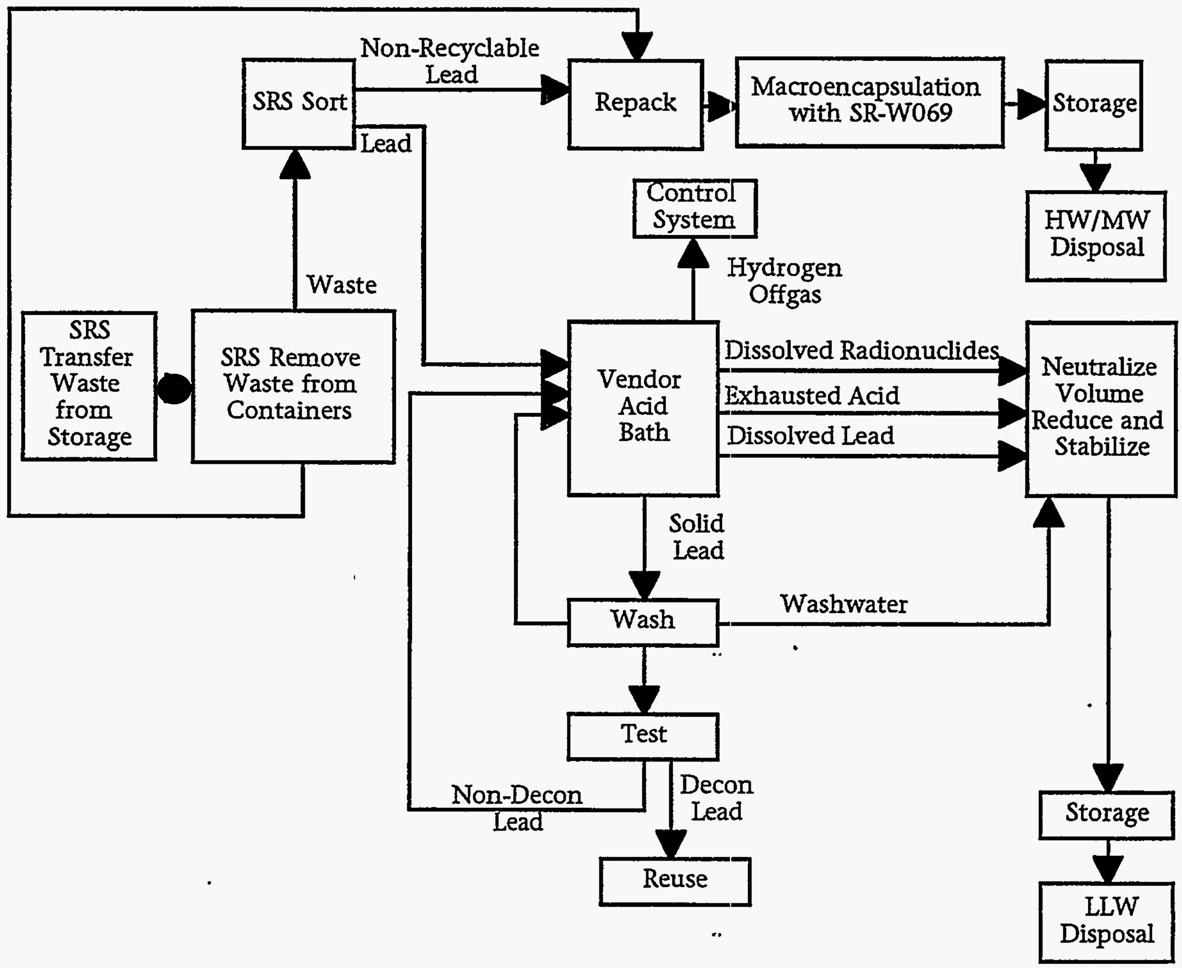
Waste Code
- D008C (elemental Pb)

LDR Treatment Standard
- D008 = specified technology = Macroencapsulation

Waste Characterization
- Process knowledge 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

3.1.4.1.A.2 TECHNOLOGY AND CAPACITY NEEDS



The 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 which 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.

Vendor workoff rates will be determined in the procurement process.

3.1.4.1.A.3 TREATMENT OPTION INFORMATION

This waste stream is radioactively contaminated on the surface only. Technologies are available to remove layers of lead using an acid bath or other method such as abrasion. This removes the surface layer leaving uncontaminated lead suitable for reuse or recycle. The radioactively contaminated waste lead is then significantly reduced in volume and can be treated in a more efficient manner.

The recycling activities are anticipated to be performed on this mixed waste stream by a vendor. The material has been declared a waste, but will be recycled as a scrap metal. Therefore hazardous waste labels will be removed and transportation of the scrap lead to the vendor for recycling will not be as hazardous waste. Material rejected by the vendor will be returned to SRS as material in nonconformance. Waste generated from the recycling activities must be disposed of by the vendor in accordance with the LDR regulations.

Option Support Justification – IDOA Performed

- Treatment option highly supportive of waste minimization and resource recovery.
- Very great volume reduction. Only material not capable of being decontaminated returned to SRS. Remainder can be reused.
- Treatment option utilizes offsite vendor treatment at existing facility. Decontamination process proven technology.
- No permit development required by SRS. Fast treatment turn around time.

Facility Status

A determination will be needed on the method of containerizing lead for shipment to the vendor, frequency of shipments, and logistics of returning nonconforming material to SRS.

Technology

Lead decontamination using an acid bath or other methods to remove the surface activated lead is a proven technology.

3.1.4.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

A contract is in place for a vendor to decontaminate 30,000 kg of lead in 1996. Additional funding and additional contracts will be needed to decontaminate the remaining lead.

The estimated cost to treat this waste stream is less than $2,500,000.

Uncertainty Issues

This technology is standard for decontaminating lead for re-use. No uncertainties exist regarding acceptance of scrap lead by the vendor, transportation, or disposition of recycled and rejected material.

Section 3.1.5 *Offsite DOE Facilities*

3.1.5.1 INEL WASTE ENGINEERING DEVELOPMENT FACILITY

3.1.5.1.A SR-W014 Tritium-Contaminated Mercury

3.1.5.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W014

The preferred treatment option for the Tritium-Contaminated Mercury waste stream is Amalgamation at an offsite DOE facility, the Idaho National Engineering Laboratory/Waste Engineering Development Facility (INEL/WEDF) – Amalgamation Unit.

Background Information:

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
- Current volume through 09/30/95 is 0.18 m^3.
- Expected 1996-2000 volume will be 0.1 m^3.

Waste Stream Composition
- Elemental mercury

Waste Code
- D009D (Elemental mercury)

LDR Treatment Standard
- D009 = specified technology = Amalgamation

Waste Characterization
- Process knowledge 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

3.1.5.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

Different DOE amalgamation units were evaluated and SRS chose the INEL/WEDF-Amalgamation Unit as the location of choice, based on information (funding, schedules, etc.) provided to SRS by INEL and DOE-HQ. A process flow diagram for treatment of the waste stream was not provided by INEL at this time.

The capacity needs of the INEL/WEDF-Amalgamation Unit are unknown to SRS at this time.

3.1.5.1.A.3 TREATMENT OPTION INFORMATION

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

Option Support Justification – IDOA Performed

- The INEL has an amalgamation facility in an advanced planning stage that is anticipated to be ready to accept waste before SRS could have any treatment funded and ready onsite.
- Utilization of the offsite DOE facility would be a cost-effective strategy for SRS as well as serving to treat this waste stream in a more timely manner.

Facility Status

This waste has been accepted for treatment by Idaho National Engineering Laboratory Waste Engineering Development Facility Amalgamation Facility. Conceptual design has been completed, and funding has been approved to continue process development. INEL has given no indication that tritium in this waste stream will pose treatment problems. According to a preliminary schedule provided by INEL, the construction of the facility will begin in the first quarter of FY 97, approximately nine months after submitting a RCRA Part B permit application to the State of Idaho. The preliminary schedule shows full scale operation beginning in the third quarter of FY 99. More information about INEL/WEDF may be found in INEL's PSTP.

Technology

Amalgamation of this waste stream containing elemental mercury is the specified technology to meet the LDR treatment standard.

Regulatory Status

WEDF will pursue a modification to their RCRA Interim Status for this planned facility.

Preparation for Operation

Future facility – not applicable

3.1.5.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Cost would be incurred in preparing this waste stream for shipment and transporting it to Idaho. Treated residues would be returned to SRS for disposal. Funding would need to be requested to support proper containerization and transportation.

The estimated cost to treat this waste stream is less than $250,000.

Uncertainty Issues

This technology is the specified technology for treating mercury. However, the waste's level of tritium in relation to the INEL/WEDF – Amalgamation Unit's WAC has not been fully analyzed. Also, transportation of this waste stream to the INEL 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. Furthermore, the facility has only the most preliminary design and no approved budget.

There is some uncertainty about an offsite option selection until completion of negotiations, administrative procedures, and verification of appropriate treatment is finalized.

Uncertainties exist for DOE sites regarding permitting status for treatment facilities slated to receive SRS wastes for treatment.

3.1.5.1.B SR-W049 Tank E-3-1 Clean Out Material

3.1.5.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W049

The preferred treatment option for the Tank E-3-1 Clean Out Material is Stabilization with grout at an offsite DOE facility, the Idaho National Engineering Laboratory/Waste Engineering Development Facility (INEL/WEDF) Stabilization Unit.

Background Information:

The waste stream consists of mercury contaminated rocks, dirt, sand, concrete, and glass cleaned out of the bottom of Tank E-3-1, a sump receipt tank in H Area.

Volume
- Current volume through 09/30/95 is 1.0 m^3.
- No future waste generation is expected as this was a one-time generation.

Inventory reduced by .2 m^3 as a correction based on audit of waste tracking records. One drum of rinsate has been re-assigned in PSTP to stream SR-W041 due to waste matrix similarity. Volume after the reassignment was actually 1.0 (Subsequently, the drum of rinsate leaked and the contents were absorbed and re-drummed; that drum has been assigned to SR-W012).

Waste Stream Composition
- Inorganic sludges

Waste Code
- D009A (TCLP Hg) nonwastewater

LDR Treatment Standard
- D009A = concentration based standard = 0.2 mg/l

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based upon analytical results.
- TCLP indicates typical mercury concentration is 14 mg/l.

Radiological Characterization
- Activity level is <80 d/m/ml.
- Beta/gamma emitters are present.
- Waste is contact handled.
- Mixed low-level waste

3.1.5.1.B.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream contains some debris substances such as rocks and possibly a few man-made items that fell into the sump area. After performing an options analysis, stabilization was found to be the appropriate technology to treat the waste stream, given its physical matrix and mercury contaminant. Different DOE stabilization units were evaluated and the SRS chose the INEL/WEDF as the location of choice, based on information (funding, schedules, etc.) provided to SRS by INEL and DOE-HQ. A process flow diagram for treatment of the waste stream was not provided by INEL at this time.

Total volume of this waste stream does not affect INEL/WEDF stabilization throughput.

3.1.5.1.B.3 TREATMENT OPTION INFORMATION

Stabilization in the INEL/WEDF process is an appropriate treatment option since most of the material in the waste is part of normal concrete. Stabilization has been demonstrated to meet the concentration based treatment standard.

Option Support Justification – IDOA Performed

- Preferred option represents a proven, demonstrated technology that is known to be capable of meeting LDR requirements.
- Option represents a cost-effective treatment process.

Facility Status

This waste has been accepted for treatment by Idaho National Engineering Laboratory Waste Engineering Development Facility Stabilization Facility. Conceptual design has been completed, and funding has been approved to continue process development. According to a preliminary schedule provided by INEL, construction of the facility will begin in the first quarter of FY 97, approximately nine months after submitting a RCRA Part B permit application to the State of Idaho. The preliminary schedule shows full scale operation beginning in the third quarter of FY 99. More information about INEL/WEDF may be found in the INEL PSTP.

Technology

Stabilization of this waste stream containing low levels of mercury is an acceptable form of treatment to meet the LDR treatment standard.

Regulatory Status

Unknown to SRS at this time

Preparation for Operation

Unknown to SRS at this time

3.1.5.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is less than $150,000.

Uncertainty Issues

This technology has been determined suitable for treating the hazardous constituent of the waste stream. However, the waste's characterization in relation to the DOE-INEL/WEDF Stabilization Unit's WAC, has not been fully analyzed.

Applicability of additional evaluation under NEPA may create uncertainties related to budget and schedule for this treatment option.

Uncertainties exist for DOE sites regarding permitting status for treatment facilities slated to receive SRS waste for treatment and with corridor states regarding transportation of waste to the treatment facility for offsite treatment.

There is uncertainty about an offsite option selection until completion of negotiation, administrative procedures, and verification of appropriate treatment are finalized.

3.1.5.1.C SR-W068 Elemental (Liquid) Mercury - Sitewide

3.1.5.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W068

The preferred treatment option for the Elemental (Liquid) *Mercury -Sitewide waste stream is Amalgamation at an offsite DOE facility, the Idaho National Engineering Laboratory/Waste Engineering Development Facility (INEL/WEDF) – Amalgamation Unit.*

Background Information:

This waste stream is waste elemental mercury generated at different SRS facilities during their transition or decommissioning stages. Current inventory is two 0.5 liter bottles from the closing of a small laboratory in the Savannah River Technology Center (SRTC) to support Naval Fuels developmental studies. This was previously listed as SR-W041B in the Draft Site Treatment Plan. Future generation will be from transition activities at Separations and High-Level Waste facilities (mercury is used as a catalyst in metal dissolution) and mercury recovered from vitrification of high level waste at DWPF.

Volume
- Current volume through 09/30/95 is 0.1 m^3.
- Expected 1996-2000 volume will be 0.425 m^3. Mercury generation beyond 1999 could be extensive as tanks containing high mercury salts and sludges in the Tank Farm are processed in DWPF.

Waste Stream Composition
- Elemental mercury

Waste Code
- D009D (elemental Hg)

LDR Treatment Standard
- D009D = specified technology = Amalgamation

Waste Characterization
- Process knowledge 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

3.1.5.1.C.2 TECHNOLOGY AND CAPACITY NEEDS

Different DOE amalgamation units were evaluated and SRS chose the INEL/WEDF – Amalgamation Unit as the location of choice, based on information (funding, schedules, etc.) provided to SRS by INEL and DOE-HQ. A process flow diagram for treatment of the waste stream was not provided by INEL at this time.

The capacity needs of the INEL/WEDF – Amalgamation Unit are unknown to SRS at this time.

3.1.5.1.C.3 TREATMENT OPTION INFORMATION

This treatment option was selected as the preferred option even though it did not have the highest score from the IDOA process. 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.

Option Support Justification – IDOA Performed

- INEL has an amalgamation facility in an advanced planning stage that is anticipated to be ready to accept waste before SRS could have any treatment funded and ready onsite.
- Utilization of the offsite DOE facility would be a cost-effective strategy for SRS as well as serving to treat this waste stream in a more timely manner.

Facility Status

This waste has been accepted for treatment by Idaho National Engineering Laboratory Waste Engineering Development Facility Amalgamation Facility. Conceptual design has been completed, and funding has been approved for continued process development. According to a preliminary schedule provided by INEL, construction of the facility will begin in the first quarter of FY 97, approximately nine months after submitting a RCRA Part B permit application to the State of Idaho. The preliminary schedule shows full scale operation beginning in the third quarter of FY 99. More information about INEL/WEDF may be found in the INEL PSTP.

Technology

Amalgamation of this waste stream containing elemental mercury is the specified technology to meet the LDR treatment standard.

Regulatory Status

WEDF will pursue a modification to their RCRA Interim Status permit for this planned facility.

Preparation for Operation

Future facility – not applicable

3.1.5.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Cost would be incurred in preparing this waste stream for shipment and transporting it to INEL. Treated residues would be returned to SRS for disposal. Funding would need to be requested to support proper containerization and transportation.

The estimated cost to treat this waste stream is less than $350,000.

Uncertainty Issues

Transportation of this waste stream to the INEL 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 are finalized. High mercury volumes projected from DWPF operations after 1999 could affect the viability of the preferred option in the future.

Uncertainties exist for DOE sites regarding permitting status for treatment facilities slated to receive SRS wastes for treatment.

3.1.5.2 OFFSITE DOE MOBILE TREATMENT FACILITIES

3.1.5.2.A SR-W034 Calcium Metal

3.1.5.2.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W034

The preferred treatment option for the Calcium Metal is a treatability study in the Los Alamos National Laboratory (LANL) Reactive Metals Skid (LA-S003).

Background Information:

Material that is used in an FB-Line process and became slightly oxidized and off-specification. The waste is stored in four 55-gallon steel drums.

Volume
- Current volume through 09/30/94 is 0.9 m^3.
- No future waste generation is expected. Off-specification material was stored in an Radioactive Materials Management Area (RMMA) before it was discovered that the material was unacceptable to use for its specified purpose. Current procedures for material handling have reduced the likelihood for this situation to recur.

Waste Stream Composition
- Reactive metal

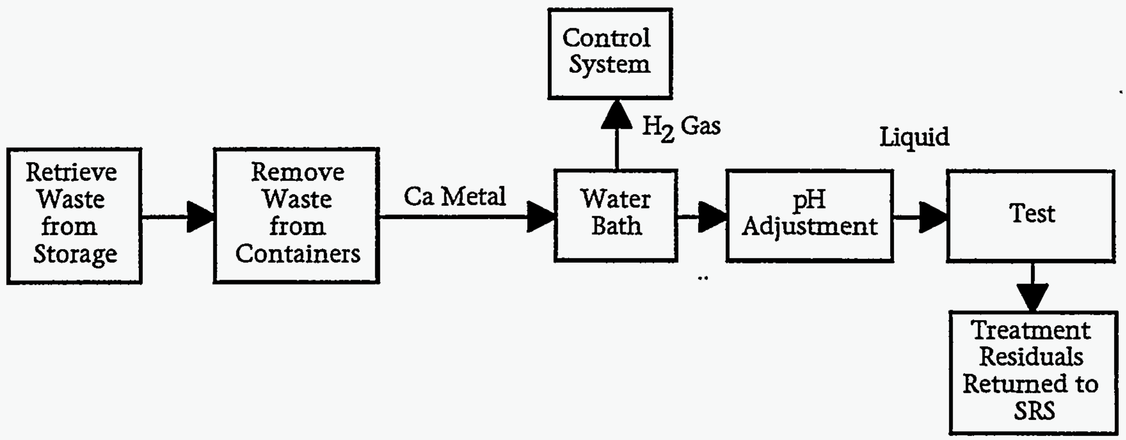
Waste Code
- D003D (water reactive) nonwastewater

LDR Treatment Standard
- D003 = specified technology = Deactivation
- Alternate debris technology may be applied.

Waste Characterization
- Process knowledge was used to characterize the waste stream.
- Confidence level is high based on the fact that this is pure technical grade calcium metal.

Radiological Characterization
- Stored in an RMMA – not likely to be contaminated but confirmation difficult. Waste has undergone radiological screening to confirm contamination. Results of the screening are being evaluated.
- Waste is contact handled.
- Mixed low-level waste

3.1.5.2.A.2 TECHNOLOGY AND CAPACITY NEEDS



This process flowsheet for the preferred option is shown above. The non-debris treatment standard for this waste stream is the specified technology of deactivation. Deactivation is simply defined as removal of the hazardous characteristic from the waste.

3.1.5.2.A.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDOA Performed

This option is preferred because:

- The process employs simple straightforward chemical reaction.
- The reaction takes place in a carefully controlled laboratory setting.
- Reaction products are nonhazardous and can be released to an outfall via a waste water treatment facility.
- No secondary waste is generated. The liquid portion of treated waste is acceptable for discharge through a wastewater treatment facility.
- Option was selected by the DOE Options Analysis Team.

Facility Status

This waste has been accepted for treatment by the Reactive Metals Skid (LA-S003). According to information from Los Alamos National Laboratory, which is involved in the design of the unit, the treatment method has been proven effective in laboratory scale and a detailed design has been completed. Funding has not been approved for this project, nor has it been permitted. A tentative schedule projects that the Reactive Metals Skid will be operational in 2000. More information about LA-S003 may be found in the LANL STP.

Technology

Controlled wet oxidation is an acceptable treatment for reactive metals and meets the LDR treatment standard of removing the reactive characteristic from the waste.

Regulatory Status

Treatment in the Reactive Metals Skid will be handled as a treatability study at LANL. Therefore, the calcium metal will be shipped to LANL as treatability study samples and will be stored according to treatability study regulations. The State of New Mexico has already agreed to allow entire waste streams to be treated in the treatability study because the results will be used for complex-wide benefits. The SRS shipping schedule will allow LANL one to two months once the waste is received to perform pretreatment sampling and analysis. LANL will also perform post-treatment testing and will ship the test results and the treatment residuals back to SRS. The mobile unit will be decontaminated between different waste streams to prevent cross-contamination. Therefore, SRS residuals will not contain radionuclide and hazardous contaminants from other wastes.

Preparation for Operation

The operators of the mobile treatment facility would have to document that their facility and procedures have been determined to be operationally ready.

3.1.5.2.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Presently there is no funding allocation for construction of a mobile facility for treatment of reactive metals. Development of line item funding will be required before construction of the mobile facility can begin and ultimately the waste can be treated.

No cost estimate has been developed to build a mobile reactive metals treatment facility. Cost to SRS of using the mobile facility to treat calcium metal should be less than $450,000.

Uncertainty Issues

Should the evaluation of radiological screening results verify the absence of radionuclide contamination, the inventory of calcium metal would exit the STP since it would no longer be mixed waste.

Section 3.1.6 ***Preferred Treatment to be Determined***

At the present time there are no waste streams in this category. All waste streams formerly placed in this category have been assigned treatment options.

Section 3.2 Waste Streams Requiring Technology Development

Section 3.2.1 DOE Mobile Treatment Facility Requiring Development

At the present time there are no waste streams in this category. Waste streams formerly in this category have been assigned alternative treatment options.

Section 3.3 Mixed Low-Level Waste Streams for Which Technology Development or Further Characterization is Required

Section 3.3.1 Waste Streams to be Further Characterized

3.3.1.1 WASTE STREAMS REQUIRING RADIOLOGICAL (ALPHA) CHARACTERIZATION

3.3.1.1.A SR-W025 Solvent/TRU Job Control Waste <100 nCi/g

3.3.1.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W025

The preferred option for Solvent/TRU Job Control Waste with Less Than 100 nCi/g is to assay, characterize, and sort the waste stream in the TRU Waste Certification/Characterization Facility (TWCCF). Then, the waste will be either macroencapsulated or vitrified.

Background Information:

The waste stream is composed primarily of solids such as disposable personal protective equipment, floor sweepings, rags, labware, and other job control waste generated through separation activities for plutonium production. The waste stream includes small amounts of transuranic waste from onsite laboratories. This waste differs from SR-W033 because solvent rags are suspected of being in the waste. A conservative interpretation of the mixture rule causes all contents in a container to be characterized with listed solvent waste codes due to the presence of solvent rags.

Volume
- Current volume through 09/30/95 is 3604.8 m^3. This number shows an increase over the 9-30-94 reported inventory. The increase was due a reallocation among waste categories (e.g., mixed TRU, mixed LLW, etc.) based on a query of 1995 updated data on SRS waste streams managed as TRU.
- No future waste generation is expected because of a program implemented to segregate F-listed solvent rags from other job control waste. This waste stream ceased to be generated when the program began. (Thirds/TRU Job Control Waste <100 nCi/g, SR-W033, is the current waste stream which evolved from SR-W025 under current F-listed solvent waste segregation.)

Waste Stream Composition
- Organic debris

Waste Code
- D001C (Ignitable Liquids, Low TOC Nonwastewaters)
- D003D (Water Reactives)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018-D019 (TCLP Toxic Organics, Benzene and Carbon Tetrachloride)
- D022-D026 (characteristic organics)
- F001, F002, F003, F005A (halogenated and nonhalogenated spent solvents)
- P012 (Arsenic trioxide)
- P015 (Beryllium dust)
- P048 (2, 4 Dinitrophenol)

- P113 Thallic oxide
- P120 Vanadium pentoxide
- U002 Acetone
- U032 Calcium chromate
- U052 Cresols
- U080 Methylene chloride
- U133 Hydrazine
- U134 Hydrogen fluoride
- U144 Lead acetate
- U151 Low mercury nonwastewaters
- U154 Methanol
- U161 Methyl isobulyl ketone
- U209 1, 1, 2, 2 Tetrachloroethane
- U211 Carbontetrachloride
- U220 Toluene
- U226 1, 1, 1 Trichloroethane
- U239 (Xylenes)

LDR Treatment Standard
- D001 = specified technology = Recovery of Organics or Combustion
- D003 = specified technology = DEACT
- D004 = concentration based standard = 5 mg/l
- D006 = concentration based standard = 1 mg/l
- D007 = concentration based standard = 5 mg/l
- D008 = concentration based standard = 5 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D011 = concentration based standard = 5 mg/l
- D018* = concentration based standard = 10 mg/kg
- D019* = concentration based standard = 6 mg/kg
- D022* = concentration based standard = 6 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 = concentration based standard = 6-30 mg/kg
- F002 = concentration based standard = 6-30 mg/kg
- F003 = concentration based standard 2.6-180 mg/kg
- F005 = concentration based standard = 10-170 mg/kg, except 2-Ethoxyethanol, 2-Nitropropane = Incineration
- P012 = concentration based standard = 5 mg/l
- P015 = specified technology = RMETL or RTHRM
- P048 = concentration based standard = 160 mg/kg
- P113 = specified technology = RTHRM or STABL
- P120 = specified technology = STABL
- U002 = concentration based standard = 160 mg/kg
- U032 = concentration based standard = 0.86 mg/l
- U052 = concentration based standard = 5.6-11.2 mg/kg
- U080 = 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
- U151 = concentration based standard = 0.025 mg/l
- U154 = concentration based standard = 0.75 mg/l, or CMBST
- U161 = concentration based standard = 33 mg/kg
- U209 = concentration based standard = 6.0 mg/kg
- U211 = concentration based standard = 6.9 mg/kg
- U220 = concentration based standard = 10 mg/kg

- U226 = concentration based standard = 6.9 mg/kg
- U239 = concentration based standard = 30 mg/kg
- Alternate debris technology

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards for any underlying constituents that may be present.

Waste Characterization
- Process knowledge was 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 10-100 nCi/g
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241} and U^{233}) are present.
- Beta/gamma emitters (H^3, Co^{60} and Cs^{137}) are present.
- Waste is contact handled.
- Mixed low-level waste

3.3.1.1.A.2 CHARACTERIZATION PLAN

This waste stream does not meet the DOE definition of transuranic waste (TRU). However, the heterogeneous items that make up this waste stream and the location where the waste was generated could result in transuranic contamination of the waste. The conservative approach would be to manage this waste in the same manner as transuranic waste. In handling this alpha waste, personnel safety and exposure concerns to protect from alpha contamination are similar for both TRU waste and the 10-100 nCi/g waste streams.

This waste stream needs further characterization. Previously, the DOE TRU definition required waste containing greater than 10 nCi/g of transuranic radionuclides to be managed as TRU waste. When the definition of TRU was changed to greater than 100 nCi/g, there were a number of containers that became "orphaned"; that is, were above the 10 nCi/g value for burial and below the 100 nCi/g to go to the Waste Isolation Pilot Plant in Carlsbad, New Mexico. Further, equipment for radiological characterization (distinguishing between 10 and 100 nCi/g) was not sensitive enough to detect small differences among the containers. This waste stream is currently managed as TRU waste and requires further characterization/assay to verify its mixed low-level part. A radiological characterization at the Transuranic Waste Certification/Characterization Facility (TWCCF) must be completed before this waste stream can be treated and disposed.

When adequate assay capabilities are available, further waste characterization will be performed (including waste sort and size reduction). The metal debris portion of this waste stream will be treated to meet LDR requirements. For the remaining MLLW portion, the preferred treatment option could concentrate the TRU fraction greater than 100 nCi/g.

3.3.1.1.A.3 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Current plans are to construct a TRU Waste Certification/Characterization Facility (TWCCF) to characterize this waste stream. Treatment of this waste stream is currently part of the TRU program. Costs for this program can be found in Chapter 4.

Uncertainty Issues

There are several uncertainties concerning this waste stream. These include budget, schedule (i.e., facility construction and project funding), and available technologies for assaying this waste so that a final disposal determination can be made. These uncertainties are further explained in Chapter 4, Section 4.1.B.

3.3.1.1.B SR-W033 Thirds/TRU Job Control Waste <100 nCi/g

3.3.1.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W033

The preferred option for Thirds/TRU Job Control Waste with Less Than 100 nCi/g is to assay, characterize, and sort the waste stream in the TRU Waste Certification/Characterization Facility (TWCCF). Then, the waste will be either macroencapsulated or vitrified.

Background Information:

The 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 transuranic waste from onsite laboratories.

Volume
- Current volume through 09/30/95 is 8.0 m^3.
- Expected 1996-2000 volume will be 308 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D001C (Ignitable low TOC nonwastewaters)
- D003D (Water reactives)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018-D019, D022-D026 (characteristic organics)
- P012 (Arsenic trioxide)
- P015 (Beryllium dust)
- 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 nonwastewater)
- U154 (Methanol)
- U161 (Methyl isobutyl ketene)
- U209 (1, 1, 2, 2 - tetrachloroethane)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (1, 1, 1 - Trichloroethane)
- U239 (Xylenes)

LDR Treatment Standard

- D001 = specified technology = Recovery of Organics or Combustion
- D003 = specified technology = DEACT
- D004 = concentration based standard = 5.0 mg/l
- D006 = concentration based standard = 1.0 mg/l
- D007 = concentration based standard = 5.0 mg/l
- D008 = concentration based standard = 5.0 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D011 = concentration based standard = 5.0 mg/l
- 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 = 5.0 mg/kg
- P012 = concentration based standard = 5.0 mg/l
- P015 = specified technology = RMETL or RTHRM
- P048 = concentration based standard = 160 mg/kg
- P113 = specified technology = RTHRM or STABL
- P120 = specified technology = STABL
- U002 = concentration based standard = 160 mg/kg
- U032 = concentration based standard = 0.86 mg/l
- U052 = concentration based standard = 5.6-11.2 mg/kg
- U080 = 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 = 037 mg/l
- U151 = concentration based standard = 0.025 mg/l
- U154 = concentration based standard = 0.75 mg/l, or CMBST
- U161 = concentration based standard = 33 mg/kg
- U209 = concentration based standard = 6.0 mg/kg
- U211 = concentration based standard = 6.0 mg/kg
- U220 = concentration based standard = 10 mg/kg
- U226 = concentration based standard = 6.0 mg/kg
- U239 = concentration based standard = 30 mg/kg
- Alternate debris technology

  *D012-D043 nonwastewaters must be treated to meet the Universal Treatment Standards for any underlying constituents that may be present.

Waste Characterization

- Process knowledge used to characterize the waste stream.
- Confidence level is medium based on the varying composition of the job waste as it is generated.

Radiological Characterization

- Total activity is 10-100 nCi/g
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241}, and U^{233}) are present.
- Beta/gamma emitters (H^3, Co^{60}, and Cs^{137}) are present.
- Waste is contact handled.
- Mixed low-level waste

3.3.1.1.B.2 CHARACTERIZATION PLAN

This waste stream does not meet the DOE definition of transuranic waste (TRU). However, the heterogeneous items that make up this waste stream and the location where the waste was generated could result in transuranic contamination of the waste. The conservative approach would be to manage this waste in the same manner as transuranic waste. In handling this alpha waste, personnel safety and exposure concerns to protect from alpha contamination are similar for both TRU waste and the 10-100 nCi/g waste streams.

This waste stream needs further characterization. Previously, the DOE TRU definition required waste containing greater than 10 nCi/g of transuranic radionuclides to be managed as TRU waste. When the definition of TRU was changed to greater than 100 nCi/g, there were a number of containers that became "orphaned"; that is, was above the 10 nCi/g value for burial and below the 100 nCi/g to go to the Waste Isolation Pilot Plant in Carlsbad, New Mexico. Further, equipment for radiological characterization (distinguishing between 10 and 100 nCi/g) was not sensitive enough to make these splits between the containers. This waste stream is currently managed as TRU waste and requires further characterization/assay to verify its mixed low-level part. A radiological characterization at the Transuranic Waste Certification/Characterization Facility (TWCCF) must be completed before this waste stream can be treated and disposed.

When adequate assay capabilities are available, further waste characterization will be performed (including waste sort and size reduction). The metal debris portion of this waste stream will be treated to meet LDR requirements. For the remaining MLLW portion, the preferred treatment option could concentrate the TRU fraction greater than 100 nCi/g.

3.3.1.1.B.3 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Current plans are to construct a TRU Waste Certification/Characterization Facility (TWCCF) to characterize this waste stream. Treatment of this waste stream is currently part of the TRU program. Costs for this program can be found in Chapter 4.

Uncertainty Issues

There are several uncertainties concerning this waste stream. These include budget, schedule (i.e., facility construction and project funding), and available technologies for assaying this waste so that a final disposal determination can be made. These uncertainties are further explained in Chapter 4, Section 4.1.B.

3.3.1.2 WASTE REQUIRING VERIFICATION OF RADIOLOGICAL CONTAMINATION OR DEVELOPMENT OF ANALYTICAL METHODOLOGY

3.3.1.2.A SR-W078 LDR Hazardous Waste Awaiting Radiological Screening

3.3.1.2.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W078

The preferred option for LDR Hazardous Waste Awaiting Radiological Screening is the development of sampling protocols to verify SRS has not introduced radiological contamination or analytical techniques development to properly characterize the constituents in the waste. Afterward, waste can be appropriately classified as mixed, or hazardous only, and the proper management identified. Waste characterized as mixed will undergo technical analysis for treatment option identification.

Background Information

The waste stream is composed of dark liquids and heterogeneous solids generated site-wide in areas where radiological contamination is possible. The physical make up of the waste stream has prevented adequate 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 waste constituents.

Volume

- Current volume as of 1/15/96 is approximately 100 m^3.
- Expected 1996-2000 volume is unknown. Some volume of waste is expected to be generated in 1996.

Waste Stream composition
- Heterogeneous solids and dark liquids

Waste Codes
- Unknown until sampling and analytical processes developed.

LDR Treatment Standards
- Unknown until sampling and analytical processes developed.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is low because of the nature of the waste and its physical characteristics.

Radiological Characterization
- Unknown

3.3.1.2.A.2 CHARACTERIZATION PLAN

SRS is in the process of developing sampling methods for the heterogeneous solids in the moratorium waste stream. An EPA funded ASTM committee is at work on a sampling protocol which is expected to be available before the end of fiscal year 1996. Work is also being done for the development of analytical processes to characterize the liquid wastes.

3.3.1.2.A.3 TREATMENT OPTION STATUS AND UNCERTAINTIES

It is anticipated that most of the volume of waste will be verified as not containing introduced radionuclides. Upon substantiation that radionuclide contamination is not present, waste 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 per Consent Order 95-22-HW, for determination of new mixed waste streams that result from characterization of LDR Hazardous Waste Awaiting Radiological Screening.

Under the provisions of Consent Order 95-22-HW, SRS will supply information for necessary action to sample or analyze the waste by January 22, 1997.

Budget Status

SRS is funding 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 this waste remain uncertain.

Should funding requirements for the development of protocols or analytical techniques require expansion of budgets beyond the operational budge scope. The source of that funding is uncertain at this time.

Section 3.4 Waste Streams Requiring Radionuclides Decay Prior to LDR Treatment

3.4.1 SR-W036 Tritiated Oil with Mercury

3.4.1.1 GENERAL INFORMATION

Waste Stream Number: SR-W036

The preferred treatment option for Tritiated Oil with Mercury is treatment by aging in a regulated storage facility followed by incineration in a facility equivalent to the Consolidated Incineration Facility (CIF).

Back Ground Information:

This waste stream consists of used oil from pumps and compressors in the tritium facilities. The oil is contaminated with tritium and possibility with 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 interference's. The possibility of mercury contamination has been established, but the concentration has not been quantified.

Volume
- Current Volume through 09/30/95 is 20.0 m^3
- Expected 1996-2000 volume will be 2.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D009E (hydraulic oil contaminated with Hg and radioactive materials)

LDR Treatment Standard
- D009 = Specified Technology = Incineration of wastes containing organics and mercury.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is low based on the fact that waste cannot be sampled for mercury level due to ALARA concerns.

Radiological Characterization
- Extent of tritium contamination is variable (background to ~ 185 Ci/l).
- Waste is contact handled.
- Mixed Low-level waste.

3.4.1.2 TECHNOLOGY AND CAPACITY NEEDS

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 off-gas 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 pose the same ALARA problem 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 12.5 years. Based on the waste acceptance criteria for the Consolidated Incineration Facility (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 incineration, 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 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.

3.4.1.3 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 insure 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.

3.4.1.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The cost of storage during the treatment phase of aging for tritium decay is estimated at $120,000 for the 65 year period.

Treatment cost for incineration in a facility similar to CIF is estimated at $75,000.

Uncertainties

Since the aging process will to 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.

CHAPTER 4 MIXED TRANSURANIC WASTE

Section 4.1 Mixed Transuranic Waste Streams Management Plans for Waste Proposed for Shipment to the Waste Isolation Pilot Plant (WIPP)

4.1.A *National Strategy for Managing Mixed Transuranic Waste*

The current DOE strategy for management of mixed transuranic (MTRU) waste is to segregate MTRU wastes from mixed low-level waste; 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. Compliance with the requirements of the Federal Facility Compliance Act (FFCAct) for MTRU waste will be achieved using the RCRA No-Migration Variance petition approach provided in the Code of Federal Regulations (CFR) Title 40, Section 268.6. Under this strategy, no treatment other than that necessary to meet WIPP WAC is anticipated; however, the performance assessment and the EPA No-Migration Variance determination will ascertain what treatments, if any, will be required to ensure disposal compliance.

DOE is actively gathering inventory and characterization data for input into the WIPP performance assessment and has prepared several regulatory submittals to EPA to demonstrate compliance with No-Migration Variance Petition requirements. A draft compliance certification package was submitted to EPA in March 1995 and a No-Migration Variance Petition in May 1995. A revised RCRA part B Permit application was submitted to the New Mexico Environment Department in May 1995. A final compliance certification package (including final performance assessment results) will be submitted to EPA by October 1996; and the disposal WIPP WAC is scheduled to be finalized by January, 1996. DOE plans to declare operational readiness for WIPP by September 1997. Disposal of contact handled (CH) TRU waste will begin in April 1998, followed by remote handled (RH) TRU waste in FY 2002. These dates are contingent upon permit approval, certification of disposal compliance, and determination of No-Migration from the appropriate regulators and are subject to the availability of the funds.

In the interim, 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 under a No-Migration Variance petition.

4.1.B *Site MTRU Waste Management Approach*

TRU waste is defined as waste contaminated with alpha-emitting transuranic radionuclides which have half-lives greater than 20 years and radionuclide concentrations greater than 100 nanocuries per gram (100 nCi/g). Also, transuranic nuclides have atomic numbers greater than 92. Mixed TRU waste is defined as transuranic waste that includes hazardous materials as identified in R61-79.261, Subparts C and D, SCHWMR. Finally, SRS MTRU waste is DOE defense-related TRU-type waste.

In 1970, the AEC issued an Immediate Action Mandate (AD-0511-21) which required that solid waste containing transuranic elements be segregated in containers that could be retrieved from permanent storage, contamination free, within 20 years.

In 1974, the Savannah River Site (SRS) procedures for storing TRU waste were modified to reflect the AEC criteria. Fifty-five gallon galvanized drums were fitted with polyethylene liners and used as the primary container for storing waste classified as containing less than 0.5 curies per package. Drums containing greater than 0.5 curies per package were enclosed in concrete culverts for additional protection. A culvert is a 7-foot by 7-foot concrete pipe with a 6-inch thick wall, sealed bottom, and a grouted lid. A culvert holds up to 14 drums.

Culverts, along with large carbon steel boxes containing bulk equipment and concrete casks, were stored above ground on concrete pads and covered with a 4-foot soil (clay) overburden. This soil provided additional shielding and weather protection.

The first five waste pads were filled with waste containers and covered with soil. The sixth pad was filled, but only partially covered with soil. Efforts to cover this pad with soil ceased when a decision was made to discontinue this type of storage. This occurred in the early stage of coverage; and, therefore this pad is open on the top with soil pushed along three of its sides (two drums high).

In 1986, in anticipation of the WIPP opening, SRS began storing TRU waste containers uncovered on concrete pads (i.e., without being covered with soil). These containers include concrete culverts containing up to fourteen 55-gallon drums each, single 55- and 83-gallon drums, and carbon steel boxes. Currently, there are nine uncovered TRU pads and four TRU pads with weather enclosures (sprung roof structures). In recent years, rainwater intruded into some drums that were stored uncovered on TRU pads. Rainwater has recently been removed from these drums. The dewatered drums have been moved to TRU pads with weather enclosures to prevent further intrusion. Currently, 19 TRU pads at SRS are covered under RCRA Interim Status.

In recent years, SRS has conducted numerous project activities to align its waste preparation with the development of the WIPP-WAC. Continued WIPP startup delays and changes to the WIPP-WAC have prompted efforts to reevaluate the Site's plans for handling, storing and preparing TRU waste streams for disposal at WIPP. The SRS solid waste management strategy recognizes the uncertainty in the current WIPP program and provides an integrated approach to continued safe interim waste storage, the retrieval of covered TRU containers that are approaching their 20-year design life, the identification of potential treatment options that will mitigate waste transport and storage concerns, and the resolution of TRU "orphan waste." "Orphan waste" is waste that potentially fits into more than one waste characterization.

Even though transuranic waste is defined as waste contaminated with greater than 100 nCi/g of transuranic radionuclides, SRS is currently managing waste that is suspected of containing 10 nCi/g or higher as TRU waste. This is based on the inability of past assay technology to accurately analyze waste below 100 nCi/g. Therefore, all waste suspected of containing transuranic radionuclides is defined as TRU waste and managed accordingly.

Currently, four mixed TRU waste streams and two mixed low-level waste (MLLW) streams are managed as TRU waste. Some of this waste will not be disposed at WIPP. The actual amount of waste will depend on assay and treatment technologies available during waste processing, and the final WIPP-WAC.

A 1995 update of the WIPP TRU Waste Baseline Inventory Report (WTWBIR), Integrated Database (IDB) and the MWIR produced revised inventory values for SRS waste streams. Specifically, waste stream volumes were reallocated based on a data query of SRS's Computerized Radioactive Waste Burial Record Analysis (COBRA) database.

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

Waste Stream No.	Description	Current Inventory Volume (Cubic Meters)
SR-W006	Mixed TTA/Xylene – TRU	<0.1
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g (MLLW managed as TRU)	3604.8
SR-W026	Thirds/TRU Job Control Waste	92.4

SR-W027	Solvents/TRU Job Control Waste	3362
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g (MLLW managed as TRU)	8.0
SR-W053	Rocky Flats Incinerator Ash (Return to Rocky Flats)	<0.1

Waste streams SR-W025 and SR-W033 are categorized as ≤100 nCi/g, but are managed as TRU waste. These two streams are classified as "orphan waste" because they potentially fit into one or more waste classifications. When assay technology is available, these waste streams will be further characterized and the portion that is TRU (> 100 nCi/g) waste will be sent to WIPP. The remaining mixed low-level component will be treated. 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 regarding characterization, preparation to meet the WIPP-WAC, and interim storage of transuranic waste before shipment to the WIPP. This strategy is outlined below. In addition, SRS has developed In-Depth Option Analysis (IDOA) for the less than or equal to 100 nCi/g mixed low-level waste streams.

SRS Solid Waste Management Strategy

The SRS solid waste management strategy supports and is in alignment with National TRU Program initiatives. The SRS solid waste management strategy identifies the specific activities necessary to safely store and manage TRU waste, including the developmental steps for potential treatment options. Execution of this strategy should allow SRS to ship waste to the WIPP at the appropriate time.

Plan Assumptions

The SRS solid waste management strategy is based on the following key assumptions:

- All SRS TRU waste (>100 nCi/g) will be sent to the WIPP for disposal
- WIPP will receive a No-Migration Determination from RCRA-LDR
- All TRU waste (>100 nCi/g) will be shipped (offsite) using the TRUPACT-II (assumes TRUPACT-II Safety Analysis Report for Packaging (SARP) modification for higher activity fraction).
- All wastes currently managed as TRU will be assayed and characterized before a final disposal determination is made.

Plan Issues

The SRS solid waste management strategy addresses the following key issues:

- SRS TRU Waste Management efforts regarding treatment will be limited pending a final WIPP-WAC.

- Drums placed in direct contact with the overburden soil under the earthen mounds are reaching their 20-year design life.

- Waste package records for stored waste are primarily in a computer database called COBRA - Computerized Radioactive Waste Burial Record Analysis. The retained data is general and limited to the following information; generating facility, dates, volumes, radionuclide content, and general storage location. Other information is retained on paper records.

- High activity TRU waste may require treatment to meet transportation requirements for shipment to the WIPP. Treatment may be needed for the destruction of organic materials to minimize gas generation from radiolysis. *Decisions on options to prepare waste for treatment will be deferred until more information is available about the WIPP-WAC.*

- WIPP is developing performance based waste acceptance criteria (WAC). Final criteria defining characterization and waste certification requirements are not expected until May 1996.

- The inability of past assay technology to accurately analyze down to the 100 nCi/g level has resulted in SRS being unable to reclassify some waste as low-level waste (LLW) or MLLW.

Plan Activities

The SRS solid waste management strategy addresses the following activities and provides a path forward for resolution:

- Interim storage
- TRU waste retrieval
- Treatment studies
- Orphan waste

Interim Storage

Delays in the startup of WIPP make it necessary to provide interim storage capability so SRS can continue safe storage and monitoring of TRU waste. In support of this requirement, SRS has developed a mixed waste storage strategy that will provide adequate storage for existing and newly generated TRU wastes through year 2000. As part of the strategy, a Container Management Plan is being developed to reorganize existing storage containers and maximize the efficient use of TRU storage space. The plan will achieve optimum utilization of available space and will consider constraints such as criticality control, weather protection, RCRA permitting, segregation by waste type, container type, and generator. SRS has identified additional storage areas, permitted capacity allocations applied to these areas and a reapportionment of unusable interim status capacity requested from SCDHEC. Implementation of the "Container Management Plan" (WSRC-RP-94-783) began in mid FY 95. Also, SRS provided an overall mixed TRU Waste Storage Plan to the South Carolina Department of Health and Environmental Control (SCDHEC) in May 1995. This plan includes current mixed TRU waste inventories and future generation through the year 2000.

A recent study has shown that use of an excessed reactor building is not economically justifiable for interim storage of TRU and MTRU wastes at SRS. Therefore, the use of a reactor building specifically for the storage of TRU and MTRU is not recommended.

TRU Retrieval

TRU waste drums (<0.5 Ci/drum) retrievably stored under earthen cover are reaching their minimum design life of 20 years. A retrieval project has been initiated to provide the equipment and technology to safely retrieve these drums, vent and purge the drums, overpack, and restore the drums in a safe configuration under weather enclosures. The configuration of the restored drums will be entered into a Data Management Plan. In addition, an activated carbon filter will be inserted in the drum lids to prevent gas accumulation. This project is funded under Line Item 90-D-176 and is a high priority. Drum retrieval is scheduled to start in 2Q FY 97.

Treatment Studies

The baseline assumption is that all TRU waste (>100 nCi/g) generated and stored at SRS will eventually be shipped to WIPP under the No-Migration Variance petition. The possibility exists that treatment will be required for TRU waste before shipment to the WIPP. This treatment may be required before shipping the high activity (Pu-^{238}) fraction waste to WIPP. Pu^{238} waste is 280 times more active than Pu^{239} and currently cannot be shipped in a TRUPACT-II (the vehicle designed to transport TRU waste). TRUPACT-II is limited to 20 curies. This is based on heat loading and gas generation as a result of radiolysis, which limits shipping in each TRUPACT-II to approximately one gram of Pu^{238}. SRS is unique in this aspect since most of the Pu^{238} in the DOE complex is stored at SRS. Pu^{238} represents 30% of the retrievable TRU waste volume at SRS and 81% of the total curies.

Treatment studies will be conducted so SRS can minimize gas generation (i.e., destroying organics thus minimizing radiolysis in TRU waste drums) to meet TRUPACT-II requirements. With funding from area Focus Groups, the Savannah River Technology Center (SRTC) is evaluating a plasma induction vitrification system and wet chemical oxidation as treatment technologies to provide stable wasteforms and destroy organics and hazardous constituents. These treatment options are contingent upon no major changes to the WIPP-WAC. However, the treatment options assume that revisions to the TRUPACT-II and SARP documents can be changed to account for higher Pu^{238} content in SRS TRU waste. It is assumed that WIPP will receive a No-Migration Determination. A decision will be made in FY 97 as to whether to continue with these two technologies at SRS.

SRS will develop more detailed facility requirements for characterizing and certifying wastes when more definitive information becomes available from the WIPP Systems Analysis work and the WIPP-WAC. Previous attempts to predict the results of WIPP studies and final WAC resulted in recommendations such as the Low Activity TRU Facility (LATF). This facility was conceptually developed around the WIPP-WAC, Revision 4, and provided characterization, repackaging and certification for low activity TRU waste. Development of the LATF was placed on hold in FY 93. This was based on continuing uncertainties in the WIPP program and the inception of the Site Treatment Plan development. The LATF and a proposed High Activity TRU Facility (HATF) for performing final treatment will be reevaluated at the appropriate time.

Assay Technology and Orphan Waste

Per DOE Headquarters guidance, SRS has waste that is classified as non-TRU because it falls below 100 nCi/g. This waste is identified as mixed low-level waste (MLLW), but is currently being managed as TRU waste until SRS can verify that it is indeed <100 nC/g.

In 1986, the Experimental TRU Waste Assay Facility began operations to assay and certify TRU waste packaged in 55 gallon drums. Because of ventilation and fire safety issues related to high activity drums (>0.5Ci), Solid Waste Management suspended operations. Efforts are underway to upgrade the existing equipment in order to assay and segregate (TRU vs LLW) low activity TRU waste drums.

When adequate assay capabilities are available, further waste characterization will be performed (including waste sorting and size reduction). The metal debris portion of this waste will be processed to meet LDR requirements. For the remaining MLLW portion, the preferred treatment option could concentrate the TRU fraction above 100 nCi/g.

TRU Waste Certification/Characterization

SRS wastes currently managed as mixed TRU do not meet E-Area Vault, or RCRA disposal criteria nor are these wastes packaged to meet anticipated WIPP disposal criteria. Current plans include a proposed TRU Waste Certification/Characterization Facility (TWCCF) that will handle waste greater than 100 nCi/g and 10-100 nCi/g mixed/non-mixed waste containers which require limited processing before disposal. The waste types the TWCCF will process 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. SRS also is evaluating mobile assay capabilities to segregate low-level waste and TRU waste.

Some preprocessing (e.g., size reduction) will be required for most alpha contaminated waste before characterization and repackaging for treatment or disposal. After assay and characterization, 10 to 100 nCi/g wastes will be classified as low-level or mixed low-level waste. This waste will be treated (if required) and disposed in onsite facilities.

Wastes entering the TWCCF will be shipped from the TRU pads, waste generators, or other waste storage areas. Some of this waste will be acceptable for onsite disposal after characterization, and the remaining waste will require processing before final disposal in the WIPP. Containers such as drums will require minimal processing before waste characterization in the TWCCF and potential processing prior to disposal. However, large waste boxes and culverts require opening and some processing before the waste can be characterized and potentially processed for disposal.

Boxes will be assayed in the TWCCF using a box portal monitor and then opened. The box contents then will be moved to a size-reduction cell where large bulky equipment items will be size-reduced (about a 30% size reduction) to fit inside a drum using such equipment as a band saw, shredder, and a remotely-operated plasma torch. These size-reduced bulk pieces then will be placed into drums along with small equipment items. Miscellaneous debris and job control waste will be packaged separately into other drums.

The culvert lids will be removed and the drums lifted out of the culverts remotely. This activity will occur in the TWCCF. The unvented culvert drums will be vented and purged to remove any potential hydrogen gas. Each container then will go through Non-Destructive Assay/Non-Destructive Examination (NDA/NDE) and head-gas sampling. Waste containers will move through each process step, as necessary, to properly certify that each individual waste container meets the WIPP-WAC, E-Area Vault Disposal Criteria, or the RCRA disposal criteria. Containers meeting any of these criteria will be sent directly to disposal without further processing. The remaining drums that cannot meet any of these disposal criteria will be opened for intrusive processing. These containers will be opened and sorted based on whether the waste is metal, job control waste, aerosol cans, etc. Waste types requiring processing such as solidifying sludges and venting aerosol cans will be processed in a glovebox. Metal waste will be further sized-reduced using such equipment as a shredder. The metal will then be decontaminated using a multi-step chemical process or similar technology. All waste types then will be repackaged into drums with stabilized waste and metal packaged separate from job control waste.

The final processing step includes a second NDA/NDE and a waste determination using data obtained from NDA/NDE, headspace gas sampling, repackaging records, etc. Based on the characterization data, each waste container will be sent to a treatment process, beneficial recycle/reuse, WIPP disposal, RCRA disposal, or low-level vault disposal. WIPP is scheduled to startup in 1998. The TRU program is currently estimated at more than $1.1 billion. This is based on preliminary estimating efforts which will require refinement as the TRU program is better defined.

Alpha Vitrification Facility

An Alpha Vitrification Facility (AVF) is proposed that will treat solids, liquids, sludges, and soil wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20 years) for disposal. This includes preparing the waste for vitrification, vitrifying the waste, and treating secondary waste gases and liquids. The AVF will receive waste from the TRU

Waste Certification/Characterization Facility (TWCCF). This waste will enter the AVF in drums. Furthermore, the AVF will require a greater level of containment than a non-alpha vitrification facility.

Solid wastes will be sized-reduced using shredders to create feed stock (small pieces <1/8 inch in size) suitable for vitrification. Soil waste will be sorted and reused if there are no radionuclides or hazardous constituents present. Contaminated soils will be used as a frit substitute (feed) in the vitrification process. This will supplement frit needs, thus providing a beneficial reuse and reducing waste treatment costs. The waste, frit, and additives will be processed in a thermal pretreatment unit to reduce carbon content. This will produce a higher quality glass matrix when vitrified.

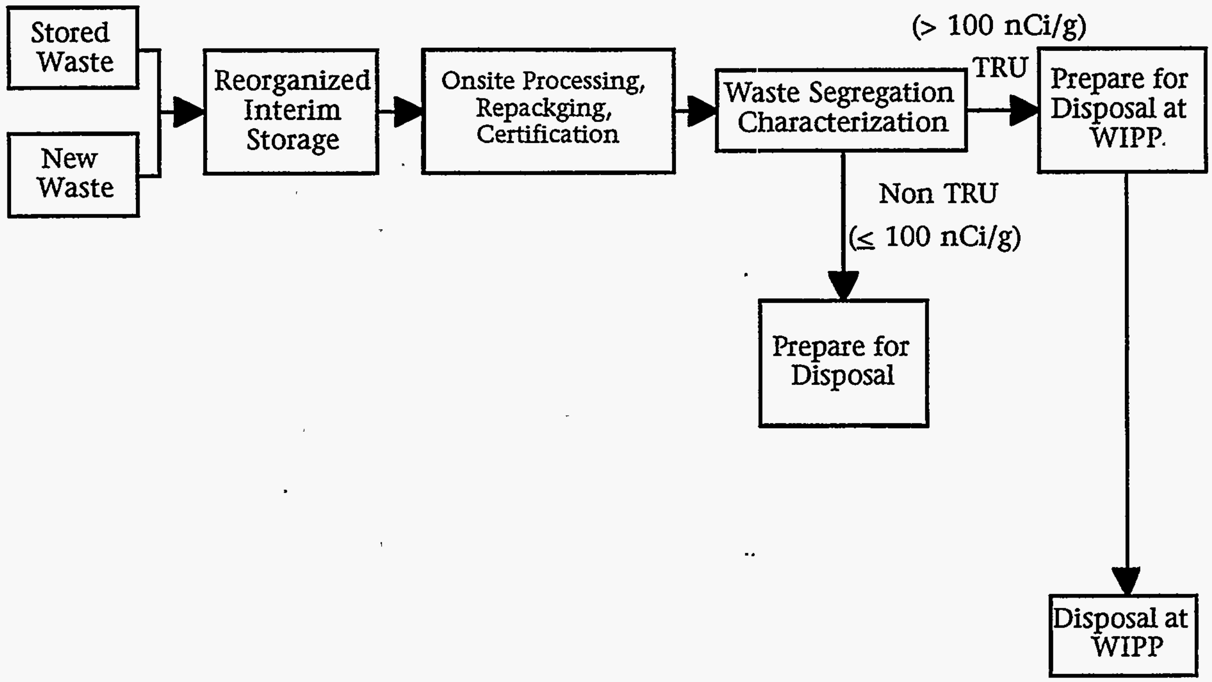
Gases generated during the vitrification process will be sent to an after-burner and an offgas treatment system. The afterburner will further destroy (any) remaining hazardous organic compounds before treating these gases in the offgas system. The offgas system will scrub gases and minimize the potential release of hazardous materials or particulates to the atmosphere. Liquids generated in the offgas treatment system will be processed in an evaporation system and ion exchange units. The ion exchange units will remove (any) mercury, trace radionuclides, and other materials that were carried over from the evaporation system. These units will bring the liquids into acceptable limits before returning the liquids to the offgas system for reuse. Concentrate or "bottom-liquids" will be stabilized using low-temperature stabilization techniques.

Vitrified and low-temperature stabilized wasteforms will be routed through the TWCCF for final certification. Certified final wastes will be routed for final disposal to a RCRA disposal facility or the Waste Isolation Pilot Plant (WIPP).

<u>TRU Plan Flow Chart</u>

A flow chart has been developed that outlines waste activities identified in the SRS solid waste management strategy. This flow chart follows the planned TRU waste activities listed below:

- TRU waste in mounded storage will be retrieved and placed in reconfigured storage.
- TRU waste storage configurations will be entered into a data management system.
- SRS will construct and operate TRU waste processing facilities to characterize and certify TRU waste to meet the WIPP-WAC, including transportation requirements.
- Studies will be done to identify treatment options for stabilizing the TRU isotopes which may be required for waste shipment to WIPP.


Stored Waste
New Waste
Reorganized Interim Storage
Onsite Processing, Repackging, Certification
Waste Segregation Characterization
(> 100 nCi/g)
TRU
Prepare for Disposal at WIPP.
Non TRU
(≤ 100 nCi/g)
Prepare for Disposal
Disposal at WIPP

4.1.1 *Mixed TRU Waste Streams Proposed for Shipment to WIPP*

Note: See Table 3, Chapter 3, Volume II for EPA Hazardous Waste Code Subcategories.

4.1.1.1 TRU WASTE REQUIRING CERTIFICATION/CHARACTERIZATION FOR WIPP

4.1.1.1.A SR-W006 Mixed TTA/Xylene – TRU

4.1.1.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W006

The preferred option for this waste steam is to assay and characterize the waste stream in the TRU Waste Certification/Characterization Facility (TWCCF), followed by preparation for shipment to, and disposal at, WIPP.

Background Information:

This waste stream is defense-related TRU waste, consisting of laboratory waste generated from plutonium extraction analytical procedures at the Savannah River Technology Center (SRTC). It consists of a homogeneous, xylene based, liquid chelating agent. TTA stands for Thenoyl Trifluoroacetone.

Volume
- Current volume through 09/30/95 is 0.1 m^3.
- There will be no future waste generation because a nonhazardous organic was identified for the lab procedure.

Waste Stream Composition
- Organic liquid

Waste Code
- D001A (Ignitable high TOC)

LDR Treatment Standard
- Manage at WIPP through a No-Migration Determination.

Waste Characterization
- Sampling and analysis 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.
- Contains transuranic contaminants Pu^{239} and Am^{241}
- Waste is contact handled.
- Mixed transuranic waste (MTRU)

4.1.1.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

This is a small waste stream and is currently stored according to RCRA in a satellite accumulation area at SRTC. After the WIPP-WAC is approved, this waste would be further characterized, treated to meet transportation requirements for removing liquids, and properly packaged for shipment to WIPP. 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, and treat the ignitable characteristic.

For information on the management of this waste stream, see the SRS solid waste management strategy in Section 4.1.B of this document.

4.1.1.1.A.3 TREATMENT OPTION INFORMATION

Please see the SRS solid waste management strategy in Section 4.1.B of this chapter.

4.1.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The TRU program cost is currently estimated at more than $1.1 billion. This is based on preliminary estimating efforts which will require refinement as the TRU program is better defined.

Uncertainty Issues

This MTRU waste stream may be processed to meet the WIPP-WAC, provided WIPP is granted a No-Migration Determination from the EPA. It must be rendered a non-liquid and meet the specification for WIPP storage. Because the waste stream volume is small, budget and schedule uncertainties exist regarding the handling of this waste. Transportation of this waste to WIPP raises an issue that will be addressed by the affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

4.1.1.1.B SR-W026 Thirds/TRU Job Control Waste

4.1.1.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W026

The preferred option for this waste steam is to assay, sort, size-reduce, and characterize the waste material in the TRU Waste Certification/Characterization Facility (TWCCF), followed by preparation for shipment to, and disposal at, WIPP.

Background Information:

This waste stream is a defense-related TRU 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 for plutonium production. A small fraction may be inorganic debris such as small laboratory utensils.

Volume
- Current volume through 09/30/95 is 92.4 m^3.
- Expected 1996-2000 volume will be 935 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D001C (Low TOC Ignitable)
- D003D (Water Reactives)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018-D019 (characteristic organics)
- D022-D026 (Chloroform, O-cresol, M-Cresol, P cresol, total cresols)
- P012 (Arsenic trioxide)
- P015 (beryllium powder)
- 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 Nonwastewater)
- 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 Waste Isolation Pilot Plant (WIPP) through a No-Migration Determination

Waste Characterization

- Sampling and analysis used to characterize the waste stream.
- Confidence level is medium based on the varying composition of the job waste as it is generated.

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}, Pu^{242}, Am^{241}, and U^{233}) are present.
- Waste is primarily contact handled with a small volume of remote handled.
- Mixed transuranic waste (MTRU)

4.1.1.1.B.2 TECHNOLOGY AND CAPACITY NEEDS

For information on the management of this waste stream, see the SRS solid waste management strategy in Section 4.1.B of this document.

The total volume of MTRU waste at SRS is substantial, and therefore, the need for appropriate storage while DOE develops the WIPP Waste Acceptance Criteria (WAC) and awaits EPA approval of the No-Migration Petition is significant. After the WIPP-WAC is approved, this waste will require further processing (e.g., characterizing and repackaging) to meet the WAC before shipment to WIPP.

Once the WIPP-WAC is finalized, project planners will develop cost estimates and schedules to implement the SRS solid waste management strategy. There are no technology or capacity needs to discuss at this time.

4.1.1.1.B.3 TREATMENT OPTION INFORMATION

Please see the SRS solid waste management strategy in Section 4.1.B of this chapter.

4.1.1.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The TRU program cost is currently estimated at more than $1.1 billion. This is based on preliminary estimating efforts which will require refinement as the TRU program is better defined.

Uncertainty Issues

The MTRU waste stream will be processed to meet the WIPP-WAC, provided WIPP is granted a No-Migration Determination from the EPA. Budget and schedule uncertainties exist regarding the handling of this waste stream. Transportation of this waste stream to WIPP raises an issue that will be addressed by the affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

4.1.1.1.C SR-W027 Solvent/TRU Job Control Waste ..

4.1.1.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W027

The preferred option for this waste stream is to assay, sort, size-reduce, and characterize the stream in the TRU Waste Certification/Characterization Facility (TWCCF), followed by preparation for shipment to, and disposal at, WIPP.

Background Information:

This waste stream is a defense-related TRU waste and 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. This waste differs from SR-W026 because solvent rags are suspected of being in the waste. 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

- Current volume through 09/30/95 is 3362 m^3. This inventory reflects a decrease from the 09/30/94 inventory. The decrease is due to a reallocation among waste categories (e.g., mixed TRU, mixed LLW, etc.) based on a query of 1995 updated data on SRS waste managed as TRU.
- No future waste generation is expected because of a current program that segregates F-listed solvent rags from other job control waste. This waste stream ceased to be generated when the solvent rag program was implemented. Thirds TRU is the current waste stream which evolved from SR-W027 under current F-listed solvent waste segregation.

Waste Stream Composition

- Organic debris

Waste Codes

- D001C (Low TOC Ignitable)
- D003D (Water Reactives)
- D004 (TCLP As)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- D018-D019 (characteristic organics)
- D022-D026 (chloroform, O-cresol, M-cresol, P-Cresol, total cresols)
- F001-F003, F005A (halogenated and nonhalogenated spent 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 (Mehtylene chloride)
- U133 (Hydrazine)
- U134 (Hydrogen fluoride)
- U144 (Lead acetate)

- U151C (Mercury - nonwastewaters <260 m/kg with no residues from RMERC)
- U154 (Methanol)
- U161 (Methyl isobutyl ketone)
- U209 (1, 1, 2, 2 - Tetrachloroethane)
- U211 (Carbon tetrachloride)
- U220 (Toluene)
- U226 (l, 1, 1 - Trichloroethane)
- U239 (Xylenes)

LDR Treatment Standard

- Manage at the WIPP through a No-Migration Determination.

Waste Characterization

- Sampling and analysis 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})
- Alpha emitters (Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241}, U^{233}) are present.
- Waste is contact handled.
- Mixed transuranic waste (MTRU)

4.1.1.1.C.2 TECHNOLOGY AND CAPACITY NEEDS

The total volume of MTRU waste at SRS is substantial and therefore, the need for appropriate storage while DOE develops the WIPP Waste Acceptance Criteria (WAC) and awaits EPA approval of the No-Migration Petition is significant. After the WIPP-WAC is approved, this waste will require further processing (e.g., characterizing and repackaging) to meet the WAC before shipment to WIPP.

Once the WIPP-WAC is finalized, project planners will develop cost and schedules to implement the SRS solid waste management strategy. There are no technology or capacity needs to discuss at this time.

4.1.1.1.C.3 TREATMENT OPTION INFORMATION

Please see the SRS solid waste management strategy in Section 4.1.B of this chapter.

4.1.1.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The TRU program cost is currently estimated at more than $1.1 billion. This is based on preliminary estimating efforts which will require refinement as the TRU program is better defined.

Uncertainty Issues

This MTRU waste is to be prepared to meet the Waste Acceptance Criteria for WIPP, provided WIPP is granted a No-Migration Determination from EPA. Budget and schedule uncertainties exist regarding the handling of this waste stream. Transportation of this waste stream to WIPP raises issues to be addressed by affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

Section 4.2 Mixed Transuranic Waste Stream Proposed for Offsite Shipment

Section 4.2.1 Waste Shipped Offsite for Treatment

4.2.1.1 WASTE SHIPPED TO ROCKY FLATS

4.2.1.1.A SR-W053 Rocky Flats Incinerator Ash

4.2.1.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W053

The preferred treatment option for the Rocky Flats Incinerator Ash waste stream is to return the waste to Rocky Flats for consolidation and treatment with similar wastes.

Background Information:

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. SRS concurred with the declaration and placed the ash in a satellite accumulation area. Rocky Flats will be addressing disposition of this waste through a separate compliance order. Rocky Flats has not included the ash in its STP.

Volume
- Current volume through 09/30/95 is 0.1 m^3.
- No future waste generation is expected because this waste originally came to SRS as sample material to run plutonium extraction studies. Once the Rocky Flats ash was declared a hazardous waste, plutonium studies were canceled.

Waste Stream Matrix
- Inorganic sludge/particulate

Waste Codes
- 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, F002, F005A (halogenated and nonhalogenated spent solvents)

LDR Treatment Standard
- Rocky Flats will be performing an option analysis to determine management of this waste in a separate action to the STP. Final disposition of the ash may be management at WIPP through a No-Migration Determination or some other alternative, including reprocessing, that satisfies the requirements set in the compliance order.

Waste Characterization
- Process knowledge 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
- Waste is contact handled.
- Mixed transuranic waste (MTRU)

4.2.1.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

Rocky Flats is performing an option analysis. Results of that analysis will identify technology and capacity needs.

4.2.1.1.A.3 TREATMENT OPTION INFORMATION

It is much more cost-effective for SRS to return this small volume of waste to Rocky Flats than to characterize, develop treatment methods for, and treat the waste while Rocky Flats takes action for their large volume of identical waste. Rocky Flats is performing an option analysis to determine the preferred treatment for their inventory of incinerator ash.

Facility Status

According to a U. S. Government memorandum dated 8/4/94 from Paul Cote, Acting Director Waste Management Division Rocky Flats, to Virgil Sauls, DOE-SR Solid Waste Division, this waste stream is:

> "...technically acceptable for treatment at Rocky Flats Environmental Technology Site (RFERTS), based upon the fact that RFERTS is in the process of developing treatment capacity for apparently identical incinerator ash as part of the RFERTS Mixed Residue Reduction Program...
>
> The development of this treatment capacity for mixed residues is subject to a waiver by the State of Colorado from the Federal Facilities (sic) Compliance Act Site Treatment Plan requirements in accordance with RCRA §3012(b)(5). Therefore, the planning process and compliance order requirements are not the same as those anticipated for the FFCAct STP. RFERTS may need to request (from the State of Colorado) a modification to the Mixed Residue Settlement Agreement and Compliance Order on Consent to accept the ash for treatment. The type of treatment capacity to be developed and the schedule are not finalized.
>
> In addition to meeting Colorado permit requirements, RFERTS proposes to receive ash for treatment only after the treatment capacity is operational, now assumed to be around 2006, and only after adequate characterization to verify the acceptability of the waste."

4.2.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost for management of this waste stream is less than $250,000.

Uncertainty Issues

This MTRU waste is to be shipped back to the Rocky Flats DOE site where it may be prepared to meet the Waste Acceptance Criteria for WIPP, provided WIPP is granted a No-Migration Determination from EPA or undergo another management alternative determined through a compliance order developed for the Rocky Flats Incinerator Ash. Because of the small volume of this waste stream, it should be consolidated with the TRU material at Rocky Flats for treatment and packaging. Transportation of this waste stream to Rocky Flats for treatment raises issues to be addressed by affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

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CHAPTER 5 HIGH-LEVEL WASTE

Note: See Table 3, Chapter 3, Volume II for EPA Hazardoüs Waste Code Subcategories.

Section 5.1 High-Level Waste Treated Onsite in Existing Facilities

Section 5.1.1 Defense Waste Processing Facility

5.1.1.1 WASTE STREAMS FOR VITRIFICATION

5.1.1.1.A SR-W016 221-F Canyon High-Level Liquid Waste

5.1.1.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W016

The preferred treatment option for 221-F Canyon High-Level Liquid Waste is removal of the low-level component of the waste stream by evaporation with treatment at the F-Area and H-Area Effluent Treatment Facility, or at the In-Tank Precipitation Unit with Stabilization at the Z-Area Saltstone facility, followed by High-Level Waste Vitrification in the Defense Waste Processing Facility (DWPF).

Background Information:

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
- Current volume through 09/30/95 is 53,600 m^3.
- Expected 1996-2000 volume will be 8771 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive wastewater)
- D005A (TCLP Ba)
- D007 (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011 (TCLP Ag)
- Nonwastewater slurry

LDR Treatment Standard
- All waste codes = specified technology = Vitrification of high-level mixed radioactive wastes

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based on availability of analysis.

Radiological Characterization
- Total activity for radiological characterization is 6.81 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

5.1.1.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

Vitrification is the specified technology for all of the waste codes in SRS high-level wastes. These wastes are generated during extraction of plutonium (Pu) from target assemblies and the dissolution of spent fuel rods. DWPF was designed with capacity to treat the identified existing and future high-level liquid waste streams at SRS.

5.1.1.1.A.3 TREATMENT OPTION INFORMATION

The high-level waste tanks in F and H Areas currently store a total volume of almost 130,000 m^3 of salt solution, saltcake, and sludge generated mostly from the dissolution of target assemblies irradiated in the SRS reactors. It is expected that an additional 13,500 m^3 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.

The total volume of high-level liquid waste is not treated at DWPF. Waste from the separations facilities is sent to the high-level waste tank farm, and kept in a tank for a minimum of one year to allow short-lived, highly radioactive isotopes to decay. The waste solution is then sent to an evaporator to reduce the volume placed in storage. Evaporator overheads from concentrating the salt waste in the tank farms are treated and released via the F and H ETF. The ITP process is designed to convert the soluble salts into an insoluble precipitate in solution which is filtered to separate the solid precipitate from the liquid solution. The liquid filtrate is transferred to Tank 50 which is the feed tank for the Z-Area Saltstone Manufacturing and Disposal Facility. The resulting precipitate slurry is transferred to the DWPF Vitrification Facility.

Borosilicate glass has been determined to be the best stabilization matrix and also represents the specified technology identified by EPA for the high-level waste stream.

At a 75% rate of operation, DWPF is expected to process approximately 190,000 kg of high-level liquid waste per year.

DWPF is operated under an industrial wastewater permit. Several permit modification have been issued since the DWPF was first designed for new construction to remove interfering containments or to make the operation safer.

TCLP tests of simulated high-level wastes were done on both levels in the range of expected wastes to be processed in DWPF and at three times the level of metals expected. These tests indicated that the wasteform produced at DWPF will remove the hazardous characteristics (reference WSRC-IM-91-116-13, Rev. C).

5.1.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

A budget reevaluation for DWPF activities has recently been completed for treatment of both this waste, SR-W016, and waste stream SR-W017.

A *Pro Forma Funding and System Attainment Addendum to the High-Level Waste System Plan* provides a sensitivity analysis to determine the program improvement or degradation that occurs at different levels of funding. Five cases were developed to bound the SRS HLW system. The Addendum highlights the total program life-cycle cost at five funding levels. All five cases were developed using the same program planning basis. The basis required that significant productivity improvement commitments be incorporated and previously planned startup reductions be implemented prior to allocating funding. Funding was then allocated according to the following priorities:

1. Support activities that protect the health and safety of workers and the public, and safely maintain existing waste inventories
2. Support "in progress" projects/programs to handle waste safely
3. Fund activities supporting DWPF sludge startup
4. Fund activities supporting DWPF combined sludge and precipitate operations
5. Maintain continuity of operations at low processing attainments
6. Fund productivity improvement programs
7. Increase system attainment
8. Reduce program risk

This method of funding allocation maximized the funding provided to the Waste Removal and Replacement High-Level Waste Evaporator Projects, thereby maximizing the attainment rate for the overall High-Level Waste System. No funding was provided for emergent work activities.

The five cases are described below:

Case 1: Minimum Life-cycle Cost – The Minimum Life-Cycle Cost Case was developed to model the best overall schedule and cost achieve the earliest program completion. No fiscal year funding limitations were placed on this case. In Case 1, the program can be completed as early as 2013, at a total program cost of $11.2 billion, in funding year dollars (or $8.7) billion in constant year dollars). 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, are met or exceeded.

Case 2: Balanced Funding – The Balanced Funding Case was developed with a recognition that the fiscal year funding limitations are a reality in the DOE complex. Therefore, the funding levels were moderately constrained resulting in an increase in the overall Life-cycle Cost versus Case 1 while maintaining a good accomplish rate for the program. In Case 2, the program can be completed in 2015, at a total program cost of $13.1 billion, in funding year dollars (or $9.8 billion in constant year dollars). 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, are met or exceeded.

Case 3: Projected Funding – The Projected Funding Case was developed using the current funding guidance provided by DOE-HQ. This funding level results in a reduced production attainment for the program and significantly increases the life-cycle cost versus Cases 1 and 2. In Case 3, the program will be completed in 2021, at a total program cost of $17.3 billion, in funding year dollars (or $11.8 billion in constant year dollars). *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, are met just in time.* Case 3 most closely matches Savannah River's current long-term plans for operating the High-Level Waste System and is the scenario profiled in the STP Reference Document Cost Estimate Sheet.

Case 4: Reduced Funding – The Reduced Funding Case was developed to illustrate the impact of further funding reductions. Even relatively small additional funding reductions in the early years are very disruptive to the program and greatly increase the overall life-cycle cost. This is primarily due to delays in the waste removal and sludge processing required to prepare feed for DWPF. In Case 4, the program will be completed in 2035, at a total program cost of $32.9 billion, in funding year dollars (or $17.6 billion in constant year dollars). 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, are not met.

Case 5: Maximum Life-Cycle Cost – The Maximum Life-Cycle Cost Case was developed to provide a bounding case which would illustrate the lowest sustainable production rate for DWPF. This case pushes program completion out to 2066 and results in an inappropriate expenditure of funds. In Case 5, the program will be completed is 2066, at a total program cost of $99.8 billion in funding year dollars (or $30.4 billion in constant year dollars). 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, are not met.

Reference: HLW-OVP-94-0145, *High-Level Waste System Plan, Revision 4, Addendum, Pro Forma Funding and System Attainment Analysis*, November 30, 1994

<u>Uncertainty Issues</u>

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this waste stream at this time.

5.1.1.1.B SR-W017 221-H Canyon High-Level Liquid Waste

5.1.1.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W017

The preferred treatment option for 221-H Canyon High-Level Liquid Waste is removal of the low-level component of the waste stream by evaporation with treatment at the F-Area and H-Area Effluent Treatment Facility, or at the In-Tank Precipitation Unit with Stabilization at the Z-Area Saltstone Facility, followed by High-Level Vitrification in the Defense Waste Processing Facility (DWPF).

Background Information:

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
- Current volume through 09/30/95 is 72,817 m^3.
- Expected 1996-2000 volume will be 6,018.4 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive 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 = Vitrification of high-level mixed radioactive wastes

Waste Characterization
- Sampling and analysis 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 37.8 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

5.1.1.1.B.2 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 recovery of enriched uranium. DWPF was designed with capacity to treat the identified, existing, and future high-level liquid waste streams at SRS.

5.1.1.1.B.3 TREATMENT OPTION INFORMATION

The high-level waste tanks in F and H Areas currently store a total volume almost 130,000 m^3 of salt solution, saltcake, and sludge generated mostly from the dissolution of target assemblies irradiated in the SRS reactors. It is expected that an additional 13,500 m^3 of high-level liquid waste from both F 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.

The total volume of high-level liquid waste is not treated at DWPF. Waste from the separations facilities is sent to the high-level waste tank farm and kept in a tank for a minimum of one year to allow short-lived, highly radioactive isotopes to decay. The waste solution is then sent to an evaporator to reduce the volume placed in storage. Evaporator overheads from concentrating the salt waste in the tank farms is treated and released via the F-Area and H-Area ETF. The ITP process is designed to convert the soluble salts into an insoluble precipitate in solution which is filtered to separate the solid precipitate from the liquid solution. The liquid filtrate is transferred to Tank 50 which is the feed tank for the Z-Area Saltstone Manufacturing and Disposal Facility. The resulting precipitate slurry is transferred to the DWPF Vitrification Facility.

Borosilicate glass has been determined to be the best stabilization matrix and also represents the specified technology identified by EPA for the high-level waste stream.

At a 75% rate of operation, DWPF is expected to process approximately 190,000 kg of high-level liquid waste per year.

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.

TCLP tests of simulated high-level wastes were done on both levels in the range of expected wastes to be processed in DWPF and at three times the level of metals expected. These tests indicated that the wasteform produced at DWPF will remove the hazardous characteristics (reference WSRC-IM-91-116-13, Rev. C).

5.1.1.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is included in the cost of waste stream SR-W016. The budget status discussion in Section 5.1.1.1.A.4 also applies to this waste stream.

Uncertainty Issues

No significant uncertainties (technical, budgetary, permitting, etc.) are identified or anticipated for this 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.

Section 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 cleanup 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 deconned (potentially in a containment building or in a tank/container in a 90 day staging area). Combustible debris may be incinerated at the CIF. Recoverable wastes and sludges may be incinerated at CIF (if organic or combustible debris) or stabilized at the CIF ashcrete unit if only metal contaminants are present.

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 by-products. In cases where investigations confirm the presence of contamination and the by-products 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 by-products 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 for the management of 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 and rinse waters 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 which 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 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 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.

ER has developed four general IDW waste stream records which have been included in the latest update of the Mixed Waste Inventory Report (MWIR). 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. 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 Personnel 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.

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 2/28/95. 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 enabling 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, using the same or similar process as was used to develop other preferred treatment options, and schedule will be identified.

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. 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 cleanup 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 the attached Table 6.1, "Environmental Mixed Wastes Forecast," are based on the best available information. These estimates will continue to be updated as cleanup 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.

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, that 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 WM-EIS planned case are listed in Table 6.1. Since planning is not complete for fiscal years beyond 1996, no information is available on the source locations. This information is compiled from the most recently estimated volumes of mixed waste.

Table 6.1 – Environmental Restoration Mixed Wastes Forecast

Calendar Year	Source Location	Waste Stream	EPA Waste Code/Isotopes	Volume
1996	• Old burial ground solvent tanks	Sludge, soil, equipment, tools, clothing (IDW Waste SR-W064, SR-W067)*	Metals and organics many radioisotopes	
	• Burial Ground Complex	Soil Samples, clothing	Metals, analysis needed/Cs^{137}, H^3, Co^{60}, Sr^{90}, Pu^{238}, Pu^{239}	
	• M-Area Equipment Dismantling	SR-W018 SR-W037-Scrap Metal Recycling		
	• SRL Seepage Basin	SR-W012		
	• Lab Waste	SR-W070		371 m^3
1997	• Burial Ground Complex	Soil Samples, clothing	Same as above	
	• SRL Seepage Basin	Soil Samples Clothing (IDW Waste SR-W064 & SR-W067)*	Same as above	
	• Lab Waste	SR-W070		105 m^3
1998	• Lab Waste	SR-W070		4 m^3
1999	• Lab Waste	SR-W070		
	• Old TNX Basin	Soil Samples, Clothing (IDW Waste SR-W064, SR-W067)*		9 m^3
2000	• Lab Waste	SR-W070		
	• Ford Bldg. Seepage Basin	Soil Samples (IDW waste SR-W064, SR-W067)*		
	• Ford Bldg. Waste Site	Soil Samples Clothing (IDW waste SR-W064 & SR-W067)*		24 m^3

*IDW waste stream numbers are temporary place holders 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 2.3.4, Volume I of the STP.

Section 6.2 Decommissioning and Decontamination (D&D) Waste

A modest increase in decommissioning (D&D) of facilities at the Savannah River Site was initiated in fiscal year 1995 using surplus funds. This is expected to continue in fiscal year 1996 and beyond, although the only D&D projects that are budgeted are for surveillance and maintenance of the Heavy Water Components Test Reactor (HWCTR) and D&D of the 232-F Tritium Facility. The HWCTR activity is not expected to generate any mixed waste.

D&D work performed during this phase in fiscal year 1994 included preliminary decommissioning work on the 232-F Tritium Facility and the 230-H Beta-Gamma Incinerator (BGI). The projected mixed waste from 232-F could include mercury, oil contaminated with tritium, and radioactively contaminated lead. The Beta-Gamma Incinerator was a demonstration unit used to incinerate contaminated solvents and other material. Some of the residual contamination could be mixed waste. 232-F has been characterized and detailed waste estimates prepared, BGI waste estimates are based on limited information. The waste estimates from these facilities have been rolled into existing waste streams discussed in Chapter 3.

The D&D project work performed in fiscal year 1994 also involved dismantling surplus auxiliary buildings that had no radioactive contamination but contained asbestos in transite and insulation panels and minor quantities of lead. It is expected that this type activity will continue in Fiscal Year 1995 and beyond. Some possible candidate buildings for FY 95 were included in the waste estimate which include buildings that have radioactive contamination. It was considered prudent to include some mixed waste generation in these estimates on the basis that whenever radioactive contamination is present there will probably be some mixed waste. The buildings that were included in the estimate are only representative of the buildings that might be selected if funding becomes available. The type of mixed waste cannot be estimated at this time, and the waste volumes are best guesses.

D&D funded project activities during FY 96 are limited to the 232-F and HWCTR projects.

For FY 96, 232-F decommissioning project work moves into the waste operations (field) activities. Sanitary, Low Level Radioactive, Mixed, and Hazardous Wastes will be removed, packaged, transported, and dispositioned in accordance with approved SRS waste certification plans and procedures. All field activities will be completed by July, 1996 and the project will be closed out before the end of the fiscal year.

In FY 96, the HWCTR project will move into the characterization phase. The characterization will involve sampling to determine the types and quantities of constituents present in the facility. The only wastes generated during FY 96 are those associated with sampling and analysis. These wastes will be stored in HWCTR until approved wastes streams are obtained. Upon completion of the characterization D&D will coordinate with the WSRC Environmental Protection Division to include the data in the Site Treatment Plan if appropriate.

As noted, all of the D&D activities beyond 232-F Tritium Facility D&D and HWCTR surveillance and maintenance are contingent. None are budgeted to date. When a specific project is funded, walkdowns and initial characterization work will be done to generate the best estimate of the volume and nature of mixed waste that could be generated. This information will be used to update the *Site Treatment Plan.*

Section 6.2 is based upon the D&D Waste Generation Forecast completed by the SRS Systems Engineering Department except 232-F, which B&W NESI has characterized and generated detailed waste estimates. The D&D Forecast covers a thirty-year time period. However, only a five year forecast is included to be consistent with other STP information.

The five-year estimate was based on buildings that were in the 1994 D&D Initiatives Plan, supplemented with a potential list of additional buildings that could be decommissioned by the year 2000.

The five-year estimates are rough because they are based primarily on building floor areas and contaminants listed in the Surplus Facility Inventory Assessment database that assumed waste volumes per unit area, as opposed to data from drawings and facility inspections. There is no apparent funding for D&D of most of these facilities (i.e., those beyond the near term D&D Initiatives Plan). This is all the information available. D&D will update the forecasts via the solid waste forecasting system as better information becomes available.

The five-year forecast and assumptions have been taken from the *Westinghouse Savannah River Company Thirty Year D&D Waste Generation Forecast for Facilities at SRS* (WSRC-RR-94-496).

<u>Assumptions</u>

1. The Surplus Facilities Inventory Assessment (SFIA) database is accurate. Facility floor area and general characterization information were used to arrive at the waste estimates presented.

2. For the five year period 1996 through 1999, facilities will be decontaminated and decommissioned to the degree that all buildings/facilities included will be removed unless otherwise specified in this report. For the years 2000 through 2004, it is expected the majority of the nonradiological facilities will be decontaminated and decommissioned to greenfield and the radiological facilities will be D&D to an extent determined on a case-by-case basis with future industrial use taken into consideration.

3. All facilities will be in a safe condition prior to decontaminated and decommissioned (i.e., all nuclear fuel or liquid waste will have been removed, systems flushed, and drained).

4. All surplus chemicals (including fuel/lubricants) stored in facilities will be drained/removed prior to D&D, and therefore, are not included in this estimate.

5. Residual chemicals are considered to be RCRA hazardous.

6. Salvage/reuse of equipment was considered only if mentioned in the Surplus Facilities Inventory Assessment (SFIA) database for a particular facility. Salvageable equipment volume was estimated at 15% of the total possible waste volume.

7. Volume reduction (including compaction and treatment) and recycling are not considered in this estimate.

8. For radiological facilities, the estimate includes removal of two feet of soil beneath the facility slab, only if the facility is completely decontaminated and decommissioned. Of the removed soil, 15% is assumed to be low-level radioactive waste. The remaining 85% is assumed to be free of any contamination (radiological and hazardous) and suitable for backfill.

9. For facilities with storage tanks (either above ground or below), the estimate includes minor to moderate soil removal if: (1) the SFIA database reported releases to soil as "unknown"; and/or (2) there is a reason to believe the tanks could have leaked (such as the tanks are old, are single shell carbon steel, etc.). Removed soil from a nonradiological facility is assumed to be hazardous waste.

10. Concrete rubble cannot be singled out in this estimate due to SFIA database limitations. No recycling of nonradioactive concrete rubble is considered.

11. Waste volume estimates were rounded to the nearest 10 cubic feet.

12. Groundwater remediation is not considered in this estimate.

13. All asbestos and asbestos containing material volumes are identified as Toxic Substance Control Act (TSCA) waste, regardless of contamination level (i.e., low-level radioactive asbestos volumes will be reported as TSCA waste, not low-level waste). If a facility had low-level TSCA waste, the percentage of low-level waste content was identified in the following tables. Note the "TSCA" column in these tables present total TSCA waste. Any low-level TSCA waste was not added to the "LLW" column.

14. For Pu^{238} production/processing facilities (e.g., old 221-HB-Line), approximately 43 ft^3 of solid waste per square foot of contaminated floor area is generated by D&D. Of this, approximately 50% is TRU waste (i.e., 21 ft^3); the rest is low-level waste (LLW). Less than 500 ft^3 is mixed waste (primarily lead shielding) per 5000 ft^2 of area.

15. For Pu^{239} processing facilities (e.g., old 221-FB-Line, SED facility), approximately 13 ft^3 of TRU waste is generated per square foot of contaminated floor area. Assume LLW waste volume is 1.25 times greater than the TRU waste volume.

16. For Pu^{238} and Pu^{239} production/processing facilities, assume the contaminated floor area is equal to the facility floor area.

17. Nonradiologically contaminated (clean) administrative facilities (offices, guardshacks, etc.) are empty facilities (i.e., all furniture, partitions, computers, office supplies, etc. have been removed). (Note: Nonradiologically contaminated facilities have TSCA and/or hazardous contamination.)

18. Empty mobile (trailer) administrative space will generate 3 ft^3 of D&D waste per ft^2 of floor area.

19. Empty administration space (with foundation) will generate 6 ft^3 of D&D waste per ft^2 of floor area (greenfield D&D).

20. Storage warehouses will be deinventoried prior to D&D.

21. Empty, nonradiologically contaminated (clean) storage warehouses (> 15 foot ceilings) will generate 8 ft^3 of D&D waste per ft^2 of floor area (greenfield D&D).

22. Process/production facilities and their support facilities (other than Pu^{238} and Pu^{239} processing facilities, and administrative facilities) will generate 12 ft^3 of D&D waste per ft^2 of floor area (greenfield D&D).

23. Identification of waste categories generated is based on the SFIA database general characterization information. If a waste category is listed in the SFIA database, in most cases volumes are estimated as follows:

    I. Nonradiological Facility

        (a) TSCA waste = 20% of total waste volume
        (b) Hazardous waste = 15% of total waste volume
        (c) Sanitary waste = 100% – (TSCA + Hazardous)

II. Radiological Facility

Percentages are estimated for the clean and contaminated areas of the facility. For the clean percentage, waste volumes are estimated following I above (for most cases). No "formula" has been developed for the radiological percentage, except that if a radiological facility contains hazardous material(s), a percentage of this quantity is assumed to be mixed waste. The estimated percentage of mixed waste would depend on what fraction of the facility is estimated to be contaminated. TRU waste is included in an estimate only if transuranic isotopes are mentioned in the SFIA record for the facility. The remaining radiological waste is then assumed to be low-level waste (low-level waste = 100% – (mixed + TRU)).

24. No reactors will be completely D&D during this period. The thick reinforced concrete center sections of Reactors R, P, L, K, and C Areas will remain in place along with the stack and support structure, the reactor and shielding, and the disassembly basins. The heat exchangers, main process pumps, and most of the stainless steel piping will be removed for the metal recycle program.

25. All pre-D&D activities generating waste by facility operations are not included in this waste estimate.

26. Lowest cost surveillance and maintenance (S&M) will include additional removal of hazardous and radioactive materials as part of reducing S&M hazards and costs. Limited facility dismantlement may also be accomplished to reduce S&M costs and reduce occupational risk.

27. D&D work will be driven by available funding. This report assumes funding will be available in the year the facility is forecasted for D&D.

28. In the 30-year period, the following facilities will not undergo D&D:

- Defense Waste Processing Facility (DWPF)
- Z-Area Saltstone Facility
- Effluent Treatment Facility (ETF)
- In Tank Precipitation (ITP) Facility
- Savannah River Technology Center (SRTC; except for SED Facility)
- Replacement Tritium Facility
- Type III Waste Tanks
- New Special Recovery Facility of 221-FB-Line
- 484-D Powerhouse Facility, 483-1D Water Treatment Facility and support buildings
- Burial Ground Facilities

29. High-level waste tanks to be D&D (i.e., Type I, II, and IV) will be closed in place. These tanks will be deinventoried prior to turnover to D&D. D&D will remove and stabilize residual wastes. Associated equipment and small buildings will be removed. Underground transfer piping, diversion boxes, etc. will remain in place.

30. Process sewer line removal and remediation is an ER responsibility.

31. All surplus powerhouse facilities will be sold in place to a salvage operator and removed from SRS.

32. Ten percent of the total waste estimate is incinerable waste.

33. The culvert fraction of TRU waste is 4% of the total TRU waste volume generated.

34. Canyon Building 221-F and 221-H will be de-inventoried and cleaned up with the building structures to remain.

Detailed Five-Year D&D Waste Generation Forecast

The following tables present the SRS D&D waste generation forecast for the years 1996 through 2000. The five-year forecast was developed from consideration of wastes generated from D&D of 49 facilities. Identification of the facilities to be D&D and the D&D time frame was provided by the Transition Decontamination and Decommissioning (TD&D) Department. The above assumptions apply to this forecast. To convert from cubic feet to cubic meters, multiply the cubic feet by 0.028.

1996 Bldg. No.	AREA	Building Name	Cubic feet Sanitary	Cubic feet TSCA	Cubic feet HAZ	Cubic feet LLW	Cubic feet MIXED	Cubic feet TRU
232	F	Manufacturing Bldg. (Tritium)* (d)	28150	10870(a)	130	34370	9130	0
109	R	Purge Water Storage Tank*	360	0	60	1110	190	0
122	R	Heavy Water Storage Building *	11250	8250#	2250	33000	6750	0
151-1	R	Electrical Distribution Building†	53820	16560	12420	0	0	0
151-2	R	Electrical Distribution Building†	105300	32400	24300	0	0	0
152	R	Electrical Transformer Near 701-3R	2730	840	630	0	0	0
191	R	Valve Pit	2890	890	670	0	0	0
704	R	Administration Building	73500	18000(c)	15750	40500	2250	0
		TOTALS-YEAR 1996	278000	87810	56210	108980	18320	0

* estimate includes soil removal beneath building
(a) approximately 90% of this value is low-level TSCA waste
(b) estimate includes minor soil removal due to existence of fuel UST; estimate includes equipment removal and building decon only
** approximately 67% of this value is low-level TSCA waste
# approximately 80% of this value is low-level TSCA waste
(c) approximately 13% of this value is low-level TSCA waste
(d) estimate includes soil removal beneath building
† These are concrete structures. After the breakers have been removed, there should be little or no RCRA or TSCA waste.

1997 Bldg. No.	AREA	Building Name	Cubic feet Sanitary	Cubic feet TSCA	Cubic feet HAZ	Cubic feet LLW	Cubic feet MIXED	Cubic feet TRU
701-1	C	Area Gatehouse	9750	3000	2250	0	0	0
701-2	C	Exclusion Area Fence Entry Point	9580	0	500	0	0	0
704	C	Area Administration & Service Bldg. *	45000	18000	13500	0	0	0
151-1	C	Electrical Substation	18250	5620	4210	0	0	0
151-2	C	Electrical Substation	18250	5620	4210	0	0	0
295	F	Stack for Building 232-F	0	0	0	1340	1340	0
		TOTALS-YEAR 1997	100830	32240	24670	1340	1340	0

* assume 13500 ft^3 (15%) of salvageable equipment per SFIA

1998 Bldg. No.	AREA	Building Name	Cubic feet Sanitary	Cubic feet TSCA	Cubic feet HAZ	Cubic feet LLW	Cubic feet MIXED	Cubic feet TRU
105-7	C	Change Building *	480	0	30	0	0	0
608	C	Change Facility	370	110	90	0	0	0
183-2	C	Water Clarification Facility (a)	15600	4800	4200	0	0	0
183-3	C	Water Clarification Diesel Gen. (b)	1870	0	1330	0	0	0
183-4	C	Water Clarification Support Facility (a)	18950	5830	5100	0	0	0
190	R	Cooling Water Pumphouse #	78000	24000	18000	0	0	0
186	R	Cooling Water Basin (25 Mgal)**	390000	120000	90000	0	0	0
412-5	D	Shelter and Shop Building	3510	1080	810	0	0	0
		TOTALS-YEAR 1998	508780	155820	119560	0	0	0

* assume 90 ft^3 (15%) of salvageable equipment per SFIA
(a) estimate includes soil removal beneath building
(b) estimate includes minor soil removal due to existence of diesel storage tank
** estimate includes equipment removal only
# estimate includes above grade D&D only

1999 Bldg. No.	AREA	Building Name	Cubic feet Sanitary	Cubic feet TSCA	Cubic feet HAZ	Cubic feet LLW	Cubic feet MIXED	Cubic feet TRU
607-1	C	Sewage Lift Station #1	280	0	20	0	0	0
607-2	C	Sewage Lift Station #2	250	0	50	0	0	0
607-7	C	Sewage Treatment Facility	15600	0	2750	0	0	0
607-9	C	Sewage Chemical Feed Building	3210	0	570	0	0	0
184-2	C	Powerhouse Support Facility *	2520	1010	880	0	0	0
191	C	Booster Pump Building	5300	0	940	0	0	0
105-1	C	Basin Deionizer Pad**	15300	0	2700	9000	1800	1800
108-3	C	Fuel Oil Loading Station	7	0	4290	0	0	0
904-1	C	Cooling Water Effluent Sump	0	0	0	5530	0	840
110	C	Helium Storage Tanks	1870	1660	430	0	0	0
152	C	Electrical Substation	3160	970	730	0	0	0
		TOTALS-YEAR 1999	47490	3640	13360	14530	1800	2640

* assume 760 ft^3 (15%) of salvageable equipment per SFIA; estimate includes soil removal beneath building

** estimate includes soil removal beneath building

2000 Bldg. No.	AREA	Building Name	Cubic feet Sanitary	Cubic feet TSCA	Cubic feet HAZ	Cubic feet LLW	Cubic feet MIXED	Cubic feet TRU
152-5	C	Secondary Substation for 707-C	2110	650	490	0	0	0
152-6	C	Secondary Transfer Station for 702-C	2340	720	540	0	0	0
152-7	C	Security Emergency Generator *	2350	0	480	0	0	0
184-6	C	Equipment Storage	3260	0	580	0	0	0
501	C	Emergency Generator *	1840	0	380	0	0	0
711	C	Maintenance Material Storage Bldg.	10400	3200	2400	0	0	0
186-1	C	Sodium Hypochloride Addition Facility	7650	0	1350	0	0	0
109	C	Purge Water Storage Tank	740	0	0	2310	0	0
614-2	C	Effluent Monitoring Building	1840	0	320	0	0	0
701-4	C	Shelter for Security Equipment	4560	0	240	0	0	0
706-8	C	Modular Office (Trailer)	10000	0	1760	0	0	0
706-9	C	Modular Office (Trailer)	10000	0	1760	0	0	0
704-3	C	Modular Office (Trailer)	5130	0	270	0	0	0
715	C	Gasoline Station (a)	600	0	1700	0	0	0
190	C	Cooling Water Pumphouse (b)	89700	27600	20700	0	0	0
186	C	Cooling Water Basin (25 Mgal) **	450000	120000	30000	0	0	0
715	L	Gasoline station (a)	600	0	1700	0	0	0
715	P	Gasoline station (b)	270	0	1320	0	0	0
		TOTALS-YEAR 2000	603390	152170	65990	2310	0	0

* estimate includes minor soil removal due to uncertainty in SFIA
(a) estimate includes moderate soil removal due to existence of fuel UST
(b) estimate includes above grade D&D only
** estimate includes equipment removal only

Section 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 are treated in a 90-day staging area or by elemental 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.

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 Clean Water 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 LDR-LDR-FFCA was superceded by the Approved STP and Consent Order 95-22-HW on September 29, 1995.

Section 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)

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 1, titled, "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 Building 645-2N in the Hazardous Waste Storage Facility 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 6 through 13.

Construction of the Consolidated Incineration Facility (CIF) has been completed and startup testing is in progress. 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 incineration process. Liquid waste will be temporarily stored in tanks while it is awaiting incineration. The stabilized ashcrete and blowdown resulting from the incineration process will be stored and/or disposed at the appropriate facilities.

Mixed Low-Level Waste – Tank Storage

- Process Waste Interim Treatment Storage Facility in M Area
- DWPF Organic Waste Storage Tank in S Area
- SRL Mixed Waste Storage Tanks at Savannah River Technology Center (SRTC)
- Burial Ground Solvent Tanks S29-S30 and Liquid Waste Solvent Tanks S33-S36 (Note: Tanks S23 through S28 are no longer in use.)

Burial Ground Solvent Tanks S23 through S30 are undergoing closure and will be replaced by new Tanks S33 through S36. A revision to the RCRA Part A has been approved adding Liquid Waste Solvent Tanks S33 through S36. During the closure of tanks S23 through S28, waste from S23 through S28 was transferred to S29 and S30. Waste from S29 and S30 will be transferred to S33 through S36 when operational. The total volume of waste in Liquid Waste Solvent Tanks S23 through S36 shall not exceed the current RCRA Part A capacity of 200,000 gallons. After certification of closure of the Burial Ground Solvent Tanks (S23 through S30), SRS will submit a final notice changing the capacity of the Burial Ground Solvent Tanks S23-S30 to zero and the Liquid Waste Solvent Tanks S33 through S36 to 120,000 gallons.

Table 1 – 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	645-2N	B	284,111(4) (1,075)
Mixed Waste Storage Building	E Area	643-29E	A	31,750 (120)
Mixed Waste Storage Building	E Area	643-43E	A	309,375 (1,171)
Mixed Waste Storage Shed	M Area	316-M	A	30,800 (117)
Mixed Waste Storage Pad	M Area	315-4M	A	600,000 (2,271)
TRU Pads	E Area	Pads 6-13	A	N/A(2)
			TOTAL	1,256,036(2) (4,754))

Mixed Low-Level Waste Tank Storage

Facility Name	Storage Area	Location	RCRA Status	Storage Capacity(1) Volume in Gallons (m^3)
Process Waste Interim Treatment	M Area	PWIT/SF	A	2,195,730 (8,311)
DWPF Organic Waste Storage Tank	S Area	430-S	A	150,000 (568)
SRL Mixed Waste Storage Tanks	SRTC	772-2A	A	52,310 (198)
Solvent Tanks Burial Ground Solvent Tanks	E Area	S23-S30	A (to be closed)	200,000(3) (757)
Liquid Waste Solvent Tanks	H Area	S33-36	A (new construction)	120,000(3) (454)
			TOTAL	2,518,040 (9,531)(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 uses storage capacity and storage space assigned to mixed TRU waste.
(3) Tanks S23-S28 have undergone interim closure. The 200,000 gallons will be eliminated and 120,000 gallons will be the revised capacity for new tanks S33-S36. The TOTAL is based on 120,000 gallon capacity for tanks S33 through S36.
(4) Capacity increased based on re-evaluation of facility.

7.1.1.2 STORED MIXED LOW-LEVEL WASTE INVENTORY

The inventory of waste currently stored in each of these facilities is given in Table 2, "MLLW Stored Inventory and Excess Capacity." These stored volumes, subtracted from the capacities listed in Table 1, result in the excess capacities listed in Table 2.

Table 2 – MLLW Stored Inventory and Excess Capacity

MLLW Container Storage

Facility	Stored Inventory Gallons (m^3)	Excess Storage Capacity[1] Gallons (m^3)
Mixed Waste Building 645-2N	99,664(377.2)	184,447(698.1)
Mixed Waste Storage Bldg. 643-29E	19,566(74.1)	12,184(46.1)
Mixed Waste Storage Bldg. 643-43E	69,730(263.9)	239,645(907)
Mixed Waste Storage Shed 316-M	13,562(91)	17,238(65.2)
Mixed Waste Storage Pad, 315-4M	0	600,000 (2,271)
TRU Pads	316,776(1,199)	N/A[2]
	TOTAL	1,053,514 (3,987.4)[2]

MLLW Tank Storage

Facility	Stored Inventory Gallons (m^3)	Excess Storage Capacity Gallons (m^3)
Process Waste Interim Treatment/Storage Facility	408,453 (1546.0)	1,787,277 (6764.9)
DWPF Organic Waste Storage Tank[3]	0 (0)	150,000 (567.8)
SRL Mixed Waste Storage Tanks	39,340 (148.9)	12,970 (49.1)
Burial Ground Solvent Tanks[4]	42,000 (159)	158,000 (598)

(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. Therefore the TRU pads have no MLLW capacity.
(3) This facility will begin storing mixed waste after the DWPF begins processing radioactive waste.
(4) Currently available storage capacity is limited to Tanks S29 & S30 due to closure of Tanks S23 through S28. The actual capacity of these two tanks is 46,350 gallons and the excess capacity is 4,350 gallons.

7.1.1.3 DESCRIPTION OF MLLW FACILITIES

Building 645-2N

Building 645-2N is part of the Hazardous Waste Storage Facility (HWSF) and is used only for storage of MLLW. Storage containers in 645-2N are typically 55-gallon drums (0.2 m^3) or 20 to 90 ft^3(.6 to 2.6 m^3) boxes.

Building 645-2N is a steel framed building with sheet metal siding and an impervious concrete slab-on-grade floor. The floor is subdivided into four storage cells. Each cell has a concrete dike capable of containing at least 10% of the maximum volume of wastes containing free liquids which the cell can store. In addition, each cell slopes to a 300-gallon (1.1 m^3) capacity sump. The building has lighting and forced ventilation.

Access to Building 645-2N, which is 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 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 measures 60 feet x 60 feet with a 50 feet x 50 feet storage pad area.

The storage area of the pad is curbed and includes a concrete sump to collect any leaks so that liquids found in the sump can be checked for radioactivity. If present, additional analysis is made for RCRA constituents. Waste stored in the building is packaged in a variety of drums (23-gallon, 55-gallon, 83-gallon [.09 m^3, .2 m^3, .31 m^3, respectively]) 20 ft^3 to 90 ft^3 steel boxes (0.6-2.55 m^3), and concrete casks used as shielding overpacks to reduce dose rate. 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 waste. The building is nearly identical in design to building 643-29E. Building 643-43E measures 160 feet x 60 feet overall with a 150 feet x 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 to collect leaks so that liquids found in the sump can be checked for radioactivity. If present, additional analysis is made for RCRA constituents.

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), and concrete casks used as shielding overpacks to reduce dose rate. Other containers, including special design containers, may also be used occasionally.

Building 316-M

The Mixed Waste Storage Shed, Building 316-M is used for storage of mixed low-level waste. The building measures 120 feet x 50 feet. The storage area of the building is 100 feet x 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' by 200' overall and is curbed on all four sides except for a 23 foot access way on the south side. It has a 134' by 199' storage area within the curbed area.

The pad has a 0.6 per cent 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, 90 ft^3/box). Other type containers, including special design containers, may be used occasionally. No liquid or multiphasic waste will be stored within the pad.

Process Waste Interim Treatment/Storage Facility (PWIT/SF)

The PWIT/SF consists of six treatment/storage tanks each with a capacity of 35,955 gallons (136.1 m^3) and four treatment/storage tanks each with a capacity of 495,000 gallons (1873.6 m^3).

The six small tanks are on a single diked pad. The tanks have sufficient shell strength and are fitted with vents and conservation vent valves to assure that they do not collapse or rupture. The base is free of cracks or gaps and can contain liquid materials until they can be removed. The base slopes to a sump which drains and collects accumulated liquid materials for testing and removal. The dike can contain the volume of any individual tank plus an additional capacity of 165,945 gallons (628.1 m^3). The pad is protected from rain water run-on by diking and a roof and full siding which covers all of the treatment/storage tanks and the pad. The tanks are elevated so they are protected from contact with accumulated liquids. The overflow for each tank is within the diked area.

The large tanks are covered double wall tanks with sufficient shell strength and pressure reliefs to assure that they do not collapse or rupture. The annulus volume of the tanks can contain any leak through the inner wall and valving enables accumulated liquid materials to be tested and removed from the annulus. The bases of the tanks are reinforced concrete free of cracks and gaps. Each tank will overflow to one of the other tanks.

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 inerted 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.

SRL (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 5,900 gallons (22.3 m^3) and are 10 feet in diameter x 11 feet high. Tanks H, J & K each have a capacity of 3670 gallons (13.9 m^3) and are 8 feet in diameter x 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 for washdown.

Solvent Tanks

Each of the eight Burial Ground Solvent Tanks, S23 through S30, are 10 feet 6 inches in diameter by 38 feet 10 inches long and has a capacity of 25,000 gallons (94.6 m^3). Each tank is constructed of 3/8-inch carbon steel with three coats of bitumastic paint applied for corrosion protection.

Each tank rests on four steel saddles that are on top of a concrete slab that slopes to the center and to one end. At the low end is a fully bituminous-coated 60-gallon (0.2 m^3) stainless steel sump that is designed to collect any liquid that may escape from the tank. A 30-millimeter (mil) polyvinyl chloride (PVC) oil resistant liner was placed in the excavations for S29 and S30 before the slabs and tanks were installed.

Tanks S23 through S28 have a seamless six mil polyethylene liner that was placed over them before backfilling. Additionally, two seamless oil resistant 20 mil sheets of PVC were placed over tanks S23 through S30 before approximately 2 feet 6 inches of soil overburden was placed over them. Following this, the area over each tank was asphalted. These measures minimize rainwater infiltration from coming in contact with the tanks, thus reducing the potential of corrosion.

The solvent in Tanks S23-S28 has been transferred to Tanks S29 and S30. Tanks S23 through S28 have undergone interim closure. The Liquid Waste Solvent Tanks S33 through S36 will be used to replace, or partially replace the capacity currently permitted for the Burial Ground Solvent Tanks S23 through S30 as discussed in Section 7.1.1.1. The approved RCRA Part A revision that SRS submitted to include tanks S33 through 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 will be constructed of carbon steel and will be 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 Mixed TRU Waste

There are currently 19 mixed TRU waste storage pads located at the burial ground in the E-Area. Mixed TRU waste is stored on storage pads 1-17. Pads 18 and 19 presently do not have any waste stored on them. Pads 18 and 19 were approved for interim storage in January 1996 by SCDHEC.

The management of mixed TRU waste on the TRU storage pads includes waste with TRU constituents above 10 nCi/g since SRS does not presently have the capability to distinguish between wastes below 100 nCi/g from that above the 100 nCi/g.

The 19 storage pads are included in the RCRA Part A permit for SRS. TRU Pads 1-5 are covered with soil and managed as a RCRA Subpart X Miscellaneous Unit while TRU Pads 6-19 are managed as a RCRA Subpart I Container Storage Unit. Pad 6 is partially covered with soil.

Storage containers on the pads consist mainly of 55-gallon ($0.2m^3$) carbon steel and galvanized steel drums. Other containers include concrete culverts that contain either 55-gallon drums or small polyboxes, and large carbon steel boxes, steel and concrete casks, and numerous steel boxes of various sizes.

7.1.2.1 MIXED TRU 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, the SRS was granted a variance from a portion of the South Carolina Hazardous Waste Management Regulations (SCIIWMR), 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, after which time all containers on pads 14 through 17 must meet the aisle space requirements. Aisle spacing will also be incorporated on pads 18 and 19.

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 of 1991, SRS submitted a detwatering plan to the South Carolina Department of Health and Environmental Control (SCDHEC) that outlined a procedure for dewatering the drums. The SRS has completed dewatering of the TRU drums and the drums are being appropriately labeled and stored on enclosed TRU pads 14 through 17. These four pads (14 through 17) are presently the only TRU pads with weather enclosures.

7.1.2.2 MIXED TRU WASTE STORED INVENTORY

The inventory of mixed TRU waste stored on pads 6 through 17, including some MLLW, is 1,385,570 gallons (5,244.4 m^3) as of October 1, 1995. Of this stored volume 316,775 (1,199 m3) is MLLW and 1,068,795 gallons (4,045.4 m^3) is mixed TRU waste.

Pads 1 through 5 could not be considered in determining the amount of excess capacity due to the historical basis on which pads 1 through 5 were granted interim status. The capacity of 1.111 million gallons (4,205.1 m^3) for pads 1-5 was thus subtracted from the total volume for pads 1 through 17 giving a difference of 3.52 million gallons ($13,323.2m^3$) of interim status capacity associated with only pads 6 through 17. The excess capacity of 2,134,430 gallons ($8,078.8m^3$) is the difference between this value and the amount of stored waste (and is exclusive of pads 1 through 5). This amount of apparent excess capacity is less than the actual excess capacity of mixed TRU waste by 316,775 ($1,199m^3$) of MLLW stored on TRU pads 6 through 17. Relocating the MLLW to an approved MLLW storage area would provide a mixed TRU waste excess capacity of 2,451,205 gallons ($9,277.8m^3$).

7.1.2.3 DESCRIPTION OF MIXED TRU 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 an asphaltic spray (for erosion control). Mounding over the pads provides shielding for the stored radionuclides and protection of the wasteforms from nature and intrusion. The top of Pad 6 is open with soil pushed up along two sides and one end.

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 6 through 19 are not covered with soil and are not expected to be covered because of the impending startup of a federal repository.

Each of the 19 TRU pads is sloped to the center and to one end. This directs any liquid to a drain which is connected to a sump. The liquid in each sump is sampled, analyzed, and, if there is any radioactive contamination, it is removed by pumping and is managed accordingly.

TRU pads 14 through 17 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. Because the enclosures will be used in a Radiological Buffer Area and will be associated with radioactively contaminated waste, when they are no longer in use they will be disposed of as low-level waste.

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. HLWs are produced during reprocessing of spent nuclear fuel or are derived from other processes which handle HLWs. 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 which 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 HLW stored in all of the tanks in the F-Area Tank Farms is approximately 33,400,000 gallons (126,419 m^3) as of October 1, 1995. The waste stored in the Type I/II tanks or Type IV tanks is included as part of the total stored inventory, however, the space in these tanks cannot be credited toward available storage capacity (The Type I/II tanks cannot receive additional HLW and the Type IV tanks are used to store only low activity waste.). Of the 27 remaining Type III/IIIA tanks (Table 3), six tanks are dedicated for processing of HLW for final disposal. The inventory in 21 of the 27 tanks is 23,700,000 gallons (89,705m³). The excess available capacity is approximately 1,000,000 gallons (3,.785m³). This excess capacity does not take into account dedicated capacity for emergency storage in an amount equivalent to the volume of two tanks, nor the tanks noted above for HLW processing.

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 the F/H ETF for final treatment prior to discharge to Upper Three Runs Creek. Mercury is recovered from the wastewater and collected for potential 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. When placed in operation, the In-Tank Precipitation (ITP) process will convert the soluble salts into an insoluble precipitate in solution which will be filtered to separate the solid precipitate from the liquid solution. The liquid filtrate will be transferred to Tank 50 which is feed for the Z-Area Saltstone Manufacturing and Disposal Facility. The resulting precipitate slurry will be transferred to the DWPF Vitrification Facility.

The F-Tank Farm contains 22 tanks and the H-Tank Farm contains 29 tanks. However, due to a history of leakage, Tank 16, a Type II tank, has been emptied, cleaned and removed from service and is not included in this discussion.

Table 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	4	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.

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 five-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 five-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. Each primary tank is surrounded by a full-height carbon steel secondary tank that is capable of containing the complete volume of the 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 prestressed 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).

Section 7.2 Future Storage Capability Needs for SRS Wastes

Requirements for future storage capability for mixed TRU and mixed low-level wastes have been determined from a study recently completed (December 1995). The study included a detailed evaluation of containerized wastes currently stored on the TRU pads and in the mixed low-level waste storage facilities considering current container storage configurations, future waste generation, and a determination of the adequacy of these storage facilities to store current and future wastes. The results of the study showed that there is adequate storage space for MTRU waste containers through the year 2000, however, it would be necessary to store some of the projected MLLW containers on available storage space on the TRU pads in order to obtain adequate storage space through the year 2000. Storage constraints will be partially alleviated when the Consolidated Incineration Facility (CIF) begins operation and treatment of stored mixed low-level wastes.

The future generation of MTRU and MLLW for the period of FY 1996 through FY 2000 are presented in the following paragraphs based on the recently published "Waste Forecast, FY 1996 and Outyears" of September 1995.

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 may change drastically as missions of facilities producing HLW change.

7.2.1 <u>Mixed Low-Level Waste</u>

The future generation of mixed low-level waste derived from the waste forecast is given in Table 4. These forecasted wastes include wastes generated by ER activities and D&D of Building 232-F. This forecasted waste in Table 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 4 Future Generation of Mixed Low-Level Waste

Units	MLLW Volume					
	FY96	FY97	FY98	FY99	FY2000	TOTAL
Gallons	198,377	63,343	36,195	37,241	41,171	376,627
Cu. Meters	750.9	239.7	137	141	157	1,425.6

These future wastes forecasted over the five year period, FY96 through FY2000, are contained in 1,187-55 gallon drums, approximately 385-B25 (or equivalent) boxes and 45-SRTC casks, 5-ITP filters and a few additional miscellaneous containers. Storage of the total of the forecasted waste will exceed the storage capability of the MLLW storage facilities and 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 FY95. Filter paper take-up rolls in 103-B25 boxes have been removed from MLLW storage buildings 645-2N and 316-M, shredded and stored in 643-43E leaving storage space available in 645-2N. Although some MLLW is in storage in Building 316-M, it is planned that future use of Building 316-M may be discontinued.

Building 643-29E is currently filled and cannot 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 2.

B25 boxes and 55 gallon drums will be stored in 645-2N and 643-43E. SRTC casks, ITP filters and miscellaneous containers will be stored on vacant areas of the TRU pads. The projected future waste containers to be placed in storage occur over the five year period FY96 through FY2000. The storage capacity of the MLLW storage buildings is based on two things: (1) container receipts spread over the five years as indicated by the annual generation in Table 4, and (2) projected treatment of MLLW in the CIF which will free MLLW storage space. Projected treatment in the CIF will reduce both the current inventory and future generation of MLLW by 50%.

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. It may be necessary to add a cover to one of the 20-22 group of storage pads to provide covered storage for some of these wastes, particularly drums. Approval of the Part B renewal application for the Mixed Waste Storage Buildings, currently under review by SCDHEC, is expected by approximately the end of 1QFY97, which will enable activation of storage pads 20-22 for mixed waste storage use. Also, about half of TRU pad 15 will be vacant after aisle spacing of drums on TRU pads 14-17 is completed, and although it is desired to maintain this vacant area for a staging and temporary operating area; potentially, it could be used for temporary covered storage of MLLW.

The plan for interim MLLW storage tentatively retains the approximately 316,776 gallons ($1,199m^3$) of MLLW on the TRU pads, although some containers have been shipped offsite and plans are being made for removal of other containers. TRU pad 9 contains the largest fraction of MLLW on the TRU pads. Approximately half of TRU pad 9 contains Naval Fuels Waste that has been reclassified as low-level waste. Effort is underway to relocate these containers from pad 9 to a non-RCRA storage location. After this occurs it will make about half of pad 9 available for storage. The waste on the other half of TRU pad 9 consists mainly of solvent rag MLLW. Shredding of this waste in preparation for treatment in the CIF began in December 1995. This work was terminated in January 1996 with the contents of 54 B25 boxes shredded. There are approximately an additional 215-B25 boxes yet to be processed.

This storage scenario will enable all of the forecasted MLLW to be stored in RCRA Part A or Part B storage facilities. There are operational aspects of the specific movements and storage locations for these waste containers that must be considered and therefore, this storage scenario is subject to change depending on the requirements prevailing at the time and storage space that will be available in specific facilities as various events transpire.

The part A revision approved by SCDHEC provided an interim status capacity of 600,000 gallons (2,271m^3) from the available capacity of TRU pads 6 through 17 for the M-Area pad (315-4M). This enables storage of 200,000 gallons of M-Area stabilized sludge and 250,000 gallons (946.2m^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 of the M-Area pad can accommodate the storage of the CIF MLLW through approximately mid-FY-2003.

The MLLW currently stored in tanks is shown in Table 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 *Mixed TRU Waste*

The recently completed study 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 is required to support storage of the forecasted containers through FY2000. 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 will continue to be stored on the TRU pads. Storage of MLLW on the TRU pads is necessary to support storage in excess of the storage capability of the MLLW storage facilities. This necessitates the addition of more storage area for the forecasted containers including a portion of the drums retrieved from pads 2-6.

The interim status capacity of 4,031,000 gallons (15,257m^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 9/30/95, is summarized in Table 5.

Table 5
Available Interim Status Capacity of TRU Pads Based on 9/30/95 Inventory

Volume Category	Gallons (m^3)
Total interim status capacity of pads 1-19, Section 7.1.2.1	4,031,000 (15,257.4)
LESS: Total mixed TRU and MLLW stored on TRU pads 1-19	2,116,163 (8,009.7)
TOTAL AVAILABLE UNUSED CAPACITY OF TRU PADS 1-19	**1, 914,837 (7248)**

There is approximately 363,378 gallons (1,375.4 m^3) of TRU waste stored on TRU pads 6-19. In addition there were 55 black boxes of TRU waste on pads 18 and 19 with a volume of 622,195 gallons (2,355 m^3). Twenty of these black boxes (226,195 gallons, 856.1 m^3), though received and placed on pad 18 in September of 1995, are actually considered part of the forecasted waste generation for FY96 and are included in Table 6. These black boxes of TRU waste have been moved to a non-RCRA storage location leaving pads 18 and 19 empty.

In general, waste containers on the TRU pads are not arranged with aisle spacing. TRU pads 6 through 13 are under a variance from aisle spacing, however, as a result of the permitting process for TRU pads 14 through 17, aisle spacing is required on TRU pads 14 through 17 by December 31, 1998. Aisle spacing on pads 14 through 17 is in progress. Aisle spacing for MTRU and MLLW on pads 18 and 19 will be maintained.

The TRU pads are largely occupied by various waste containers including MTRU, TRU and MLLW containers. Some storage space is available on the TRU pads and is estimated to be equivalent to about 4 TRU pads. Pad 8 is essentially empty now that dewatering of drums is complete and pad 12 is about 3/4 empty. Pads 18 and 19 are empty and will have covers installed on them. These two pads will be reserved for storage of retrieved mixed TRU waste drums as retrieval begins. It is projected that 1/2 of pad 15 will be vacant after aisle spacing on pads 14 through 17 is completed. It is expected that approximately 1/4 of pad 9 will be available for storage after the Naval Fuels LLW is moved from the pad, and the solvent rags in the remaining approximately 215-B25 boxes are shredded, and the boxes are placed back in storage on pad 9 with aisle spacing. However, operational considerations and the timing of when these actions concerning the Naval Fuels waste on pad 9 may take place is uncertain and the apparent 1/4 pad storage space afforded may not be available in the time frame needed and should not be relied on.

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 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 6.

Table 6
Forecasted Generation of Mixed TRU and TRU Wastes

Waste Type	Volume, Gallons (m^3)					
	FY96	FY97	FY98	FY99	FY2000	TOTAL
Mixed TRU	7,645 (28.9)	1,320 (5)	1,320 (5)	1,320 (5)	1,320 (5)	12,925 (48.9)
TRU	438,373* (1,660)	32,725 (124)	32,725 (124)	32,448 (123)	32,448 (123)	568,719 (2,153)

*Includes 395,842 gallons (1,498.3 m^3) for 35 black boxes in FY96. Of this total, 20 black boxes (226,195 gallons, 856.1 m^3) were delivered to Solid Waste for storage in September 1995; 15 additional black boxes are yet to be shipped to storage in FY96.

The forecasted MTRU waste is comprised of 235-55 gallon drums over the FY96 through FY2000 period. TRU waste containers consist of 1,698-55 gallon drums, 528 polyethylene boxes (polyboxes), 39 large black boxes and one special container. Based on experience it is estimated that approximately 85% of all mixed TRU drums will exceed the 0.5 Ci per container limit and will be placed in culverts. All polyboxes will be placed in culverts. This will result in 193 culverts that will be placed on pads 7-13. There will be 35 mixed TRU drums and 255 TRU drums stored on pads 14-19. It is estimated that storage of these containers will require approximately 1 1/4 TRU pad.

Storage of these containers essentially consumes the available MTRU storage space on TRU pads 8 and 12. Containers will not be stored on the vacant half of pad 15; this area instead will be used as a temporary staging and operating area. Pads 18 and 19 will be filled with retrieved drums beginning in approximately 4Q FY97. With various non-standard MLLW containers sharing some of the TRU pad storage area, all available TRU pad storage space will be occupied. The remaining additional retrieved drums will be stored on the new RCRA storage pad(s). It is expected that it will also be necessary to store MLLW containers (e.g., SRTC casks, ITP filter containers and other miscellaneous containers) on this new RCRA storage pad(s) and possibly some MLLW drums as well.

A Container Management Plan has been prepared that provides the initial planning for container movements and storage locations for newly generated containers. The Container Management Plan is a "living document" and will be revised as necessary to meet differing needs and requirements as waste storage activities progress.

In Table 5 it was noted that the available interim status storage capacity of TRU pads 1 through 19, as of 9/30/95, was 1,914,837 (7,247.7 m^3). The FY96 through FY2000 volume requiring storage is 12,925 gallons (48.9m^3).). The available interim status storage capacity remaining after receipt of the 12,925 gallons (48.9m^3) is 1,901,912 gallons (7,198.8 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 High-Level Waste (HLW)

The fifty tanks in the F-Area and H-Area Tank Farms are industrial wastewater permitted, however, only 27 of them are allowed to receive fresh canyon waste on a continuing basis. Six of the 27 tanks are dedicated for the processing of the waste for the In-Tank Precipitation (ITP) and Extended Sludge Processing (ESP) Facility. Of the remaining 21 tanks, an excess storage capacity of only approximately 1,000,000 gallons (3,785 m^3), is available for future waste receipts.

The forecast of future HLW for FY1996 through FY2000 is approximately 14,600,000 gallons (55,640 m^3), and is comprised of 3,800,000 gallons (14,383 m^3) to F-Area and H-Area Tank Farms and 10,800,000 gallons (40,878 m^3) of DWPF recycle. This forecast exceeds the currently available storage capacity of 1,000,000 gallons (3,785 m^3), however, HLW will continue to be evaporated and will be processed through the ITP and ESP facilities. Final waste treatment and storage of the HLW will be provided by the DWPF and Saltstone Manufacturing Facility. With the startup of the ITP and the vitrification plant, large-scale waste removal activities for the F-Area and H-Area Tank Farms will proceed.

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 FY96 through FY2000.

Section 7.3 Storage Capacity Needs

7.3.1 MLLW Capacity

Table 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 volume 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 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. Additional storage space, however, is needed in order to accommodate the containers of primarily MLLW future generated wastes.

Table 7 - Overall Mixed Waste Excess Capacity Through FY2000

Mixed Waste Container Storage

Waste Type	Available Capacity Gallons (m^3)	Forecasted Generation FY96-FY2000 Gallons (m3)	Capacity After Five Years Gallons (m^3)
MLLW - Aggregate of existing facilities	1,053,514 (3,987.7) From Table 2	376,627 (1,425.6) From Table 4	676,887 (2,562)
Mixed TRU Waste and MLLW on TRU pads	1,914,837 (7,247.7) From Table 5	12,925 (48.9) From Table 6	1,901,912 (7,198.8)
NET AVAILABLE INTERIM STATUS/PERMITTED CAPACITY			2,578,799 (9,670.8)

*MLLW on TRU pads = 316,776 gallons (1,199 m^3)

Waste Low-Level Waste Tank Storage

Waste Type	Available Capacity Gallons (m^3)	Forecasted Generation FY-96FY2000 Gallons (m^3)	Capacity After Five Years Gallons (m^3)
Process Waste Interim Treatment Storage Facility	1,787,277 (6,764.9)	(1)	0
DWPF Organic Waste Storage Tank	150,000 (567.8)	139,500 (528)	10,500 (39.7) (3)
SRL Mixed Waste Storage Tanks	12,970 (49.1)	(2)	(2)
Burial Ground Solvent Tanks and Liquid Waste Storage Tanks	80,540 (304.5)	3,963 (15)	(3)
NET AVAILABLE INTERIM STATUS/PERMITTED CAPACITY			1,978,799 (7,489.8)

(1) The inventory of the Process Waste Interim Treatment Storage Facility will change as the treatment process for the M-Area sludge begins. The stored volume in the tanks will not exceed the permitted capacity for the tanks; however, the volume will continue to fluctuate until the treatment process of the M-Area sludge is completed.
(2) The inventory in the SRL MWST will change with time as treatment continues and therefore the volume stored will be a continuously changing quantity. The treatment processes and future generation will be well coordinated so as to ensure that the stored volume does not exceed capacity.
(3) The inventory will decrease as CIF processing begins.

Section 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.

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CHAPTER 8 PROCESS FOR EVALUATION OF DISPOSAL ISSUES IN SUPPORT OF THE SITE TREATMENT PLAN (STP) DISCUSSIONS

This section discusses the overall Department of Energy (DOE) process for evaluating issues related to the disposal of residuals from the treatment of mixed low-level waste (MLLW) subject to the Federal Facility Compliance Act (FFCAct). SRS is among the sites being analyzed further for potential development as a disposal site for residuals from the treatment of MLLW subject to the FFCAct. This section outlines the disposal planning process developed by DOE, in consultation with the states, for evaluating potential options for the disposal of residuals from the treatment of MLLW. Importantly, because DOE is not currently developing MLLW disposal sites (with the exception of the Hanford Site) preferred alternatives or final destinations for disposal of treatment residuals are not known at this time. The results of this process are intended to be considered during subsequent planning activities and discussions between DOE and regulatory agencies.

Section 8.1 Background

The FFCAct requires DOE to develop a plan for the treatment of mixed wastes. The FFCAct does not impose any similar requirement for the disposal of mixed wastes after they have been treated; however, DOE recognizes the need to address this final phase of mixed waste management. The following process reflects DOE's current strategy for evaluating the options for disposal; the evaluation will increase understanding of the strengths and weaknesses of a site's potential for disposal, but is not a site selection process. Ultimately, the identification of sites that may receive mixed waste for disposal will follow state and federal regulations for siting and permitting, and will include appropriate public involvement.

High-level and mixed transuranic wastes are among the mixed waste subject to the FFCAct. Options for disposal of these mixed wastes are not identified by this process because there are established processes for studying, designing, constructing, and operating disposal facilities for these wastes.

The 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. Currently, the Hanford Site has the only active permitted facility operated by DOE for the disposal of residuals from the treatment of MLLW. This plan has been redirected in conjunction with the planning process (Figure 8.1) and the Environmental Management Programmatic Environmental Impact Statement (EM PEIS). The sites subject to evaluation under this process are the 49 sites reported to Congress by DOE in the Mixed Waste Inventory Report (MWIR), April 1993, that are currently storing or expected to generate mixed waste.

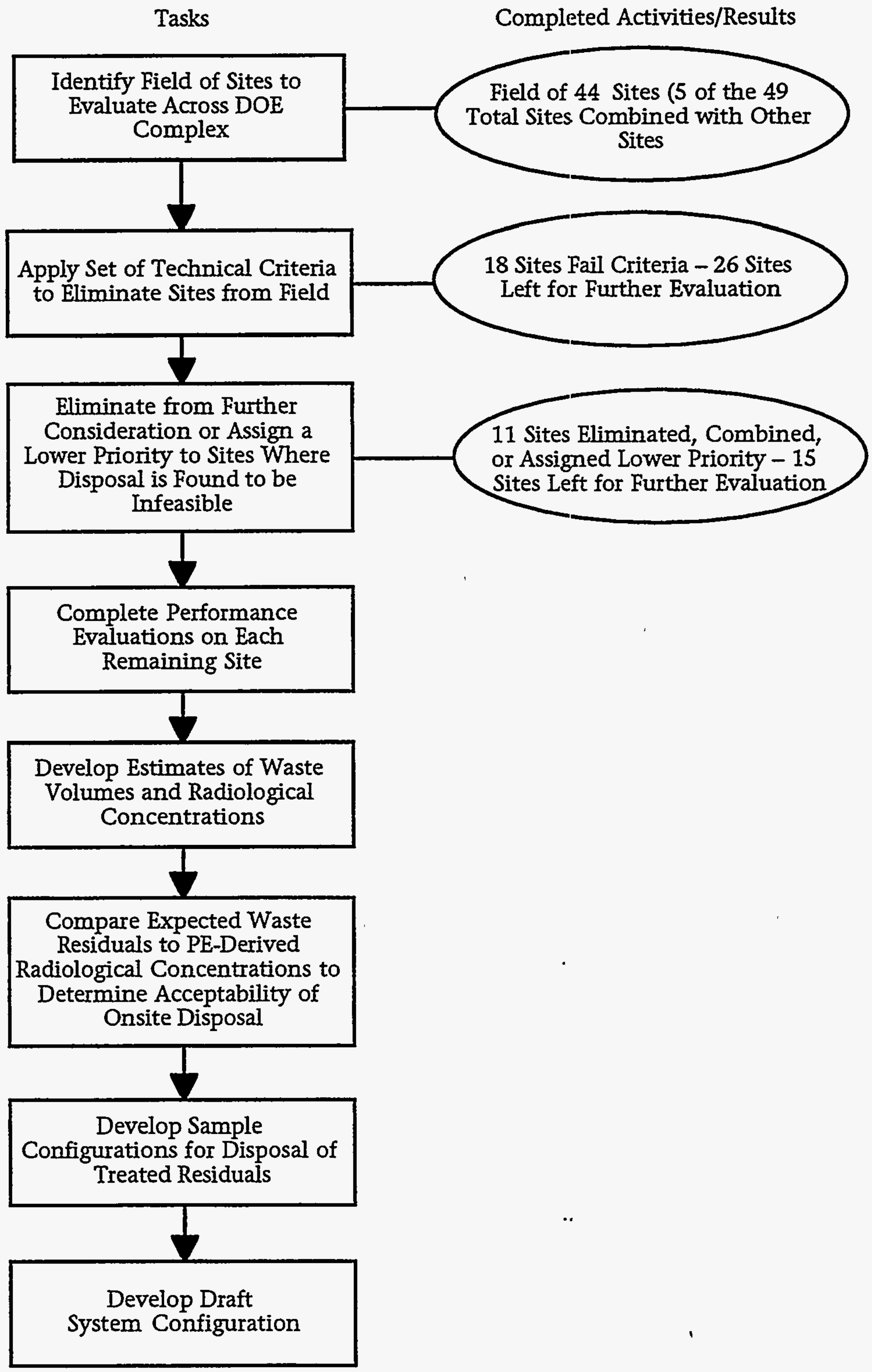

Figure 8.1 – Disposal Planning Process

Section 8.2 Disposal Planning Process

Although the FFCAct does not specifically address disposal of treated mixed wastes, both DOE and the states have recognized that disposal issues are an integral part of treatment discussions. A process was established to evaluate and discuss the issues related to the potential disposal of the residuals from the treatment of DOE MLLW at the sites subject to the FFCAct, shown in Figure 8.1. The focus of this process has been to identify, from among the 49 sites that currently store or are expected to generate mixed waste, sites that are suitable for further evaluation of their potential as disposal sites. Sites determined to have marginal or no potential for disposal will be removed or deferred from further evaluation under this process. The remaining sites will be evaluated more extensively. Ultimately, a number of sites are expected to be identified that are technically acceptable for disposal of treated residuals.

8.2.1 Activities to Date

Site Grouping

The initial step in this process was to examine each of the 49 sites to determine which sites, while individually listed in the MWIR, were in such geographic proximity that further analysis could address them as a single site. This grouping reduced the number of sites to 44, as follows:

- Idaho National Engineering Laboratory and Argonne National Laboratory (West) are located on a single federally-owned reservation near Idaho Falls, Idaho;
- The Sandia National Laboratories, California, and Lawrence Livermore National Laboratory are located on adjoining federally-owned properties near Livermore, California;
- The Inhalation Toxicology Research Institute and Sandia National Laboratories, New Mexico, are located on the same federally-owned reservation; and
- The Oak Ridge National Laboratory, Oak Ridge K-25 Site,, and Oak Ridge Y-12 are all located within the federally-owned Oak Ridge Reservation near Oak Ridge, Tennessee.

Initial Site Screening

At a joint meeting on March 3 and 4, 1994, DOE and the states agreed on three exclusionary criteria for further screening the 44 remaining sites. These criteria were developed by reviewing federal and state requirements regarding the siting of waste treatment, storage, and disposal facilities. In order to be evaluated further, a site:

- must not be located within a 100-year flood plain;
- must not be located within 61 meters (200 feet) of an active fault; and
- must have sufficient area to accommodate a 100-meter buffer zone.

The first criterion (100-year flood plain) is derived from both Nuclear Regulatory Commission (NRC) and Resource Conservation and Recovery Act (RCRA) requirements. The second criterion (active fault) was selected from requirements found in RCRA which restrict the location of waste treatment, storage, and disposal facilities. The third criterion (sufficient area for 100-meter buffer) is derived from guidance from the Environmental Protection Agency (EPA), NRC, and DOE for the proper operation of waste facilities.

Evaluation of the 44 sites resulted in identification of 26 sites meeting the above criteria. At a joint meeting on March 30 and 31, 1994, DOE and the states agreed to remove from further evaluation those sites not meeting the screening criteria. Also at that meeting, DOE agreed to collect additional, more detailed information on the remaining 26 sites to identify additional strengths and weaknesses of a site. It was agreed that DOE or any affected state may propose further elimination of sites from consideration following the site-specific evaluation.

Evaluation of the Remaining Twenty-six Sites

DOE and the states met on July 26 and 27, 1994, to discuss the site-specific data on the remaining 26 sites and to consider proposals for eliminating additional sites from further evaluation. The focus of these discussions was to identify sites suitable for further evaluation under this process.

The criteria that DOE and the states used to eliminate sites from further evaluation at this stage were derived from three main groupings of consideration: Technical Considerations, Potential Receptor Considerations, and Practical Considerations. Each of the remaining 26 sites were evaluated against the criteria in these groupings that included; soil stability and topography, precipitation and evapotranspiration, population, proximity to sensitive environment, land acquisition, government presence at the site, and regulatory constraints.

Sites with marginal or no potential for disposal, based on these criteria, were recommended for removal or postponement form further evaluation. As a result of the meeting, DOE and the states agreed to eliminate five sites from further evaluation due to their limited potential for disposal. These are:

Site	**State**
Energy Technology Engineering Center	California
General Atomics	California
General Electric Vallecitos Nuclear Center	California
Pinellas Plant	Florida
Site A/Plot M	Illinois

Additionally, DOE and the states agreed to merge the evaluation of Knolls Atomic Power Laboratory at Niskayuna, New York, and Knolls Atomic Power Laboratory at Kesselring, New York, due to their close, geographic proximity.

While not eliminated from further evaluation, it was agreed to lower the evaluation priority of an additional four sites. Issues, such as the technical capabilities of the site, the volume of mixed waste that may be generated by the sites, and the acceptability of offsite waste contributed to a conclusion that further evaluation of some sites should not be a high priority. DOE and the states agreed to evaluate these sites in terms of their capability to dispose of their own mixed waste onsite if no other offsite disposal options could be identified. These sites will not to be considered for disposal of wastes from other sites, and may be eliminated from further analysis if sufficient evidence suggests the potential for disposal is limited. The sites in this category are:

Site	**State**
Weldon Spring Remedial Action Project	Missouri
Brookhaven National Laboratory	New York
Mound Plant	Ohio
Bettis Atomic Power Laboratory	Pennsylvania

Performance Evaluation

The performance evaluation being conducted for the 15 sites identified for further evaluation entails the collection of more detailed site-specific data related to the site characteristics. The performance evaluation methodology is based on the principles of radiological performance assessments and was developed by DOE performance assessment experts. Additionally, the evaluation will be based on RCRA-compliant engineered facilities. This information is used to evaluate the sites and estimate the radionuclide concentration limits of waste that may be disposed at a given site. The performance evaluations were initiated in August 1994. The 15 sites for which performance evaluations are being prepared are:

Site	State
Lawrence Livermore National Laboratory, Site 300	California
Rocky Flats Environmental Technology Site	Colorado
Idaho National Engineering Laboratory	Idaho
Argonne National Laboratory	Illinois
Paducah Gaseous Diffusion Plant	Kentucky
Nevada Test Site	Nevada
Los Alamos National Laboratory	New Mexico
Sandia National Laboratory	New Mexico
West Valley Demonstration Project	New York
Fernald Environmental Management Project	Ohio
Portsmouth Gaseous Diffusion Plant	Ohio
Savannah River Site	South Carolina
Oak Ridge Reservation	Tennessee
Pantex Plant	Texas
Hanford Site	Washington

8.2.2 Next Steps in the Evaluation Process

As illustrated in Figure 8.1, progress has been made in the planning of the disposal process. The following steps outline further activities which have been completed or are to be completed to facilitate an informed decision about the disposal of DOE MLLW. Coordination with the states will continue to ensure stakeholder input and to resolve concerns at the earliest possible stage.

Complete Remaining Performance Evaluations

The performance evaluation (PE) was completed for the 15 sites considered and was reported in the document "Performance Evaluation of the capabilities of DOE sites for Disposal of Mixed Low-Level Waste" (Volumes 1-3) issued October 10, 1995.

The performance evaluation (PE) developed was designed to quantify and compare the potential technical capabilities of the 15 DOE sites for MLLW disposal. The principal goal of the PE was to estimate, for grouted residuals resulting from the treatment of MLLW, permissible concentrations of radionuclides in waste for disposal at each site. These "permissible waste concentrations" were based solely on long-term performance of the disposal facility and surrounding environment and did not take into account any operational waste acceptance criteria that might have been developed for a particular site. Grout was the waste form evaluated in the PE because the majority of treated and stabilized DOE MLLW is anticipated to have been stabilized by this method, although other waste forms may be used.

The existing levels of contamination that may exist at the 15 sites have not specifically been considered in the PE analysis. The site analyses did not consider the effects of overlapping plumes from nearby disposal facilities or accidental releases. These considerations are expected to be included in the site-specific performance assessments. The PE used analyses that are consistent with the approach used in many low-level waste (LLW) performance assessments. The objective was to use a set of modeling assumptions of sufficient detail to capture major site-specific characteristics and yet be general enough for consistent application at all sites. Additionally, the analyses were designed to ensure that the sites were analyzed consistently and that all major assumptions were clearly stated.

Details of the background and the results of the evaluations of the capabilities of the DOE sites for disposal of treated MLLW residuals were provided in the three volumes of the PE analysis report.

Develop Estimates of Waste Volumes and Radionuclide Concentrations in Treated Residuals

As the treatment methods for the MLLW waste streams are finalized through the FFCAct process, estimates of the volumes and radionuclide concentrations of the treated residuals are being developed for all waste streams. These estimates are needed to compare to the performance evaluation-derived radionuclide concentration guides.

Compare Estimates of Radionuclide Concentration in Treated Residuals to Performance Evaluation-Derived Radionuclide Concentrations Guides

Radionuclide concentrations for each site's treated waste residuals will be compared to those disposal values derived in the performance evaluation in this step. Comparing radionuclide concentrations in treated residues with performance evaluation concentration guides will compare MLLW stream characteristics to potential disposal sites' capabilities. This evaluation will also include offsite DOE and commercial disposal site candidates for those treated waste streams which do not have onsite capabilities. Confirmation of the candidates streams and sites will be attained through detailed performance assessment efforts.

Develop Sample Configurations for Disposal of Treated Residuals

An Options Analysis Team (OAT) approach will be employed to develop, sample complex-wide configurations for the disposal of treated MLLW residuals. These configurations will take into account such technical issues as compatibility of radionuclides (both handled at the site and those considered acceptable by the performance evaluations), capacity to handle projected residual volumes, etc. Under the OAT approach, other types of issues will be weighed during the configuration discussions such as transportation costs and distances.

Develop a Draft Disposal System Configuration

Using the sample configurations as a starting point, DOE will develop with state and stakeholder input, a draft disposal system configuration. This configuration will be the basis for determining future funding and schedules for proposed disposal facilities. The final EM PEIS will provide bounding analysis of potential environmental impacts for the range of sample configurations considered. It will identify preferred sites for further development as disposal facilities. Following the issuance of the Record of Decision (ROD) for the EM PEIS, DOE may initiate site-specific National Environmental Policy Act (NEPA) evaluations for the proposed disposal facilities; initiate performance assessment analyses for compliance with DOE Order 5820.2A; and initiate processes for permitting disposal facilities.

Section 8.3 Integration with the STP Process

The FFCAct does not require disposal to be included in the STPs; however, given the complex issues involved, DOE recognizes the importance of state input to facilitate resolution of issues related to disposal. Chapter 8.0 information is provided in the STP to continue to involve the states and inform them of DOE's continued work on the disposal issue. As the disposal planning process progresses, further information will be provided and coordination with the states will continue.

CHAPTER 9 TREATMENT FACILITIES AND TREATMENT TECHNOLOGIES

This section describes existing SRS facilities considered in options analysis.

Section 9.1 Existing Facility Descriptions

9.1.1 M-Area Liquid Effluent Treatment Facility (LETF)

Facility Description

M-Area LETF consists of three closely related processes:

- Chemical Transfer Facility (CTF)
- Process Waste Interim Treatment/Storage Facility (PWIT/SF)
- Dilute Effluent Treatment Facility (DETF)

Chemical Transfer Facility (CTF)

CTF treated concentrated spent process solution from reactor materials production facilities. The only part of CTF now in use is a slurry tank and pumps, in which DETF filtercake is mixed with caustic and pumped to PWIT/SF. CTF operates under a South Carolina Department of Health and Environmental Control (SCDHEC) Industrial Wastewater Treatment Permit.

Process Waste Interim Treatment/Storage Facility (PWIT/SF)

PWIT/SF is a SCDHEC Interim Status Hazardous Waste Treatment and Storage facility. The facility includes six 35,000 gallon storage tanks and four 500,000 gallon storage tanks. These tanks contain waste slurry that has separated into a thick sludge and a clear supernatant liquid. Supernatant liquid is treated in the DETF, and the sludge is treated by vitrification (see below).

Dilute Effluent Treatment Facility (DETF)

DETF is an industrial wastewater treatment facility using the Environmental Protection Agency's (EPA's) Best Demonstrated Available Technology (BDAT) for metal finishing and aluminum forming industries. This treatment precipitates metal ions from dilute wastewater and separates the precipitate by filtration. The filtercake is transferred to PWIT/SF via CTF, where it is stored awaiting vitrification. The filtrate is collected and analyzed. If it meets NPDES release specifications, it is discharged to a surface stream.

Capacity

LETF is permitted to release 86,000 gallons per day to surface water. The facility throughput depends on the amount of suspended solids in the stream feeding the filters. Currently, the amount of filtrate released while processing the supernatant liquid from PWIT/SF is 38,000 gallons per day.

9.1.2 M-Area Vendor Treatment Facility

A contract has been awarded to a subcontractor to design, build, and operate a vitrification process that will transform M-Area wastes into a form meeting the land disposal restrictions. M-Area wastes that make up the design basis for the vitrification process are:

- M-Area plating line sludge from supernatant treatment (PWIT/SF sludge)
- M-Area high nickel plating line sludge (PWIT/SF sludge)

- M-Area treatability test samples
- Filtercake from the Mark 15 filters
- Nickel plating line solution
- Plating line sump material

Facility Description

The above wastes will be blended into a homogeneous mixture in existing tanks in M Area. Stabilizing chemicals and glass-forming materials will be added to the mixture to make vitrifier feedstock. The feedstock will be pumped into a melter at a temperature of 1150°C. The glass-forming materials chemically bond and microencapsulate the constituents of concern into a matrix of borosilicate glass. The glass is placed into containers for storage and disposal. The entire operation takes place in a structure that has secondary confinement apparatus and air emission control equipment.

Capacity

The vitrifier is sized to treat the entire volume of design-basis waste in one year. It has a nominal glass output of 5 tonnes per day and a maximum production of 7.5 tonnes per day. While the vitrifier is treating the design basis waste, it has no excess capacity. After the design-basis waste is treated, the vitrifier will have about one additional year of service life left. The remaining service life could be used to treat other waste streams provided such arrangements can be made with the vendor and M Area remains operational. SCDHEC must concur with the use of M-Area for treatment of additional mixed waste streams.

Technical analysis determined that waste stream SR-W054, Enriched Uranium Contaminated with Lead, had very similar chemical constitutes to the M-Area Vendor Facility design basis wastes. This wastestream was added to M-Area Vendor design basis in the PWIT/SF. SRS is proposing through the annual update to include two additional wastestreams for treatment in the M-Area Vendor Facility SR-W031, Uranium/Chromium Solution, and SR-W048, Soils from Spill Remediation.

9.1.3 Consolidated Incineration Facility (CIF) and Ashcrete Stabilization Facility

When CIF begins operations it will receive 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). Liquid waste can arrive by container or by pipeline. Solid waste arrives packaged in a cardboard box 21 inches on each side.

Facility Description

CIF is a rotary kiln incinerator with a secondary combustion chamber. The liquid waste is fed into the rotary kiln's primary combustion chamber and the 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 stable solid wasteforms (ashcrete). The ashcrete system also stabilizes blowdown liquid from the quench and scrubber (blowcrete).

Capacity

The CIF thermal capacity of 18.1 million BTU/hr is 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 capacity of each system is

- Solid waste to rotary kiln — 2025 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 — 302 lbs/hr

The CIF can generally 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 will receive high-level waste from tank farms in the defense materials production areas. 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.

Facility Description

DWPF has two treatment processes:

1. A chemical process hydrolyzes the precipitate slurry into a low-level radioactivity, organic liquid (primarily benzene) and a high-level radioactive aqueous stream.
2. A vitrification process treats the aqueous stream and high-level radioactivity sludge to remove mercury, mixes the streams with additives and glass-forming materials, and continuously feeds a high temperature melter in which the materials fuse into borosilicate glass.

The organic liquid goes to CIF for incineration. The borosilicate glass, which bonds with and encapsulates the constituents of concern, is placed in a stainless steel canister for storage.

Capacity

According to the Mixed Waste Inventory Report (MWIR), the maximum technical capacity for the system is approximately 2 million pounds per year.

9.1.6 *Effluent Treatment Facility (ETF)*

ETF is a multi-purpose plant for treating highly dilute aqueous wastes. Waste arrives at ETF by pipeline. Plans are also underway to provide a station at which liquid waste in containers can be unloaded. The treatment option of interest for treating mixed waste streams is the ion exchange process. However, other treatment components in 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 adsorbtion. 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 ETF without passing a final assay.

Capacity

Demonstrated maximum throughput of ETF is about 130 (gpm) gallons per minute. At present ETF is processing about 40-50 gpm average. Acceptance of waste streams at ETF must be on a case-by-case basis, depending on the quantity of waste and concentration of the constituent of concern.

Section 9.2 Process Descriptions

This section contains descriptions of the treatment technologies considered in the options analysis.

9.2.1 Amalgamation

Amalgamation is a process applicable to waste liquid, elemental mercury contaminated with radioactive materials. Mercury is combined with inorganic regeants such as copper, zinc, nickel, gold, or sulfur that results in a non-liquid semi-solid amalgem which is more easily managed and less mobile.

9.2.2 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.

9.2.3 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.

9.2.4 Incineration

Incineration is a controlled process by which combustible solid, liquid, or gaseous wastes are changed into noncombustible gases and solid ash.

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

Lead waste, which is unmixed with plastic, paper, or leather, or is clad with stainless steel, is 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.

9.2.8 Neutralization

Neutralization uses these chemicals either 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 is exhausted through the offgas system.

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.

9.2.13 Thermal Treatment

Thermal treatment involves processing hazardous waste in a device that uses elevated temperatures as the primary means to change the chemical, physical, or biological characteristics or composition of the hazardous waste. Examples of thermal treatment processes are incineration, pyrolysis, calcination, wet air oxidation, and microwaving.

9.2.14 *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.)

Section 9.3 Planned/Proposed Facilities

This section contains descriptions of planned or proposed facilities considered in the options analysis.

9.3.1 *Containment Building*

In the August 18, 1992 *Federal Register* (57 FR 37194), EPA promulgated standards for a new hazardous waste management unit: a "containment building." 40 CFR 264 Subpart DD, 264.1101 and the analogous sections of Part 265 describe design and operating criteria. Design features of a containment building include:

- Walls, floor, and roof to prevent exposure to the elements
- A primary barrier such as the floor, a process area, or process tankage that is resistant to the hazardous materials contained
- Secondary containment system, beyond the primary barrier, for hazardous liquid materials (the containment building itself can act as the secondary containment to tanks inside)
- Leak detection system between two barriers
- Liquid collection and removal systems

The design of the containment building submitted with the permit application must be certified by a registered professional engineer.

The owner or operator of the containment building must:

- Ensure that the containment building floor is maintained free of cracks, corrosion, or other defects that could allow hazardous materials to escape

- Control the inventory of hazardous material within the containment walls so that "the height of any containment wall is not exceeded"

- Provide a decontamination area for personnel and equipment to prevent spreading hazardous materials outside the containment building

- Control fugitive emissions

The owner or operator must promptly repair any condition that may have resulted in a release of a hazardous waste. The owner or operator also is tasked with monitoring, inspection, recordkeeping, and reporting requirements.

The August 18, 1992, *Federal Register* (57 FR 37194) also amended §262.34, specifies the requirements governing accumulation of hazardous waste, to allow generators to hold hazardous waste onsite in a containment building for 90 days or less without a permit or interim status. According to *RCRA Regulations and Keyword Index 1993 Edition* (McCoy and Associates, Inc.):

> A generator accumulating waste in a containment building for less than 90 days in compliance with §262.34 and Part 265, Subpart DD... may treat these hazardous wastes

in a containment building without obtaining a permit or interim status as long as thermal treatment is not involved.

9.3.2 *TRU Waste Certification/Characterization Facility (TWCCF)*

TWCCF is a proposed 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 nonmixed 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. The TWCCF is in the pre-conceptual phase of development.

Facility Description

TRU Waste Certification/Characterization Facility (TWCCF) will process wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20 years) for final disposal. The TWCCF will receive wastes from TRU pads, waste generators, or other waste storage areas. The TWCCF 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 classified as low-level or mixed low-level waste, 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).

9.3.3 *Alpha Vitrification Facility (AVF)*

The AVF is a proposed facility that will provide capabilities to vitrify greater than 10 nCi/g alpha contaminated mixed and non mixed wastes. This includes newly generated waste, stored waste, and soils. The AVF also will provide capabilities to treat secondary waste gases and liquids that are generated during the vitrification process. The AVF is in the pre-conceptual phase of development and is unfunded.

Facility Description

The Alpha Vitrification Facility (AVF) will treat solid, liquids, sludge, and soil wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20 years) for disposal. This includes preparing the waste for vitrification, vitrifying the waste, and treating secondary waste gases and liquids. The AVF will receive waste from the TRU Waste Certification/Characterization Facility (TWCCF). This waste will enter the AVF in drums. Furthermore, the AVF will require a greater level of containment than a non-alpha vitrification facility. Vitrified and low temperature stabilized wasteforms will be routed through the TRU Waste Certification/Characterization Facility for final certification. After certification, these wasteforms will be sent for final disposal to a RCRA disposal facility, Shallow Land Disposal Facility, or the Waste Isolation Pilot Plant (WIPP).

CHAPTER 10 OFFSITE WASTE STREAMS FOR WHICH SRS TREATMENT IS THE PREFERRED OPTION

Naval Reactors, (NR) has selected SRS mixed waste treatment facilities as preferred options in the Naval Reactors Program STP. DOE-SR has completed its evaluation confirming its ability to treat Naval Reactors mixed wastes.

DOE-SR cannot fully determine a schedule for treating NR wastes at this time. The schedule for acceptance of offsite DOE Complex waste will depend on the volume and characterization of waste to be treated as well as prioritization of onsite and offsite waste treatment. WSRC has recommended that the DOE Complex develop prioritization protocols for treatment of mixed waste to ensure timely treatment of wastes subject to RCRA Land Disposal Restrictions and wastes not stored in compliance with RCRA regulations.

Prior to actual acceptance of Naval Reactors wastes major changes to the SRS facility baseline documents including regulatory permits will be required prior to the initiation of waste treatment operations. The required modifications to the baseline documents have not been forecasted, and an accurate schedule for waste treatment operations has not been determined at this time. Naval Reactor waste must be approved by SCDHEC prior to being shipped to SRS.

WSRC has assumed that all waste treatment residues returned to the generating site would meet the published disposal waste acceptance criteria for the specified site.

Table 10.1 identifies the SRS treatment facilities selected as preferred options for NR Program mixed wastes.

For Charleston Naval Shipyard waste (since this facility will be closed April 1, 1996), shipment has been received by SRS and is currently in RCRA regulated storage.

In general, shipment of Naval Reactors (NR) wastes to CIF will occur within 24 months of commencing CIF operations. This schedule assumption is subject to SCDHEC approval of permit modifications and the facility production schedule. For wastes generated subsequent to the initial waste shipment, NR may ship wastes within 90 days of accumulating sufficient quantities.

SRS will treat NR's waste according to the approved CIF processing schedule and will provide for treatment according to Land Disposal Restrictions (LDR) requirements.

Table 10.1 – Naval Reactors Program Waste

Waste Stream No.	DOE Site/ Waste Stream	SRS Treatment Facility	Potential Issues	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)
BT-W001	Oil Containing Heavy Metals #1	CIF	(1) (2) (3) (4)	0.42	0.41
BT-W002	Spent Solvent Rags	CIF	(1) (2) (3)	0.21	0.0
BT-W003	Oil Containing Heavy Metals #2	CIF	(1) (2) (3)	1.26	0.22
BT-W007	Solids with Solvents	CIF		0.42	0.0
BT-W018	TCLP Extract Fluid	CIF	(1) (2) (3) (6)	0.0	0.02
CN-W001	Solids Containing Potassium Chromate	CIF	(1) (2) (3)	0.7*	0.0**
CN-W004	Organic Debris Contaminated with Lead and/or Chromium	CIF	(1) (2) (3)	1.00*	0.0**
KA-W002	Cutting Oils and Liquids	CIF	(1) (2) (3) (6)	0.0	0.1
KA-W003	Trichloroethylene	CIF	(1) (2) (3)	0.21	0.1
KA-W006	Freon® 113 on Rags	CIF	(1) (2) (3)	0.342	0.0
KA-W007	Oils	CIF	(1) (2) (3)	0.224	2.0
KA-W009	Organic Debris	CIF	(1) (2) (3)	0.461	2.0
KA-W013	Organic Debris without Metals	CIF	(1) (2) (3) (6)	0.001	0.4
KA-W014	Organic Sludges and Particulates	CIF	(1) (2) (3) (6)	0.0	0.4
KK-W003	Oils	CIF	(1) (2) (3) (6)	0.0	0.25
KK-W005	Organic Debris	CIF	(1) (2) (3) (5)	1.02	1.00
KK-W008	Organic Sludges/Particulates	CIF	(1) (2) (3) (6)	0.0	0.75
KK-W009	Organic Debris without Metals	CIF	(1) (2) (3) (6)	0.0	0.4
KK-W011	Cutting Oils and Liquids	CIF	(1) (2) (3) (6)	0.0	0.4
KW-W001	Oil	CIF	(1) (2) (3) (6)	0.0	0.45
KW-W003	Organic Debris	CIF	(1) (2) (3) (6)	0.0	1.5
KW-W006	Organic Sludges/Particulates	CIF	(1) (2) (3) (6)	0.0	1.6

*Cumulative inventory through 12/14/95

	DOE Site/ Waste Stream	SRS Treatment Facility	Potential Issues	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)
NN-W002	Solid Waste Contaminated with Potassium Chromate	CIF	(1) (2) (3) (6)	0.24	1. 50
PN-W015	Solids containing Potassium Chromate	CIF	(1) (2) (3) (6)	0.0	0.03
			Total	6.508	13.53

Notes for Table 10.1

1. All waste must meet the waste composition and packaging limitations of the approved CIF Waste Acceptance Criteria (WAC). The approved WAC will be issued in the SRS 1S Manual and is scheduled to be issued in 1995. A copy will be sent to NR upon approval, and arrangements for packaging of the waste to meet the CIF WAC will be made at that time.

2. Adequate NEPA documentation must be completed for the operation of CIF for onsite and applicable offsite mixed waste and for transportation of waste to SRS. NEPA coverage for transportation is the responsibility of the generator.

3. Approved RCRA permit modifications to allow treatment of offsite waste at CIF and storage of offsite wastes at appropriate SRS storage facilities will be required prior to scheduling and acceptance of NR waste.

4. The CIF WAC surface radiation limit is 10 mR/hr. NR waste is shown to have a surface rate above 200 mR/hr. SRS will dilute this waste with our own waste to meet the CIF WAC.

5. The CIF cannot treat Radioactive Lead Solids (D008C). KK-W005 contains fine lead particulates from HEPA Filters. If the waste does not qualify as D008C waste, then CIF can incinerate combustible HEPA elements that exceed the lead TCLP limit as long as the CIF WAC concentration limit is not exceeded.

6. Future-generated wastes will have to be characterized at the time of generation to ensure that they meet the CIF WAC.

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CHAPTER 11 SUMMARY INFORMATION

Section 11.1 Preferred Option Summary (by Waste Stream)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current[1] cumulative inventory through 09/30/95 (m^3)	Future[2] forecast generation (Cumulative) (m^3) 1996-2000	Total Cumulative (Current + Forecast) (m^3)
SR-W001	Rad-Contaminated Solvents	Incineration followed by Stabilization – CIF	15.6	5.0	20.6
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A	N/A	N/A
SR-W003	Solvent Contaminated Debris (LLW)	Incineration followed by Stabilization – CIF	9.3	3.6	12.9
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 Process	15.4	0	15.4
SR-W006	Mixed TTA/Xylene – TRU	Characterization at SRS – WIPP Disposal	0.1	0	0.1
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	48.2	375	423.2
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	55.8	375	430.8
SR-W009	Silver Coated Packing Material	Macroencapsulation in a Steel Container – Containment Bldg.	9.86	3.1	12.96
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	N/A	N/A
SR-W011	Cadmium-Coated HEPA Filters	Scrap Metal Exclusion	100.2	0	100.2
SR-W012	Incinerable Low-Level Material	Incineration followed by Stabilization – CIF	3.2	2283	2286.2
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated	Decontamination by Offsite Vendor	83.5	30	113.5
SR-W014	Tritium-Contaminated Mercury	Amalgamation – Offsite DOE-INEL-WEDF	0.18	0.1	0.28
SR-W015	Mercury/Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	10.7	263.05	273.75
SR-W016	221-F Canyon High-Level Liquid Waste	Stabilization by Vitrification – DWPF	53,600	8,771	62,371
SR-W017	221-H Canyon High-Level Liquid Waste	Stabilization by Vitrification – DWPF	72,817	6,018.4	78,835.4
SR-W018	Filter Paper Take Up Rolls (FPTUR)	Incineration followed by Stabilization – CIF	260	0	260
SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	N/A	N/A	N/A
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	Acid Washing followed by Placement in an Engineered S. S. Container	0	48.9	48.9
SR-W021	Poisoned Catalyst Material	Waste stream eliminated	N/A	N/A	N/A
SR-W022	DWPF Benzene	Incineration followed by Stabilization – CIF	0	528	528
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a cask, as a 90-day generator	0.3	0	0.3
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	2.3	0.2	2.5
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization at SRS	3604.8	0	3604.8
SR-W026	Thirds/TRU Job Control Waste	Characterization at SRS – WIPP Disposal	92.4	935	1027.4
SR-W027	Solvent/TRU Job Control Waste	Characterization at SRS – WIPP Disposal	3362	0	3362

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current[1] cumulative inventory through 09/30/95 (m³)	Future[2] forecast generation (Cumulative) (m³) 1996-2000	Total Cumulative (Current + Forecast) (m³)
SR-W028	Mark 15 Filter Paper	Incineration followed by Stabilization – CIF	1.0	0	1.0
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification – M-Area Vendor Treatment Process	1.0	0.4	1.4
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 Process	0.6	0	0.6
SR-W032	Mercury Contaminated Heavy Water	Recycling via Ion Exchange at D-Area Facility	6.6	0	6.6
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization at SRS	8.0	308	316
SR-W034	Calcium Metal	Deactivation by Wet Oxidation - DOE Mobile Reactive Metals Unit - Offsite	0.9	0	0.9
SR-W035	Mixed Waste Oil – Sitewide	Incineration followed by Stabilization – CIF	2.8	3.0	5.8
SR-W036	Tritiated Oil with Mercury	Treatment by aging followed by Incineration	20.0	2.0	22.0
SR-W037	M-Area Plating Line Sludges	Stabilization by Vitrification – M-Area Vendor Treatment Process	2503	0	2503
SR-W038	Plating Line Sump Material	Stabilization by Vitrification – M-Area Vendor Treatment Process	0.4	0	0.4
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	5.0	0	5.0
SR-W040	M-Area Stabilized Sludge	Waste stream eliminated	N/A	N/A	N/A
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	0.0	0	0.0
SR-W042	Paints and Thinners	Incineration followed by Stabilization-CIF	5.4	7.0	12.4
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	Incineration followed by Stabilization – CIF	149.7	15.0	164.7
SR-W046	Consolidated Incineration Facility (CIF) Ash	Stabilization – CIF Ashcrete Unit	0	155	155
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	Stabilization – CIF Ashcrete Unit	0	1000	1000
SR-W048	Soils from Spill Remediation	Stabilization by Vitrification M-Area Vendor Treatment Process	16.8	0	16.8
SR-W049	Tank E-3-1 Clean Out Material	Stabilization – Offsite DOE-INEL-WEDF	1.0	0	1.0
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	0	0.4	0.4
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Incineration followed by Stabilization – CIF	0.8	4.5	5.3
SR-W052	Cadmium Contaminated Glovebox Section	Waste stream eliminated	N/A	N/A	N/A
SR-W053	Rocky Flats Incinerator Ash	Return to Rocky Flats	0.1	0	0.1
SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	N/A	N/A

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current[1] cumulative inventory through 09/30/95 (m^3)	Future[2] forecast generation (Cumulative) (m^3) 1996-2000	Total Cumulative (Current + Forecast) (m^3)
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Incineration followed by Stabilization – CIF	739	0	739
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators	Waste stream eliminated	N/A	N/A	N/A
SR-W057	D-Tested Neutron Generators	Waste stream eliminated	N/A	N/A	N/A
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	0.1	0	0.1
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 – Onsite	0.2	0	0.2
SR-W061	DWPF Mercury	Consolidated with SR-W068	N/A	N/A	N/A
SR-W062	Low Level Contaminated Debris	Macroencapsulation with Polymer by a Vendor – Onsite	6.2	81	87.2
SR-W063	Macroencapsulated Low-Level Waste	Meets Treatment Standard	0	56	56
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 Personnel Protective Equipment (PPE) Waste	Awaiting ROD, etc.			
SR-W068	Elemental (Liquid) Mercury - Sitewide	Amalgamation – Offsite DOE-INEL WEDF	0.1	0.425	0.525
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	Macroencapsulation with Polymer by a Vendor – Onsite	74.1	15	89.1
SR-W070	Mixed Waste from Laboratory Samples	Incineration followed by Stabilization – CIF	2.5	41.8	44.3
SR-W071	Wastewater Suitable for Treatment in CIF	Incineration followed by Stabilization – CIF	24.9	250	274.9
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	Extraction or Immobilization Alternative Debris Technologies as 90-day Generator	0	1,065	1065
SR-W073	Plastic/Lead/Cadmium Raschig Rings	Incineration followed by Stabilization – CIF	1.8	0	1.8
SR-W077	Aqueous Characteristic Wastewater	Ion Exchange in D-Area	0.0	9.0	9.0
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	Awaiting Characterization	100	unknown	100
CN-W001	Solids Containing Potassium Chromate	Incineration followed by Stabilization-CIF	0.7[3]	0.0	0.7
CN-W004	Organic Debris with Lead and/or Chromium	Incineration followed by Stabilization - CIF	1.0[3]	0.0	1.0
		TOTALS	137,764.54	22,652.875	160,417.415

Note: Volumes listed on this table are taken from the 1995 Mixed Waste Inventory Report. They may not represent actual volumes of mixed waste stored at SRS as of the date of the annual update.

1 Current inventory through 09/30/95.
2 Future generation 1996-2000.
3 Inventory as of 12/14/95.

Section 11.2 Preferred Option Summary (by Facility)

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)	Total Cumulative (Current + Forecast) (m^3)
Consolidated Incineration Facility (CIF)				
Treatment Standard – Incineration				
SR-W001	Rad-Contaminated Solvents	15.6	5.0	20.6
SR-W003	Solvent Contaminated Debris (LLW)	9.3	3.6	12.9
SR-W012	Incinerable Low-Level Material	3.2	2283	2286.2
SR-W022	DWPF Benzene	0	528	528
SR-W035	Mixed Waste Oil – Sitewide	2.8	3.0	5.8
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	739	0	739
Treatment Standard – Other Than Incineration				
SR-W018	Filter Paper Take Up Rolls (FPTUR)	260	0	260
SR-W028	Mark 15 Filter Paper	1.0	0	1.0
SR-W042	Paints and Thinners	5.4	7.0	12.4
SR-W045	Tri-Butyl-Phosphate & n-Paraffin	149.7	15.0	164.7
SR-W051	Spent Filter Cartridges and Carbon Filter Media	0.8	4.5	5.3
SR-W070	Mixed Waste from Laboratory Samples	2.5	41.8	44.3
SR-W071	Wastewater Suitable for Treatment in CIF	24.9	250	274.9
SR-W073	Plastic/Lead/Cadmium Raschig Rings	1.8	0	1.8
Ashcrete Stabilization				
SR-W046	Consolidated Incineration Facility (CIF) Ash	0	155	155
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	0	1000	1000
Charleston Naval Shipyard				
CN -W001		0.7[1]	0.0	0.7
CN-W004		1.00[1]	0.0	1.00
	Subtotal	1217.7	4295.9	5513.6
Effluent Treatment Facility-Wastewater Treatment				
SR-W041	Aqueous Mercury and Lead	0.0	0	0.0
SRTC Low Activity Waste Storage Tanks – Ion Exchange				
SR-W007	SRL (SRTC) Low Activity Waste	48.2	375	423.2
SRTC High Activity Waste Storage Tanks - ION Exchange				
SR-W008	SRL (SRTC) High Activity Waste	55.8	375	430.8

[1]Inventory as of 12/14/95.

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)	Total Cumulative (Current + Forecast) (m^3)
High-Level Waste ITP Facility				
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	0	48.9	48.9
D-Area Heavy Water Operations Facility				
SR-W032	Mercury Contaminated Heavy Water	6.6	0	6.6
SR-W077	Aqueous Characteristic Wastewater	0	9.0	9.0
	Subtotal	6.6	9.0	15.6
Defense Waste Processing Facility				
SR-W016	221-F Canyon High-Level Liquid Waste	53,600	8,771	62,371
SR-W017	221-H Canyon High-Level Liquid Waste	72,817	6,018.4	78,835.4
	Subtotal	126,417	14,789.4	141,206.4
Meet Treatment Standards				
SR-W024	Mercury/Tritium Gold Traps	2.3	0.2	2.5
SR-W040	M-Area Stabilized Sludge	N/A	N/A	N/A
SR-W063	Macroencapsulated Low-Level Waste	0	56	56
	Subtotal	2.3	56.2	58.5
Macroencapsulation as a 90-Day Generator				
SR-W015	Mercury/Tritium Contaminated Equipment	10.7	263.05	273.75
SR-W023	Cadmium Safety/Control Rods	0.3	0	0.3
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	0	1,065	1065
	Subtotal	11.0	1328.05	1339.05
M-Area Vendor Treatment Process				
SR-W005	Mark 15 Filtercake	15.4	0	15.4
SR-W029	M-Area Sludge Treatability Samples	1.0	0.4	1.4
SR-W031	Uranium/Chromium Solution	0.6	0	0.6
SR-W037	M-Area Plating Line Sludges	2503	0	2503
SR-W038	Plating Line Sump Material	0.4	0	0.4
SR-W039	Nickel Plating Line Solution	5.0	0	5.0
SR-W048	Soils from Spill Remediation	16.8	0	16.8
	Subtotal	2,542.2	0.4	2542.6

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)	Total Cumulative (Current + Forecast) (m^3)
SRS (Facility TBD) – Macroencapsulation				
SR-W009	Silver Coated Packing Material	9.86	3.1	12.96
SR-W060	Tritiated Water with Mercury	0.2	0	0.2
SR-W062	Low - Level Contaminated Debris	6.2	81	87.2
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	74.1	15	89.1
	Subtotal	90.36	99.1	189.46
Offsite DOE Mobile Treatment Facilities				
SR-W034	Calcium Metal	0.9	0	0.9
Treatment by Aging Followed by Incineration				
SR-W036	Tritiated Oil with Mercury	20.0	2.0	22.0
Offsite Vendor Facility – Decontamination				
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated	83.5	30	113.5
Offsite DOE Facility – INEL/WEDF Amalgamation				
SR-W014	Tritium-Contaminated Mercury	0.18	0.1	0.28
SR-W068	Elemental (Liquid) Mercury Sitewide	0.1	0.425	0.525
	Subtotal	0.28	0.525	.805
Offsite DOE – Rocky Flats Environmental Technology Site				
SR-W053	Rocky Flats Incinerator Ash	0.1	0	0.1
Offsite DOE Facility – INEL/WEDF Stabilization				
SR-W049	Tank E-3-1 Clean Out Material	1.0	0	1.0
Waste Streams to be Further Characterized				
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g**	3604.8	0	3604.8
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g **	8.0	308	316
SR-W078	LDR Hazardous Waste Awaiting Radiological Screening	100.0	unknown	100.0
	Subtotal	3712.8	308	4020.8
Waste Streams Undergoing Development of Treatment Technology				
TRU Waste Streams				
SR-W006	Mixed TTA/Xylene – TRU	0.1	0	0.1
SR-W026	Thirds/TRU Job Control Waste	92.4	935	1027.4
SR-W027	Solvent/TRU Job Control Waste	3362	0	3362
	Subtotal	3454.5	935	4389.5

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/95 (m^3)	Future forecast generation (1996-2000) (m^3)	Total Cumulative (Current + Forecast) (m^3)
Lab Waste Treated as a 90-day Generator at SRTC followed by Vitrification				
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	0.0	0.4	0.4
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	0.1	0	0.1
	Subtotal	0.1	0.4	0.5
Scrap Metal Exclusion				
SR-W011	Cadmium-Coated HEPA Filters	100.2	0	100.2
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 w/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 Recharacterized				
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 Applicators	N/A	N/A	N/A
SR-W057	D-Tested Neutron Generators	N/A	N/A	N/A
	TOTAL	137,764.54	22,652.875	160,417.415

** Mixed low-level waste conservatively managed as TRU (transuranic waste).

Note: Volumes in this table are taken from the Mixed Waste Inventory Report dated 09/30/95. They may not represent actual volumes of mixed waste of SRS as of the date of the annual update.

Section 11.3 Mixed Waste Treatment Residue Summary - 3/01/96

Residue from mixed waste treatment requiring RCRA Subtitle C disposal.

Waste Stream	Treatment	Residue Status	Comment
SR-W023 Cadmium Safety/Control Rods	Macroencapsulated in a stainless steel container.	Container stored at SRS on TRU Pad 12. Total volume of waste = $15.2m^3$	Total volume calculated from container outside dimensions.
SR-W024 Mercury/Tritium Gold Traps	Macroencapsulated in a stainless steel container.	Containers stored at SRS Mixed Waste Storage Building (643-29E). Total volume =$2.3m^3$.	

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.

The following material has been recycled in part or total. No residues have been generated requiring disposal as hazardous waste by SRS: SR-W011, Cadmium Coated HEPA Filters; SR-W013 Low-Level Waste Lead to be Decontaminated (partial volume only).

CHAPTER 12 ACRONYMS AND GLOSSARY

– 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
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
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	Department of Energy
DOE-AL	Department of Energy – Albuquerque
DOE-HQ	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
EC	Environmental Coordinator
ECM	Environmental Compliance Manual
EIS	Environmental Impact Statement
EM	DOE Office of Environmental Restoration and Waste Management

EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPD	Environmental Protection Department
ER	Environmental Restoration
ETF	Effluent Treatment Facility
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
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 Derived Waste
IDW	Investigative Derived Waste
IMERC	Incineration of Wastes Containing Organics and Mercury
IMWIR	Interim Mixed Waste Inventory Report
INCIN	Incineration
INEL	Idaho National Engineering 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 Facility
LATF	Low Activity 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
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
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

– 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
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 –

VES	Vinyl Ester Styrene
VOC	Volatile Organic Compounds
Vol	Volume

– W –

WAC	Waste Acceptance Criteria
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
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

CHAPTER 13 REFERENCES

"Federal Facility Compliance Act of 1992," 42 U.S.C. and 6961.

Code of Federal Regulations, Title 40, Part 268, "Land Disposal Restrictions."

Cost Guide, Economic Analysis: Methods, Procedures, Life-cycle Costing, and Cost Reviewing/Validating, DOE/MA-0063, Volume 1, January 1982.

Heenan, T. F. to N. Boyter, "Development of Savannah River Site (SRS), Site Treatment Plan (STP) in Accordance with the Federal Facility Compliance Act of 1992 (FFCA) (Letter, Gould to Roberts, December 21, 1993)," March 14, 1993.

"1993 RCRA Part B Permit Renewal Application – Savannah River Site," Volume X – Consolidated Incineration Facility, WSRC-IM-91-53, Section C, Rev. 1, August 1993.

The RCRA Land Disposal Restrictions: A Guide to Compliance, 1993 Edition, Table 6.1, McCoy and Associates, Inc., Lakewood, CO.

Savannah River Site, "Consolidated Incineration Facility (CIF) Mission Need and Design Capacity Review," Draft B, July 7, 1993.

Savannah River Site, "Environmental Assessment, Consolidated Incineration Facility," DOE/EA-0400, December 1992.

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, "Environmental Restoration and Waste Management Five-Year Plan for Fiscal Years 1993 – 1997," Revision 7, August 1991.

U. S. Department of Energy, "Final Mixed Waste Inventory Report: Waste Streams, Treatment Capacity," May 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," Rev. 1, April 7, 1994.

U. S. Department of Energy, "Protocol for Identifying a Potential Offsite Mixed Waste Treatment Option in the DSTP," Rev. 1, March 7, 1994.

U. S. Department of Energy, "Treatment Selection Guides," Rev. 0, March 14, 1994.

U. S. Department of Energy-Savannah River, "Land Disposal Restrictions (LDR) Federal Facility Compliance Agreement (FFCA) Bridging Amendment between the Environmental Protection Agency – Region IV (EPA-IV) and the Department of Energy Savannah River Field Office (SR)," June 21, 1993.

U. S. Department of Energy/SRPO, "Glossary of Terms Commonly Used in the Disposal of High-Level Radioactive Wastes in Mined Geologic Repositories," 1987.

Westinghouse Savannah River Company, WSRC Environmental Compliance Manual, 3Q, Rev. 18, December 1994

Westinghouse Savannah River Company, High-Level Waste Management Division, HLW System Plan, HOW-OVP-94-0145, Revision 4, November 30, 1994.

Westinghouse Savannah River Company, Investigation-Derived Waste Management Plan, WSRC-RP-94-1227, Revision 2.

Westinghouse Savannah River Company, Proposed Site Treatment Plan (PSTP) (U) Reference Document, March 20, 1995