WSRC-TR-94-0608-
Vol. 1-2

Proposed Site Treatment Plan (PSTP)

RESPONSIBILITY • SECURITY • SAFETY
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Volumes I and II

The information in this document was developed during the course of work under Contract No. DE-AC09-89SR18035 with the Department of Energy.

SAVANNAH RIVER SITE

MIXED WASTE

PROPOSED SITE TREATMENT PLAN (PSTP) (U)

WSRC-TR-94-0608

Approved

A. L. Schwallie / 3-20-95

Ambrose Schwallie — Date
President
Westinghouse Savannah River Company

Approved

Mario Fiori / 3-23-95

Mario Fiori, Ph.D. — Date
Manager, Department of Energy
Savannah River Site

GH5600srd 3/20/95

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March 29, 1995

ATTN: WSRC

Ensure that this version is the same as that approved by Mr. Schwallie and Dr. Fiori on 3/20/95 and 3/23/95, respectively. That version must be the only one released. Planned release date is Monday (April 3, 1995) by DOE. Please coordinate release by that date.

Thank you for your cooperation.

W. F. Perrin, TIO

3/28/95
Date

February 22, 1995

Mario Fiori, Ph.D.
Manager, Department of Energy
Savannah River Site

Dear Dr. Fiori:

I certify, with this transmittal of the Proposed Site Treatment Plan (PSTP), dated February 22, 1995, that Westinghouse Savannah River Company (WSRC) has the capability to implement all of the mixed waste treatment activities specified in the PSTP.

WSRC is not certifying the availability of funds. Rather, if the funds are available as defined by the PSTP cost estimates and priority is established by the Department of Energy (DOE) to perform the work on the schedule provided, then the PSTP identified activities can be accomplished as described on the schedule provided in the PSTP.

Yours very truly,

N. C. Boyter
Vice President and General Manager
Solid Waste and Environmental Restoration Division

gh/srd

SAVANNAH RIVER SITE

MIXED WASTE

PROPOSED SITE TREATMENT PLAN (PSTP) (U)

Volumes I and II

FEBRUARY 22, 1995

GH5600srd 2/17/95

MASTER

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TABLE OF CONTENTS

Volume I – Compliance Plan Volume

Volume II – Background Volume

Summary of Revisions

Page	Revision No.	Date of Revision
Signature Page	0	02/22/95
Title Page	0	02/22/95
ii through v	0	02/22/95
Volume I – Compliance Plan		
1-1 through 1-2	0	02/22/95
2-1 through 2-21	0	02/22/95
3-1 through 3-15	0	02/22/95
4-1 through 4-2	0	02/22/95
5-1 through 5-2	0	02/22/95
Volume II – Background Plan		
1-1 through 1-23	0	02/22/95
2-1 through 2-46	0	02/22/95
3-1 through 3-151	0	02/22/95
4-1 through 4-18	0	02/22/95
5-1 through 5-10	0	02/22/95
6-1 through 6-13	0	02/22/95
7-1 through 7-16	0	02/22/95
8-1 through 8-8	0	02/22/95
9-1 through 9-8	0	02/22/95
10-1 through 10-5	0	02/22/95
11-1 through 11-11	0	02/22/95
12-1 through 12-10	0	02/22/95
13-1 through 13-4	0	02/22/95

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 waste, 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 the mixed waste to the standards promulgated by the U. S. Environmental Protection Agency (EPA) pursuant to Section 3004(m) of RCRA. 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 proposed Site Treatment Plan (STP) for Savannah River Site (SRS) mixed waste in accordance with RCRA Section 3021(b). In general, the purpose of the proposed STP is to identify DOE's proposed plan for treating the mixed waste at SRS and for developing technologies where technologies do not exist or need modification. DOE-SR and SCDHEC agree that this STP fulfills the requirements contained in the FFCAct, RCRA 3021, and therefore, pursuant to Section 105(a) of the FFCAct (RCRA Section 3021(b)(5)), it is the DOE's requirements to submit a plan for the development of treatment capacities and technologies pursuant to RCRA Section 3021.

Emerging or new technologies not yet considered may be identified that provide opportunities 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 its treatment plan in accordance with the provisions of the proposed STP and/or the Order.

The *Compliance Plan Volume* provides overall schedules with target dates for achieving compliance with the land disposal restrictions (LDR) and contains procedures to establish milestones to be enforced under the Order. Information regarding the technical evaluation of treatment options for SRS mixed wastes is contained in the *Background Volume* and is provided for informational purposes only.

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CHAPTER 2 IMPLEMENTATION OF THE PLAN

The purpose of this section is to describe proposed U. S. Department of Energy, Savannah River Operations Office (DOE-SR) mechanism and provisions for administering and implementing the Site Treatment Plan (STP). The goal of the following provisions is to establish a process that achieves compliance with FFCAct in a manner that is efficient and effective for both DOE-SR and South Carolina Department of Health and Environmental Control (SCDHEC).

Section 2.1 Compliance Requirements

2.1.1 Schedule Definitions

The purpose of the following subsections is to describe the process DOE-SR is proposing to establish milestones for treatment of covered wastes. The process will be described using the terms, "project activity schedule(s)," "milestone(s)," and "target date(s)" as defined below:

(a) **Project Activity Schedule(s)** shall mean the overall schedule(s) in the STP for performing key activities in support of mixed waste treatment(s). Key activities include milestones, when set in accordance with Section 2.1.2 and target dates for future activities. Project activity schedules will be provided in Sections 3.0 through 5.0 in accordance with the Section 3021(b)(1)(B)(ii) of the Federal Facility Compliance Act (FFCAct). Project activity schedule(s) include both milestone(s) and target date(s), as defined below.

(Note: Project activity schedules for certain Preferred Treatment Options were provided in the Draft Site Treatment Plan (DSTP); other schedule(s) will be provided after they are developed, and these schedules are planned for inclusion in the STP. The project activity schedules for the STP will include target dates only. DOE-SR proposes that milestones will be set in accordance with Section 2.1.2 for the first full federal fiscal year after execution of the consent order.)

(b) **Milestone(s)** shall mean those specific date(s) or time frame(s) within the STP project activity schedule(s) that 1) constitute the steps DOE-SR is committing to take to provide for treatment of its mixed waste; and 2) for which approved funding exists. Milestones are enforceable and will be established in accordance with Section 2.1.2.

(c) **Target Date(s)** shall mean those specific dates or time frame(s) within the STP project activity schedule(s) for outyear activities beyond the funded federal fiscal year which constitute the steps DOE-SR plans to take to provide for treatment of its mixed waste. Target date(s) are non enforceable, but may be converted to milestones in accordance with Section 2.1.2.

2.1.2 Approach to Setting Target Dates and Milestones

In the next fiscal year (after the fiscal year in which the STP has been approved) and annually thereafter, milestone(s) will be set based upon receipt of funding for STP activities for the current federal fiscal year. Target dates have been included for outyears in the STP. Target dates may be adjusted in accordance with any changes in DOE Planning for outyear activities as part of the annual update. Project activity schedules which identify the key steps for providing for treatment of covered wastes are described below and are included in Section 3.0 through 5.0 of this plan. The project activity schedules will include target dates and milestones, as defined above.

Within 60 days of receiving its Approved Funding Program, but not later than March 31 of the current federal fiscal year, DOE-SR shall submit proposed milestone date(s) for the current fiscal year. DOE-SR will determine these date(s) by converting the next ensuing target date(s) to a milestone date(s), as appropriate. Each milestone, as defined above, will be identified and provided to SCDHEC as part of the Annual Update described in Section 2.2. Approval of the proposed conversion of target dates to milestones shall be in accordance with Section 2.10, "Submittal, Review, and Approval of Deliverables." Milestones for the current federal fiscal year will be updated annually. If there is no ensuing target date to convert to a milestone within a given fiscal year, progress on interim activities for the treatment options will be discussed and provided through the Annual Update. As appropriate, the Annual Update shall include adjusted target dates.

2.1.3 *Types of Project Activity Schedules*

Project activity schedules through the *Compliance Plan Volume* are listed below in Tables 1 through 4. In general, there are four types of project activity schedules for mixed wastes at SRS. In that the FFCAct has specific requirements for scheduling, these schedule models have been designed in accordance with those requirements. These models include the following:

Table 1 – Typical Project Activity Schedule for Mixed Waste with Existing Treatment Technology(ies)

Table 2 – Typical Project Activity Schedule for Mixed Waste without Existing Treatment Technology(ies)

Table 3 – Typical Project Activity Schedule for Radionuclide Separation of Mixed Waste(s)

Table 4 – Typical Project Activity Schedule for Mixed Waste(s) to be Shipped Offsite for Treatment.

(Note: These examples are typical. Some variation may be necessary in certain instances. For example, depending upon the status of the facility (e.g., operating under interim status or at differing stages of development) some types of target dates or milestones within a project activity schedule may not be necessary for a particular facility. Additionally, where appropriate, schedule assumptions will be included as a footnote to each individual schedule.)

2.1.3.1 How Mixed Waste with Existing Treatment Technology(ies) will be Addressed

The STP expressly recognizes that treatment technologies have been identified and developed for some of the mixed wastes currently being generated and stored at SRS, and that for other mixed wastes, there are either no available technologies or the treatment technology must be modified or adapted to be made available for mixed waste. For mixed wastes for which treatment technologies have been identified and developed, a schedule is required which includes submitting of all applicable permit applications, entering into contracts, initiating construction, commencing systems testing, commencing operations, and processing backlogged and currently generated mixed wastes. For these wastes which have existing treatment technologies, a project activity schedule modeled after Table 1, "Typical Project Activity Schedule for Mixed Wastes with Existing Treatment Technology(ies)," will be used.

Table 1
Typical Project Activity Schedule for Mixed Wastes with Existing Treatment Technology(ies)

Types of Activities Selected for Scheduling Target Dates and Milestones:

a) Submit permit application(s) to the appropriate agency(ies)
b) Enter into contract(s)
c) Initiate construction
d) Commence systems testing
e) Commence operation
f) Submit for approval a schedule for processing backlogged and currently generated mixed waste(s)

List of schedule assumption(s), as appropriate

2.1.3.2 How Mixed Waste without Existing Technology(ies) will be Addressed

For mixed wastes for which no treatment technologies have been identified and developed, or for which treatment technology must be modified or adapted to be made available for mixed waste, a schedule is required which includes identifying the funding requirements for the identification and development or the modification or adaptation of such technologies, identifying and developing such technologies, submitting treatability study exemptions, and submitting research and developing (R&D) permit applications. For these wastes which do not have existing treatment technologies, a project activity schedule modeled after Table 2, "Typical Project Activity Schedule for Mixed Wastes without Existing Treatment Technology(ies)," will be used.

Table 2
Typical Project Activity Schedule for Mixed Wastes without Existing Treatment Technology(ies)

Types of Activities Selected for Scheduling Target Dates and Milestones:

a) Identify funding requirements for identification and development of technology
b) Identify and develop technology
c) Submit treatability study exemption(s), where applicable
d) Submit R&D permit application(s), where applicable
e) Submit for approval a schedule for treatment in accordance with Table 1 or a new schedule for alternative treatment technologies or capacity in accordance with Section 2.1.3.2

List of schedule assumption(s), as appropriate

2.1.3.3 How Mixed Wastes Undergoing Radionuclide Separation will be Addressed

The FFCAct sets additional requirements in cases where DOE-SR intends to conduct radionuclide separation of mixed waste. Should DOE-SR determine that it intends to conduct radionuclide separation of mixed wastes, DOE-SR will provide an estimate of the volume of waste generated by each case of radionuclide separation, the estimated costs of waste treatment and disposal if radionuclide separation is used compared to the estimated costs if it is not used, and the assumptions underlying such waste volume and cost estimates. For these wastes, a project activity schedule modeled after Table 3, "Typical Project Activity Schedule for Radionuclide Separation of Mixed Wastes," will be used. For the purposes of this Plan, the term, "radionuclide separation" shall mean the segregation of the radioactive portion of the mixed waste from the hazardous portion and may include storage of mixed wastes for purposes of allowing for radioactive decay of the radioactive portion of the mixed waste to further facilitate treatment. Storage of mixed wastes for the purposes of allowing for radioactive decay of the radioactive portion of the mixed waste shall be considered to be storage for the purpose of accumulation of such quantities of waste as are necessary to facilitate proper recovery, treatment, or disposal in compliance with Resource Conservation and Recovery Act (RCRA) Section 3004(j). Such storage may be included in the project activity schedules for the *Compliance Plan Volume*, as appropriate, including treatment schedules or schedules related to radionuclide separation.

Table 3
Typical Project Activity Schedule for Radionuclide Separation of Mixed Waste(s)

Types of Activities Selected for Scheduling Target Dates and Milestones:

a) Provide an estimate of the volume of waste(s) generated by each case of radionuclide separations
b) Provide an estimate of the volume of waste(s) that would exist or be generated without radionuclide separation
c) Provide an estimate of the costs of waste treatment and disposal if radionuclide separation is used compared to the estimated costs if it is not used
d) Provide the assumption(s) underlying such waste volume and cost estimates
e) Submit, for approval, a plan for treatment or management of residue(s), as appropriate in accordance with Section 2.1.3

List of schedule assumption(s), as appropriate

2.1.3.4 The Compliance Plan Volume

The *Compliance Plan Volume* shall contain now or in the future, project activity schedule information for other types of specific situations related to treatment of SRS mixed wastes, including the following:

How Offsite Shipment of Mixed Wastes will be Addressed

For mixed waste that shall be shipped offsite for treatment, the final milestone/target date for the treatment of such waste in this *Compliance Plan Volume* shall be the completion of mixed waste shipment(s) to the offsite treatment facility as illustrated below in Table 4, "Typical Project Activity Schedule for Mixed Waste(s) to be Shipped Offsite for Treatment." Information supporting development or use of offsite treatment capacity or technology for treatment of such wastes is provided in the *Background Volume* of the STP. In the event such offsite treatment schedules impact the SRS *Compliance Plan Volume*, DOE-SR shall notify SCDHEC and they shall negotiate necessary changes in accordance with Section 2.5, "Delays/Extension;" Section 2.6, "Modifications;" and Section 2.7, "Revisions," as appropriate, and subject to the Section 2.9, "Resolution of Disputes Arising from Plan Implementation."

Table 4
Typical Project Activity Schedule for
Mixed Waste(s) to be Shipped Offsite for Treatment

Types of Activities Selected for Scheduling as a Target Date and Milestone:

a) Complete shipment of mixed waste(s) offsite

List of schedule assumption(s), as appropriate

In the event DOE-SR decides to treat waste(s) at an offsite facility in lieu of plans to treat such waste(s) onsite, DOE-SR shall so notify SCDHEC. DOE-SR schedules, target dates, and milestones pertaining to that particular waste(s) will no longer be applicable or enforceable and, as part of the notice, DOE-SR shall include a date by which a proposed plan and schedule for shipment of the subject waste(s) will be prepared in accordance with the STP for submission to SCDHEC. Such new proposed schedule for shipment offsite shall be subject to approval by SCDHEC under Section 2.10, "Submittal, Review, and Approval of Deliverables," and, if applicable, shall also be subject to the revision requirements of *Compliance Plan Volume*. Where mixed waste(s) will be shipped to another DOE facility, DOE will notify the regulator agency in the state in which the receiving facility is located of the proposed shipment.

<u>How Characterization of Mixed Wastes will be Addressed</u>

For mixed waste(s) which are not sufficiently characterized to allow identification of appropriate treatment, DOE-SR will propose schedules for characterizing such waste(s). The final commitment in this schedule will require DOE-SR to either identify the existing/planned facility that will receive the waste(s) and any necessary changes to the pertinent schedule or submit a new proposed schedule which ensures treatment of the subject waste(s) as described in this section.

<u>How Transuranic (TRU) Mixed Waste will be Addressed</u>

DOE anticipates that SRS TRU mixed waste will ultimately be disposed at the Waste Isolation Pilot Plant (WIPP) in the state of New Mexico. DOE-SR will store and prepare TRU mixed waste at SRS for shipment to WIPP. DOE-SR shall provide SCDHEC with a progress report on the status of the WIPP as part of the Annual Update in Section 2.2. This Annual Update will contain the status of the No-Migration Variance, compliance with the applicable disposal standards, and other pertinent technical issues related to the WIPP's readiness. Since the WIPP project is not the subject of *Compliance Plan Volume*, this Annual Update will not be subject to review and approval pursuant to this STP. If no TRU mixed waste has been shipped from SRS to WIPP by December 31, 1999, DOE-SR and SCDHEC agree to meet and discuss the status of the TRU waste in storage at SRS and modify this STP as necessary. In the event DOE-SR has new information prior to December 31, 1999, that would indicate shipments would be made at either an earlier or later date, DOE-SR agrees to provide such information and meet with SCDHEC to discuss modifications of this STP as necessary.

Section 2.2 Annual Site Treatment Plan Update

2.2.1 Purpose

The purpose of this section is to (a) ensure that SCDHEC and DOE-SR effectively communicate and exchange information about schedule, technology development, funding and concerns that affect the implementation of the STP; (b) provide a procedure for updating the Background Volume to the STP; and (c) provide a procedure for updating the STP Compliance Plan Volume.

2.2.2 Timing

Within 60 days after DOE-SR annual budget allocation is approved and transmitted by DOE-HQ (receipt of the Approved Funding Program), but no later than March 31, DOE-SR shall provide an Annual Update of the STP to SCDHEC for review, comment and approval. The first Annual Update will occur in the first full federal fiscal year following the approval of the STP. The Annual Update will occur annually thereafter. The annual update will contain the proposed milestones for the current fiscal year for approval in accordance with Section 2.10, "Submittal, Review and Approval of Deliverables," and with Section 2.2.3.2.

The Annual Update shall provide SCDHEC with information to track progress on milestones regarding DOE-SR's related planning and scheduling. Approval for conversion of target dates to milestones will be sought by DOE-SR during the Annual Update. The Annual Update shall also allow for input from the public, affected states, and the Environmental Protection Agency (EPA) on proposed Revisions to the STP when applicable and appropriate. The Annual Update to the STP will minimize paperwork necessary to document changes and be handled by page changes to the extent practicable.

2.2.3 Contents Summary

The Annual Update of the STP shall be divided into two volumes which will consist of an update to the Background Volume and an update to the Compliance Plan Volume. Requests for approval of changes or notification of changes to the STP may be submitted in the Annual Update or at any time such changes are determined by DOE-SR to be appropriate.

2.2.3.1 Contents Details

The Annual Update to the Background Volume will provide the following information:

(a) The amount of each covered waste stored at SRS as follows: 1) the estimated amount in storage at the end of the previous fiscal year; and 2) the estimated amount anticipated to be placed in storage in the next five fiscal years.

(b) A description of progress made up to the last fiscal year on each project activity schedule in the STP. If applicable, DOE-SR will also describe current or anticipated alternative treatment technology(ies) which are being evaluated for use in lieu of treatment technologies or capacities identified in the STP. This description will include potential, alternate commercial treatment, and offsite DOE-SR treatment capacity or technology development.

(c) An evaluation of characterization, packaging, and/or treatment capabilities and/or plans for MTRU waste to ensure that the activities and commitments included in the Site Treatment Plan (STP) remain consistent with the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC), No Migration Petition, RCRA Part B Permit, and/or Compliance Certification Development.

(d) A description of DOE-SR's progress in seeking funding for activities set forth in the STP and any funding issues which may impact the schedule.

(e) The status of any pending or planned extension, treatability variance, or no migration petition.

(f) Information which has changed or not previously been included regarding waste form, waste code, treatment technology, and capacity needs.

(g) Notification of the deletion of waste streams in accordance with Section 2.4.1.

2.2.3.2 Schedule Changes

The Annual Update to the Compliance Plan Volume shall reflect the current project activity schedule and shall clearly identify proposed changes requiring approval under Section 2.10, "Submittal, Review and Approval of Deliverables and Revisions," subject to the procedures of Section 2.7, "Revisions."

2.2.4 ***Public Availability***

DOE-SR shall make the Annual Update available to the public by placing it in public reading rooms. When the Annual Update includes proposed revisions to *Compliance Plan Volume*, the provisions of Section 2.7, "Revisions," also apply.

Section 2.3 Inclusion of New Waste Streams

2.3.1 ***Purpose***

The purpose of this section is to establish a method for including in the STP "new waste stream(s)" which include newly identified or generated mixed waste stream(s) at the site, offsite mixed waste(s) received for treatment at SRS, and waste(s) generated through environmental restoration and decontamination and decommissioning activities to the extent such waste will be treated in facilities designated under the STP.

When new mixed waste stream(s) are found to exist, these waste(s) will be addressed pursuant to the provisions set forth in this section. It is agreed that notification of the new mixed waste stream(s) will be provided and will include a date for submission of a proposed plan and schedule for treatment of the new mixed waste stream(s) in accordance with the STP.

2.3.2 ***Notification***

DOE-SR shall notify SCDHEC of additional or "new waste stream(s)" which either have been generated or stored, or may notify SCDHEC, as appropriate, of waste that is anticipated to be generated or stored at SRS, in the future. To the extent practicable, DOE-SR shall provide a description of the waste code, wasteform, volumes, technology, and capacity needs, and other similar pertinent information regarding such wastes in a manner consistent with the format and type of information included in the STP, and a description of how DOE-SR intends to manage the waste consistent with Section 2.1 of *Compliance Plan Volume*. Except as provided in Sections 2.3.3 and 2.3.4 below, the information provided pursuant to this section is not subject to SCDHEC approval.

2.3.3 ***Schedule Development***

If DOE-SR cannot provide such information or schedules because of inadequate characterization or because it is otherwise impracticable, DOE-SR shall include appropriate justification, supporting information, and proposed plans for developing such information and schedules consistent with Section 2.1.3, "Types of Project Activity Schedules," as a deliverable under Section 2.10, "Submittal, Review, and Approval of Deliverables."

2.3.4 Changes

DOE-SR may propose changes to *Compliance Plan Volume*, of the STP to accommodate new mixed waste stream(s). If any such changes are required, DOE-SR shall submit the changes for approval as a deliverable in accordance with Section 2.10, "Submittal, Review, and Approval of Deliverables." Additionally, DOE-SR may propose revisions to *Compliance Plan Volume* of the STP, as necessary, to accommodate new waste streams subject to Section 2.7, "Revisions."

CHAPTER 3 LOW-LEVEL MIXED WASTE TREATMENT

The following sections contain target dates that would be converted into milestones as the PSTP is implemented according to procedures established in Chapter 2.0 of this volume. Chapter 3.0 identifies low-level mixed waste streams, Chapter 4.0 identifies TRU mixed waste streams, and Chapter 5.0 identifies high level mixed 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 PSTP. Waste streams that have been eliminated, combined, are in compliance, or will be in compliance by October 1995 do not appear in Volume I.

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	*
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 Supernatant Treatment	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.A
SR-W005	Mark 15 Filter Cake	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.B
SR-W006	Mixed TTA/Xylene – TRU	Characterization in TWCCF – WIPP Disposal	4.1.1	4.1.1.1.A
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	N/A	3.1.1.3.A
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	N/A	3.1.1.3.B
SR-W009	Silver Coated Packing Material	Macroencapsulation in S. S. Container – Containment Bldg.	3.1.3.1	3.1.3.1.A
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	*
SR-W011	Cadmium-Coated HEPA Filters	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.C
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
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	3.1.1.7.A

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
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	*
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	Acid Washing followed by Placement in an Engineered S. S. Container – ITP	N/A	3.1.1.4.A
SR-W021	Poisoned Catalyst Material	Waste stream eliminated	N/A	*
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	3.1.1.7.B
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	N/A	3.1.1.6.A
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization in TWCCF	3.3.1	3.3.1.1.A
SR-W026	Thirds/TRU Job Control Waste	Characterization in TWCCF – WIPP Disposal	4.1.1	4.1.1.1.B
SR-W027	Solvent/TRU Job Control Waste	Characterization in TWCCF – 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.D
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	*
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.E
SR-W032	Mercury Contaminated Heavy Water	D-Area Facility	N/A	3.1.1.5.A
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization in TWCCF	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

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
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	Incineration followed by Stabilization – DOE Mobile Packed-Bed Incinerator – Onsite	3.2	3.2.1.1
SR-W037	M-Area High Nickel Plating Line Sludge	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.F
SR-W038	Plating Line Sump Material	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.G
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	3.1.2.1	3.1.2.1.H
SR-W040	M-Area Stabilized Sludge	Waste stream eliminated	N/A	•
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	3.1.1.2	3.1.1.2.A
SR-W042	Paints and Thinners	CIF – Incineration	3.1.1.1	3.1.1.1.H
SR-W043	Lab Waste with Tetraphenyl Borate	Consolidated with SR-W012	N/A	•
SR-W044	Tri-Butyl- Phosphate & n-Paraffin – TRU	Consolidated with SR-W045	N/A	*
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.I
SR-W049	Tank E-3-1 Clean Out Material	Stabilization – Offsite DOE-INEL-WEDF	3.1.5.1	3.1.5.1.B
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	N/A	5.1.2.1.A
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	*
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	*

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Volume I Section Identification	Volume II Section Identification
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	None – pursuing research program	3.2	3.2.2.1
SR-W057	D-Tested Neutron Generators	Waste stream eliminated	N/A	*
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	Treatment by SRTC as a 90-Day Generator	N/A	5.1.2.1.B
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	*
SR-W060	Tritiated Water with Mercury	Macroencapsulation in S. S. Container – Onsite	N/A	3.1.3.1.B
SR-W061	DWPF Mercury	Amalgamation – Offsite DOE-INEL WEDF	N/A	3.1.5.1.C
SR-W062	Toxic Characteristic (TC) Contaminated Debris	Macroencapsulation with Polymer by a Vendor – Onsite	3.1.3.1	3.1.3.1.C
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	Meets Treatment Standard	N/A	3.1.1.6.B
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 Steel and Metal 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	Amalgamation – Offsite DOE-INEL WEDF	3.1.5.1	3.1.5.1.D
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.A
SR-W070	Mixed Waste from Laboratory Samples	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.N
SR-W071	Wastewater from TRU Drum Dewatering	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.O
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	3.1.1.7.C
SR-W073	Plastic/Lead/Cadmium Raschig Rings	Incineration followed by Stabilization – CIF	3.1.1.1	3.1.1.1.P

* Waste stream eliminated or consolidated. See Section 2.6.1.

The following project activity schedules are proposed to be used for the milestone setting process as described in Section 2.1 of this volume.

Days are defined as calendar days; activities defined as occurring within a given quarter shall be completed by the last day of the quarter.

Section 3.1 Low-Level Mixed Waste Treated Onsite

3.1.1 Onsite Treatment in Existing Facilities

3.1.1.1 Consolidated Incineration Facility (CIF)

Incineration 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 from TRU Drum Dewatering
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 4th quarter federal FY 95.

Testing period shall mean the period following completion of the CIF construction when the facility performs integrated testing such as test burns using simulated or actual waste to determine readiness to conduct a trial burn before the receipt of waste for incineration.

Commencing Operations:
Operations shall commence on February 2, 1996.

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:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule
- Completion of appropriate National Environmental Policy Act (NEPA) documentation (Waste Management EIS) and issuance of a Record of Decision (ROD) on CIF. Decisions reached following additional NEPA review are expected to be consistent with CIF schedule. Selection of a different alternative may require submittal of a revised proposal.
- No significant technical deficiencies are identified during the trial burn or from an operational readiness assessment
- SCDHEC approval of Resource Conservation and Recovery Act (RCRA) permit revisions by April 1, 1995, for waste management processes (e.g., blowdown stabilization) necessary to support CIF operation and startup
- Resolution of the Environmental Protection Agency (EPA) Combustion Strategy impacts on permitting schedule prior to March 1, 1995.
- 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

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

The ETF is the preferred option for certain mixed waste streams, including the following:

SR-W041, Aqueous Mercury and Lead

Estimated Schedule for Treatment of this Waste Stream (may be deleted from PSTP at a later date)

Submit Treatability Demonstration:
By 4Q federal FY 95, if required

Entering into Contracts:
Not applicable

Initiating Construction:
No construction required; ETF operational

Conducting Systems Testing:
No testing required; ETF operational

Commencing Operations:
By 4Q federal FY 95

Processing Backlogged and Currently Generated Mixed Waste:
By 4Q federal FY 95

Schedule Assumptions

The ability to perform in accordance with the estimated schedule for the ETF 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
- No changed 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 approval 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
- Treatability demonstration completed and approval by SCDHEC to introduce the waste, if needed

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-W004, M-Area Plating Line Sludge from Supernate Treatment
SR-W005, Mark 15 Filter Cake
SR-W011, Cadmium-Coated HEPA Filters
SR-W029, M-Area Sludge Treatability Samples
SR-W031, Uranium/Chromium Solution
SR-W037, M-Area High Nickel Plating Line Sludge
SR-W038, Plating Line Sump Material
SR-W039, Nickel Plating Line Solution
SR-W048, Soils from Spill Remediation

Estimated Schedule for this Onsite Facility

Submittal of all applicable permit applications:
Completed (except for permits or permit modifications that may be required for waste streams SR-W011, SR-W031, and SR-W048)

Entering into Contracts:
Completed

Initiating construction:
Within 30* days after the effective date of the Industrial Wastewater Construction Permit

Initiating construction shall mean beginning of work necessary to pour concrete foundations.

Conducting Systems Testing:
Within 180* days after the effective date of the Industrial Wastewater Construction Permit

Conducting systems testing shall mean initiating of equipment testing to ensure that operating specifications are met.

Commencing Operations:

Initiate M-Area Vendor Treatment of the LDR waste within 225* 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

Note: * This schedule was developed based on the assumption of a cementation process. Vitrification technology has been selected for the M-Area Vendor Treatment Process. The project schedule has been evaluated, and adjustments may be appropriate.

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).
- Approval by SCDHEC of the Industrial Wastewater Construction Permit no earlier than December 31, 1994.
- Receipt of an effective Wastewater Operations Permit and an Air Quality Control Operating Permit within 225 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
- Approval of wastewater treatment permit modification for new wastes (SR-W011, SR-W031, SR-W048)

3.1.3 Onsite Treatment in Planned Facilities

3.1.3.1 Containment Building Treatment Facilities

Macroencapsulation in Separations Containment Building 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. Submit RCRA Part A application to SCDHEC by 3Q federal FY 97

Entering into Contracts:
Not applicable

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

Conducting Systems Testing:
Initiate systems testing within 90 days of construction completion. Initiation of system testing shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 90 days after completion of successful systems testing. Commence operations shall mean begin placing mixed waste in stainless steel boxes.

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 for the Containment Building 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 and issuance of a Record of Decision.
- Approval by EPA of a treatability variance by December 1995
- 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

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

SR-W062, Toxic Characteristic (TC) 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 01.

Entering into Contract(s):
By 12 months after permit approval, 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 effective date of approval of permit application and award of contract, whichever is later, initiate construction. Initiation of construction shall mean initial equipment ordering.

Conduct Systems Testing:
Initiate systems testing within 90 days of construction completion. "Initiate systems testing" shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 90 days after completion of successful 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 and issuance of a Record of Decision.
- 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

3.1.4 *Offsite Vendor Treatment Facilities*

3.1.4.1 Decontamination

A commercial vendor 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

Completing Shipment of Waste Offsite:
Within 90 days after receipt of authorization from the selected treatment facility for SRS to begin shipment and receipt of an acceptable waste processing schedule, DOE-SR will provide a schedule for completion of offsite waste shipment to SCDHEC.

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 for transportation and issuance of a Record of Decision.
- 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 Disposal Facility

Idaho National Engineering Laboratory (INEL) 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

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 PSTP Volume II for additional information.

Completing Shipment of Waste Offsite:

After receipt of funding for project by DOE-SR, within 90 days of INEL's receipt of an approved schedule for processing backlogged and currently generated mixed waste, SRS will provide a schedule for completion of offsite waste shipment.

Schedule Assumptions

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

- Adequate funding identified for shipment of waste to INEL
- Approval by INEL to ship waste
- Completion of appropriate NEPA documentation for transportation and issuance of a Record of Decision.

3.1.5.2 Department of Energy Mobile Treatment Facilities

Treatment with a DOE Mobile Treatment Facility is the preferred option for the following waste streams:

SR-W034, Calcium Metal

Estimated Schedule for Treatment of this Waste Stream

Completing Shipment of Waste Offsite:

After receipt of funding for project by DOE-SR, within 120 days of Albuquerque's 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

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 and issuance of a Record of Decision. Decisions reached following additional NEPA review are expected to be consistent with the alternatives specified in the estimated schedule for deactivation. Selection of a different alternative may require submittal of a revised proposal.
- Approval by SCDHEC of the Part A expansion of in interim status for the treatment of calcium in containment building within six months of submitting application
- 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

Section 3.2 Waste Stream Requiring Technology Development

SR-W036, Tritiated Oil with Mercury
SR-W056, Job Control Waste with Enriched Uranium and Solvent Applicators

Estimated Schedule for Treatment of these Waste Streams

Identifying and Developing Technology:
Within 120 days after receipt of funding of project by DOE-SR, a schedule will be provided to identify and develop a treatment technology for these wastes. The schedule will address the need for treatability study exemptions and Research and Development permit applications, as appropriate.

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 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
- 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 of 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
- Waste stream SR-W036 will be shipped offsite to a mobile treatment unit if this technology if found to be appropriate.

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

3.3.1 Waste Streams to be Further Characterized

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

Submit applicable permit application(s):
Submit RCRA Part B permit application to SCDHEC by 4Q federal FY 03.

Entering into Contracts:
Not applicable

Initiating Construction:
Within 90 days of the effective date of approval of permit application or a KD-3 decision, whichever is later, initiate construction. Initiation of construction shall mean equipment ordering.

Conduct Systems Testing:
Initiate systems testing within 90 days of construction completion. "Initiate systems testing" shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 90 days after completion of successful systems testing or a KD-4 decision, whichever is later. "Commence operations" shall mean begin preparation of the first drum.

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

<u>Schedule Assumptions</u>

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
- 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

CHAPTER 4 TRU MIXED WASTE STREAMS

The following project activity schedules are proposed to be used for the milestone setting process as described in Section 2.1 of this volume.

Section 4.1 National Strategy for Managing Mixed Transuranic Waste

The current DOE strategy with regards to mixed transuranic (MTRU) waste is to segregate MTRU wastes from mixed low-level wastes; to maintain the MTRU wastes in safe interim storage; to characterize, certify, 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) and the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDR) for MTRU waste will be achieved using the RCRA No Migration petition approach provided in the Code of Federal Regulations Title 40 Part 268.6.

Under this strategy, no treatment, other than that necessary to meet WIPP WAC is anticipated. However, DOE is undertaking a comprehensive systems prioritization method (SPM) approach to identify experiments, modeling, engineering design, and waste acceptance criteria (WAC) that are needed to support regulatory compliance the SPM is designed to address regulator and stakeholder concerns early and throughout the process; to lead to a scientifically sound performance assessment in demonstrating regulatory compliance; and to be more efficient and cost-effective. The SPM process allows for total system analysis and comprehensive stakeholder input into regulatory compliance. The SPM, along with the performance assessment, and the EPA No Migration Determination (NMD) will ascertain what treatments, if any, will be required to ensure disposal compliance.

DOE commits to begin discussions with involved regulatory agencies regarding potential alternative treatment options for MTRU waste in January 1998 if DOE fails to declare operational readiness for WIPP by that time, or at such earlier time as DOE announces a delay in the opening of WIPP substantially beyond January 1998 or at such time when ongoing analysis (SPM or performance assessment) demonstrates LDR treatment will be required for disposal compliance. Once DOE and regulatory agencies have negotiated a schedule, DOE will submit modifications to the STPs for MTRU waste, no sooner than twelve months after agreement is reached.

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

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

SR-W006, Mixed TTA/Xylene – TRU
SR-W026, Thirds/TRU Job Control Waste
SR-W027, Solvent/TRU Job Control Waste

DOE's current policy is that TRU mixed waste will be characterized and treated to meet the Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria (WAC) and then shipped to WIPP for disposal. Consistent with this policy, the treatment of TRU mixed waste to meet Land Disposal Restrictions (LDR) standards has 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 03.

Entering into Contracts:
Not applicable

Initiating Construction:
Within 90 days of the effective date of approval of permit application or a KD-3 decision, whichever is later, initiate construction. Initiation of construction shall mean equipment ordering.

Conducting Systems Testing:
Initiate systems testing within 90 days of construction completion. "Initiate systems testing" shall mean begin equipment checkout.

Commencing Operations:
Commence operations within 90 days after completion of successful systems testing or a KD-4 decision, whichever is later. "Commence operations" shall mean begin preparation of the first drum.

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 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
- 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

Section 4.2 Transuranic Mixed 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:

After receipt of funding for project by DOE-SR and 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 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 MIXED WASTE

The following project activity schedules are proposed to be used for the milestone setting process as described in Section 2.1 of this volume.

Days are defined as calendar days; activities defined as occurring within a given quarter shall be completed by the last day of the quarter.

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

5.1.1 Defense Waste Processing Facility (DWPF)

Vitrification in 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:
Systems testing underway. Systems testing using water has been completed. Systems testing using nonradioactive chemicals (Cold Chemical Runs) was completed in October 1993. Melter heatup testing was initiated in April 1994. For the purpose of the PSTP, completion of nonradioactive test work and approval to commence radioactive operations is planned by the 2nd quarter federal FY 96.

Commencing Operations:
For the purpose of the PSTP, operations shall commence within 12 months after the successful introduction of radioactive test materials into DWPF. Commencing operation shall mean initial transfer of high-level waste to the DWPF vitrification building.

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

Schedule Assumptions

This schedule was prepared for the purpose of the PSTP, and is not intended to replace or supersede aggressive work performance goals set by DOE in facility management work plans/schedules for the DWPF.

Upon the final determination of schedule for the DWPF, the ability to meet the schedule is contingent on, but not limited to, the following:

- Receipt by DOE-SR of adequate funding specifically identified for this project to support the schedule

- Completion of the DWPF Supplemental Environmental Impact Statement (EIS) and issuance of a Record of Decision (ROD) that supports salt feed preparation for DWPF vitrification via the In-Tank Precipitation process
- Resolution of any technically related finding(s) that might result from an operational readiness assessment
- Supporting high-level waste management processes/facilities will not impact the commencement of DWPF operations by the Commence Operations date.
- 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

Volume II

Background Volume

CHAPTER 1 INTRODUCTION

Section 1.1 Purpose and Scope

The Department of Energy (DOE) is required by Section 3021(b) of the Resource Conservation and Recovery Act (RCRA), as amended by the Federal Facility Compliance Act (FFCAct), to prepare plans describing the development of treatment capacities and technologies for treating mixed waste. The Act requires site treatment plans (STPs) to be developed for each site where DOE generates or stores mixed waste. Mixed waste is defined by the FFCAct as waste containing both a hazardous waste subject to RCRA and a source, special nuclear, or byproduct material subject to the Atomic Energy Act (AEA) of 1954. The Conceptual Site Treatment Plan and the Draft Site Treatment Plan, previous phases of treatment plan development as committed by DOE in the April 6, 1993, Federal Register, were submitted to the State of South Carolina and other stakeholders such as EPA, for review and comment before being further developed as the Proposed Site Treatment Plan (PSTP). Comments from stakeholders on the previous documents have assisted in the preparation of the final phase of development of the Site Treatment Plan, the Proposed Site Treatment Plan (PSTP).

The purpose of the PSTP is to identify the current preferred treatment options for the Savannah River Site's (SRS) mixed waste or to provide a schedule for the characterization and/or development of technology for tracking SRS mixed waste streams that do not have a preferred option identified. The preferred treatment options were developed in the Draft Site Treatment Plan (DSTP) by means of a technical option analysis of previous mixed waste treatment scenarios listed in the Conceptual Site Treatment Plan (CSTP). Information about SRS mixed waste treatment has been modified and further developed in the PSTP in reaction to comments received on the DSTP from the South Carolina Department of Health and Environmental Control (SCDHEC) and other stakeholders as well as review from DOE-HQ and internal review at SRS.

In addition to listing treatment options, the PSTP provides treatment schedules for the mixed waste streams based on requirements in the Federal Facilities Compliance Act (FFCAct).

Information in the PSTP is to be used as a basis for beginning negotiations with SCDHEC for the development of a compliance order for the treatment of mixed waste. Department of Energy Savannah River Operations Office (DOE-SR) is working toward having the compliance order in place by the October 6, 1995, deadline in the FFCAct.

Even though the PSTP listed treatment options and schedules with a more complete status than those found in the DSTP, DOE continues to investigate new or emerging technologies which could provide opportunities for better management of mixed waste. DOE will continue to work closely with the regulators and other stakeholders during site treatment plan development to appraise them of the results of technology investigation and to seek input on methods of treatment that offer advantages of public acceptance, risk abatement, and reduced life-cycle cost. Should more promising technologies be identified, DOE trusts that opportunities will be available to modify the treatment plan and/or compliance order.

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-W004	M-Area Plating Line Sludge from Supernate Treatment
SR-W005	Mark 15 Filtercake
SR-W006	Mixed TTA/Xylene – TRU**
SR-W009	Silver Coated Packing Material
SR-W011	Cadmium-Coated HEPA Filter
SR-W012	Incinerable Toxic Characteristic (TC) 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-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 High Nickel Plating Line Sludge
SR-W038	Plating Line Sump Material
SR-W039	Nickel Plating Line Solution
SR-W041	Aqueous Mercury and Lead
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-W056	Job Control Waste with Enriched Uranium and Solvent Applicators
SR-W060	Tritiated Water with Mercury
SR-W061	DWPF Mercury
SR-W062	Toxic Characteristic (TC) Contaminated Debris
SR-W068	Elemental (Liquid) Mercury
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated

SR-W070	Mixed Waste from Laboratory Samples
SR-W071	Wastewater from TRU Drum Dewatering
SR-W073	Plastic/Lead/Cadmium Raschig Rings

Waste streams marked with a ** are included in the *Compliance Plan Volume* but will not have schedules because they are Transuranic (TRU) waste which will meet Waste Isolation Pilot Plant (WIPP) Waste Acceptance Criteria for disposal at WIPP.

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-W057	D-Tested Neutron Generators

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

SR-W002	Rad-Contaminated Chlorofluorocarbons – Combined with SR-W001
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

Waste streams that do not appear in the *Compliance Plan Volume* because they meet the Land Disposal Restrictions (LDR) Treatment standard or will meet the LDR standard when they are generated.

SR-W007	SRL (SRTC) Low Activity Waste	Sufficient LDR capacity available
SR-W008	SRL (SRTC) High Activity Waste	Sufficient LDR capacity available
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-W032	Mercury Contaminated Heavy Water	To be recycled by 10/95
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-W072	Supernate or Sludge Contaminated Debris from High-Level Waste ((HLW) Operations	Treated in 90-day staging area

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 through at least the mid 1990s. 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. A final decision may require resumption of operations of SRS plutonium processing lines.

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), is now undergoing testing in preparation to vitrify high-level radioactive liquid wastes.

A major contributor of mixed waste generated at SRS was the preparation of target and fuel assemblies for the reactors done in M Area. 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 can be 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

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.

<u>SRS Principal Mixed Waste Facilities</u>

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 (23-30), the Transuranic (TRU) Waste Storage Pads, the Mixed Waste Storage Buildings (MWSB) (Buildings 645-2N, 643-29E, and 643-43E), 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). A permit application has been submitted for the M-Area Vendor Treatment Process. 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 permitted and 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 currently under construction.

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 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 will analyze treatment options for mixed waste using these facilities with and without modifications, and will investigate other options for treatment of mixed waste streams generated at SRS.

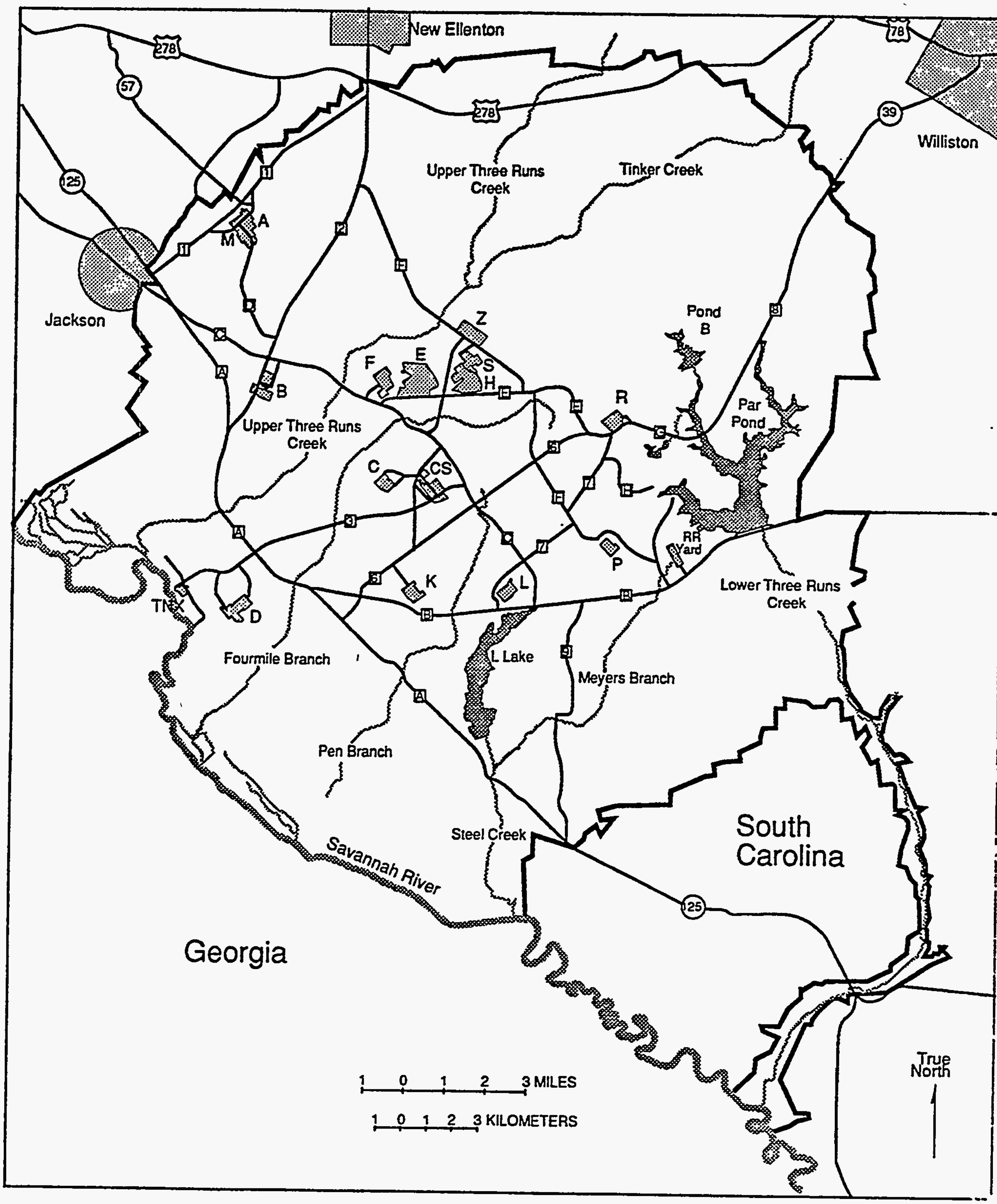

Figure 2 – Location of Major Production, Support, and Research and Development Areas at the Savannah River Site

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

RCRA Land Disposal Restrictions (LDR) require the treatment of hazardous waste (including the hazardous component of mixed waste) to certain standards before land disposal and, with limited exceptions, prohibits storage of hazardous wastes which do not meet LDR standards. DOE currently is storing mixed waste because the treatment capacity for such wastes, either at DOE sites or in the commercial sector, is inadequate or unavailable. Some DOE facilities such as SRS have negotiated an agreement with the EPA that allows continued storage for LDR mixed waste until treatment capacity is constructed. However, agreements that do not include the states such as the SRS Land Disposal Restrictions Federal Facility Compliance Agreement (LDR-FFCA) must be replaced by compliance orders required by the FFCAct. Such agreements may be bridged or merged into the site treatment plan schedules required by the FFCAct. However, language in the SRS LDR-FFCA states that it will no longer be in effect after October 6, 1995, the date listed in the FFCAct for developing a compliance order, unless the SCDHEC and DOE-SR jointly request an extension. Therefore, SRS is developing a site treatment plan and, subject to approval of the plan, intends to execute a compliance order with the State of South Carolina to comply with the FFCAct.

The FFCAct requires DOE to prepare a plan for developing the required treatment capacity for mixed waste for each DOE site storing, generating, or expecting to generate mixed waste. Plans prepared by each DOE facility shall be reviewed by the host state or EPA, with consultation provided by other affected states. If the plan is approved, specific schedules contained in the plan would then be made enforceable by the issuance of a compliance order by SCDHEC. The states have the option to approve the plan presented by their DOE site, approve the plan with modification, or disapprove the plan. If the plan is approved and an order is signed between the state and the DOE facility, the Act provides that DOE will not be subject to fines and penalties for LDR storage prohibition violations for mixed waste as long as it remains in compliance with the approved plan and order.

The FFCAct specifies that the site treatment plans must provide a schedule for developing the necessary treatment capacity. For mixed waste without an identified treatment technology, the plan must include a schedule for identifying and developing treatment technologies. The FFCAct also requires the plan to address wastes for which DOE proposes radionuclide separation. 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," as required by the Act, was published April 6, 1993, in the Federal Register (58 FR 17875). The published schedule specifies that DOE sites will provide the site treatment plans in three phases: the first phase entitled "Conceptual Site Treatment Plan" was issued on October 30, 1993. The second phase, the "Draft Site Treatment Plan," was issued August 31, 1994. A "final proposed plan" now called the Proposed Site Treatment Plan (PSTP) will be issued in April 6, 1995 in response to a delay requested by the states from the original Federal Register date of 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 CSTP focused on identifying treatment needs, capabilities, and options for treating the Site's mixed wastes. The DSTP focused on identifying a preferred option for treating the Site's mixed wastes whenever possible, as well as proposed treatment schedules for treating existing stored mixed waste, and mixed waste expected to be generated in the next five years. The options represent the Site's best judgment from available information and should be viewed as a starting point for discussions leading to the development of the PSTP.

Upon issuance of the DSTP, DOE began development of the third and final stage of site treatment plan preparation, the PSTP. The PSTP represents a refinement of information presented in each DOE site's DSTP after review by stakeholders, such as the states, EPA and the general public. The PSTP reflects updated technical analysis on preferred options introduced in the DSTP, refinement of costs and schedule information, and other changes resulting from comments by stakeholders, further development of guidance by DOE Headquarters, and internal review.

The process of review and change is expected to continue as more information becomes available on mixed waste generation, treatment technology, budgets and other factors. However, through this iterative process it is DOE's intent to develop treatment plans that reflect discussions among the stockholders as well as site-specific input and thus meet the needs of each state as well as compliance with requirements for the FFCAct in a timely fashion.

Upon submittal to the regulatory agency, each plan will be reviewed with the option for approval, approval with modification, or disapproval under the FFCAct.

However, it is DOE's hope and intent that the methodology for development of the site treatment plans will result in a document that will facilitate approval and result in completion of discussions for the issuance of compliance orders addressed in the Act. DOE's goal is to have all plans approved and compliance orders in place by October 1995.

Section 1.4 PSTP Organization

This PSTP was developed by modification and expansion of the DSTP. As a result, the PSTP is similar in format and content to the DSTP. It has been modified for clarity and has been expanded through the addition of information on new waste streams.

The PSTP appears in two volumes. Volume I, called the *Compliance Plan Volume*, is a short, focused document containing the preferred options and schedules for implementing the treatment for SRS mixed waste requiring a compliance order. It is intended to contain all the information required by the FFCAct. An introductory chapter is devoted to a discussion of the purpose and scope of the *Compliance Plan Volume*.

Volume II is called the *Background Volume*. Within this volume are the details regarding the process, rationale, and uncertainties associated with the identification of a preferred option for each waste stream, as well as budget status for the option. Chapter 1 of Volume II contains general information on the PSTP and the Site, and provides development assumptions. Description of the development methodology used in determining the preferred options is found in Chapter 2.

Chapters 3.0 through 5.0 discuss the preferred options for treatment of mixed low-level waste, TRU mixed waste, and high-level mixed waste. The organization of waste streams in each radiological category by treatment facility is identical in Volumes I and II for consistency. In Volume I, these same chapters identify preferred options and, to the extent feasible, proposed schedules as required under the FFCAct.

Volume II includes four 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 information on requests from other DOE sites to have their mixed waste streams treated at SRS treatment facilities, and describes the evaluation process for these wastes, DOE-HQ input into decisions concerning offsite waste coming to SRS, and a listing of those waste streams that SRS has determined can be treated. This serves as a preliminary evaluation demonstrating that SRS facilities are capable of treating the offsite waste, not as a determination that the waste will actually come to SRS for treatment. This section lists those wastes for which other sites have identified SRS treatment facilities as the preferred treatments in their DSTPs and for which technical analysis determined that treatment can occur at SRS. Final decisions on actual treatment will be 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 PSTP and the compliance order.

Section 1.5 Evolving Technologies

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

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. Buried Waste Retrieval Stabilization
3. Radioactive Waste Tank Remediation
4. Mixed Waste Characterization, Treatment, and Disposal
5. Facility Transitioning, Decommissioning and Final Disposition

SRS was designated as the lead site for the Groundwater Plume Containment and Remediation Focus Area. Idaho National Engineering Laboratory (INEL) has been designated the lead site for the Mixed Waste Characterization, Treatment and Disposal Focus Area. The stated mission of the Mixed Waste Treatment, Storage and Disposal Focus Area is to develop, demonstrate and deliver technologies and treatment systems for treating and disposing of mixed low-level waste and mixture transuranic waste in a safe, timely, and cost-effective manner. It is anticipated that the Focus Area will incorporate elements of existing mixed waste R & D programs funded through the DOE-Headquarters Office of Technology Development (OTD).

The MWFA will identify applicable baseline technologies, opportunities for modifying existing technologies, develop new technologies, and implement technology transfer opportunities to solve major problems for retrievably-stored and newly generated mixed low-level waste (MLLW) and mixed transuranic wastes for buried wastes after retrieval.

A primary objective of the MWFA is to ensure that emerging technologies and future mixed waste technology development are considered and evaluated within the FFCA process. It is anticipated that site treatment plans and resulting consenting orders will have the flexibility to evolve with time to include new management options offered by advances in technology.

The MWFA plans to coordinate three pilot-scale demonstrations of mixed waste treatment systems in the areas of waste destruction (plasma hearth, waste stabilization (vitrification), and characterization and material handling (robotics)). 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 existing mixed waste R&D programs funded through the DOE-Headquarters Office of Technology Development (OTD). Two significant ongoing R&D programs are the Mixed Waste Integrated Program and the Integrated Thermal Treatment Study.

<u>Vitrification</u>

Vitrification produces a non-leaching stabilized wasteform of high integrity and minimal secondary waste.

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 include a full spectrum of techniques for characterizing waste streams and glasses ranging from chemical analysis to microstructural characterization.

SRS developers 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: SRS is developing vitrification process limits for joule-heated (cold-trap and stirred) melters for processing of low-level mixed waste (LLMW). This effort is being funded by DOE-Headquarters through the Office of Technology Development. The current plans are to (1) demonstrate vitrification on an actual LLMW using a transportable vitrification system in a field demonstration; (2) provide an up front de-listing petition; (3) demonstrate vitrification of actinide elements for safe permanent storage; (4) demonstrate high temperature vitrification on various waste types; and (5) demonstrate vitrification of ashes and reclamation of noble metals from electronic components.

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-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
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 Hearth

Plasma technologies use a flowing gas between two electrodes to stabilize an electrical charge or arc. As an electric current flows through the plasma, energy is dissipated in the form of heat and light, resulting in Joule heating of the process materials and forming a leach-resistant slag that can be modified by adding such materials as soil. The plasma hearth process relies on a stationary, refractory-lined primary chamber to produce and contain the high temperatures necessary for producing the slag.

The plasma hearth process begins with the waste being fed into a primary plasma chamber where the heat from the plasma torch allows the organic compounds in the waste to be volatilized, oxidized, pyrolyzed, and decomposed. The remaining inorganic material is then fed to the secondary combustion chamber for high temperature melting, producing a molten slag. Cooling and solidification of the slag produce a non-leachable, high-integrity wasteform. Offgas volumes are lower than those from conventional incineration units.

Advantages of the plasma technologies include the ability to feed high amounts of metal-bearing wastes, including whole drums. The resulting slag requires no additional stabilization. The technology is extremely robust and can accept various wasteforms such as papers, plastics, metals, soils, liquids, and sludges. Based on these characteristics minimal characterization data are needed. In non-plasma vitrification technologies, combustion of paper and plastics can produce soot and result in offgas problems.

Status: The plasma hearth process has undergone bench-scale testing by DOE at Argonne National Laboratories West (INEL) and is currently undergoing demonstration-scale testing at Ukiah, California, to evaluate potential treatment of solid mixed wastes. Ongoing projects for the plasma hearth process involve major hardware development and the determination of the level of characterization required of mixed waste prior to processing.

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-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
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 Arc

The plasma arc centrifugal treatment furnace uses the plasma arc process with an internal rotating drum to treat hazardous, mixed, and transuranic wastes. In this process, the waste is fed into a molten bath created by a plasma arc torch. The feed material and molten slag are held in the primary chamber by centrifugal force. Within the plasma furnace, all water and organic waste material are volatilized. The organic material is also fully oxidized to carbon dioxide, water vapor and acid gases, including sulfur dioxide and hydrochloric acid vapor. Offgas requires treatment by scrubbing system. Non-volatile waste material fully oxidized and uniformly melted by the high power electric arc and collected as molten slag which is discharged as a non-leachable homogeneous glass residue.

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 containments. 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 offgas treatment that exceed regulatory standards.

Status: A full-scale plasma arc demonstration is being planned for the INEL to remediate soils and debris contaminated with transuranic radionuclides. SRS has been funded by OTD to demonstrate a small-scale arc melter vitrification system that would meet all regulatory low-level mixed waste disposal requirements. The system provided will be used to establish operating costs and offgas/secondary waste stream characteristics for further evaluation and analysis. The operating temperatures of the plasma arc system are expected to allow a variety of low-level mixed waste streams to be vitrified in a way that minimizes secondary waste generation and allows regulatory approved disposal of resulting glassy slag.

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-W056, Job Control Waste with Enriched Uranium and Solvent Applicators
- 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

The Chemical and Hydrogen Technology Section of SRTC is conducting a research and development program to develop a closed-loop wet chemical process for the complete oxidation of combustible solid waste and decontamination of noncombustible solids. Acid digestion results in byproducts of water, carbon dioxide, and acidic gases. Scrubber systems may be required based on wastes being treated. Following bench-scale development, other goals include assessing the feasibility of a production-scale process and development of a preliminary flowsheet with projected throughputs.

Tests on a number of materials have been conducted, both with and without a palladium (Pd) catalyst. Pd facilitates conversion of the CO offgas to CO_2 for more complete oxidation. The results show that essentially complete (96%+) oxidation of nitromethane, neoprene, EDTA, cellulose, tartaric acid, tributylphosphate (TBP) using air destructive oxidation and high density polyethylene (HDPE) using microwave-heated oxidation. The air destructive oxidation tests were conducted with 0.1 M nitric acid/concentrated phosphoric acid at temperatures ranging from 140 to 170°C. Benzoic acid was successfully treated at 190°C, atmospheric pressure, and polyethylene and polyvinylchloride (PVC) at 200°C, 10-15 psig.

Microwave digestion tests of benzoic acid in nitric/phosphoric acid at 100-120W power for 75-150 minutes were also conducted with fair results. Parametric studies were also conducted with water-soluble Trimsol oil. Preliminary materials of construction tests have also been conducted. Acceptable materials of construction resistant to nitric/phosphoric acid corrosion include tantalum, teflon- and glass-lined vessels. Other materials evaluated include 304L, 316L and 317L stainless steels, Alloy20 and Hastelloy. Results to date on this R & D effort is summarized in WSRC-TR-94-0471, "Progress Report on Nitric-Phosphoric Acid Oxidation".

Status: Plans are to obtain general oxidation rates for representative organics under different processing conditions and to determine the effects of several nitric-phosphoric acid compositions on reaction kinetics. Other areas needing development include elucidation of metal solubilities, precipitation chemistry and solid-liquid separation characteristics.

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

Delphi Wet Oxidation Process

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 the 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.

The status of the technology is that the DOE Morgantown (W. Va) Office has funded Delphi to conduct a demonstration at SRS and Weldon Springs Site, Mo. The initial portion involving a demonstration at SRS is anticipated to last about nine months. It is planned to commence around September 1995. The equipment will be installed at TNX and tests will be conducted using hazardous, but non-radioactive wastes or surrogates. Equipment check out is scheduled for February 1996 completion. The tests are expected to be completed July 1996, and the equipment moved to Weldon Springs by August 1996. Treatment of up to 50,000 lbs of contaminated tri-butyl-phosphate and other hazardous wastes will be carried out.

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 (CEP)

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 has formed a limited partnership with Martin Marietta, 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. This concept is known as environmental recycling.

The status of the technology is that L'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, Hoechst Celanese and Scientific Ecology Group of Westinghouse. At SRS, Joint Work Statements for two CRADAs have been drafted. This includes the destruction of tritiated oil wastes, including provisions for subsequent recovery of the liberated tritium.

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-W061, DWPF Mercury
SR-W062, Toxic Characteristic (TC) Contaminated Debris
SR-W064, IDW Soils/Sludges/Slurries
SR-W066, IDW Steel and Metal Debris

SR-W067, IDW Personnel Protective Equipment (PPE) Waste
SR-W068, Elemental (Liquid) Mercury
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) deserve a special discussion. These needs 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 nCi/cc) non-RCRA oil. Two fundamental issues need to be addressed in disposing 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 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 needs to be developed and tested by the different lab 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.

Two other technologies that may hold promise are the Molten Metal CEP technology and the acid digestion process described earlier.

An R&D program is necessary to reliably characterize oil samples (mercury and total organic carbon) and to develop an acceptable treatment process to address both the mercury and tritium components of the waste. There is currently no funding in the FY95 SRS operating budget to address this need. A joint CRADA project is being proposed with Molten Metal Technology (M4) to adapt the CEP technology for treating this RCRA radioactive oil as an alternative to incineration.

This technology 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:

- Jule-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 Proposed 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 MWIR, 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 in May 1994. The MWIR represents the DOE's mixed waste inventory as of September 1993. At SRS, to reflect the most current information in the PSTP, local MWIR data was updated to reflect inventory data as of September 1994.

The PSTP reflects the most current and accurate data on the waste streams and technology needs. It includes data generated for the SRS MWIR in September 1994. As a result, there may be some differences in the PSTP with the DSTP and the MWIR which has been distributed to the public. Any differences will be noted and explained. 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 or deleted. Investigation disclosed that three waste streams could be combined with other, similar wastes, thus making treatment simpler. Also, four deleted waste streams are identified and discussed briefly in the PSTP. Other waste streams identified in the DSTP have since been treated to LDR standards and no longer need to be addressed in the PSTP. Future waste streams to be included in the next MWIR data collection are discussed in Chapter 6.)

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. Smaller activities require Environmental Assessments (EA) while small routine activities can be 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 DWPF is permitted, constructed, and undergoing testing and modification in preparation to operate. The CIF is permitted and under construction. The M-Area Vendor Treatment Process is in an advanced planning stage and has submitted a permit application.

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. An analysis of the need to prepare a supplement to the 1987 EIS also has recently been completed. 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 will allow DOE to determine whether 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 include 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.

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 (WMEIS)

DOE-SR is preparing an EIS, called the 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 will be considered. In addition, the WMEIS will provide 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 includes 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 TWCCF. SRS is reassessing 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 will be evaluated in the WMEIS. However, reassessment also could result in modified facilities.

Analysis of options for onsite treatment of SRS mixed waste streams developed by the STP will support the WMEIS for mixed waste, and will be the foundation for EIS evaluations regarding mixed waste.

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

DOE is preparing a Programmatic Environment Impact Statement (PEIS) which will be used to formulate and implement a waste management program 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 low level mixed 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 will not identify a preferred alternative (i.e., configuration) for mixed waste facilities since this will 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 is scheduled to be published in March 1995. The final PEIS will be issued after a public comment period, at or near the time of issuance of the Consent Orders by the appropriate regulatory agency. To remain flexible and accommodate potential changes, the WM PEIS Record of Decision for mixed waste will be issued after the appropriate regulatory agency has fulfilled its legislative requirement of issuing the Consent Orders.

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* (WSRC-RP-93-1448) addresses planning for sanitary waste, hazardous waste, mixed low-level waste, low-level radioactive waste, and transuranic waste. The *High-Level Waste System Plan* (HLW-OPV-94-0077) 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 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 serves 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 will transition SRS commitments regarding mixed waste treatment until a compliance order is in place with the SCDHEC as required in the FFCAct. The LDR-FFCA could terminate at an earlier time if SCDHEC and DOE-SR sign a compliance order before October 6, 1995. The LDR-FFCA will terminate on October 6, 1995, or at a date requested jointly by SCDHEC and DOE-SR and agreed to by EPA-IV.

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 which deal with mixed waste. It has not yet been determined how environmental wastes will be reflected in the final site treatment plan. DOE will continue discussions with the states and EPA to address this matter.

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 consent order pertaining to continued storage and future treatment of restricted 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 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: 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.

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 PSTP. 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 safety concerns, HLW will not be transported offsite except as a treated, stable waste that is ready for disposal.

- Regarding defense-related transuranic (TRU) waste, the PSTPs will 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 PSTPs will 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 PSTP.

  The STPs will recognize that DOE's policy regarding WIPP is under review and may change in the future. The STPs will 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. PSTPs 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 to the extent known, particularly where utilization of facilities in the PSTP are being considered for managing ER, D&D mixed waste streams. The PSTP will propose a strategy for the inclusion of ER and D&D mixed waste streams and other future waste streams into the Site Treatment Plans or compliance order.

- The PSTP will address all wastes in the updated MWIR. Any changes /corrections to the MWIR waste streams and treatment facility information will be explained in the PSTP.

- On a volume basis, most of DOE's mixed waste will 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) will 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 PSTP 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 PSTP.

- 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 PSTP. 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 mixed waste will be treated onsite.

- ER, Transition, and D&D waste streams will be addressed in the PSTP to the extent that they are known. The site treatment plan 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 PSTP for new ER, Transition, and D&D waste streams will be incorporated into the text of the document. SRS is negotiating the classification of Investigation Derived Waste (IDW). (IDW is not anticipated to be included in the PSTP.)

- 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, and CIF. Existing non-RCRA disposal facilities include the E-Area Vaults and the Z-Area Saltstone Disposal Vaults.

- Since permits have not yet been issued for the M-Area vendor treatment process, the process is 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 Process. 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 PSTP will not address moratorium waste in the preferred option analysis process.
- The level of detail for option analysis will vary in the PSTP from waste stream to waste stream.
- The five-year window for waste forecasting will continue to be used as established in the Final MWIR (1995 through 1999).
- In all relevant PSTP 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

There are several disciplines dealing with the treatment of mixed waste at DOE facilities with which the PSTP must interact. To assist the reader in dealing with the specialized language found in the PSTP, the following definitions are provided.

Amalgamation (AMLGM) – a process applicable to radioactive wastes containing mercury, and particularly to wastes containing radioactive mercury isotopes. Mercury compounds are converted into a solid alloy with mercury and 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. Amalgamation may be performed using zinc, copper, nickel, gold, or sulfur. A hazardous waste treatment process identified in R61-79.268.42 of the South Carolina Hazardous Waste Management Regulations (SCHWMR).

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). A hazardous waste treatment process identified in R61-79.268.34 SCHWMR.

Borosilicate Glass – a type of heat-resistant glass containing at least 5% boric oxide (by weight); used in glassware that resists heat. 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. A hazardous waste treatment process identified in R61-79.268.42 SCHWMR.

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. A hazardous waste treatment process identified in R61-79.268.42 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. 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 40 CFR Part 264, Subpart 0, or 40 CFR Part 266, Subpart H.

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.

Containment Building – a hazardous waste management unit used to store or treat hazardous waste under the provisions of Subpart DD of 40 CFR parts 264 and 265, which enumerates the design and operating standards for these units to ensure containment comparable to that of a RCRA tank or container.

Corrosive/Corrosivity – (1) a solid waste exhibits corrosivity if (a) a sample of the waste is either aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5; or (b) it is a liquid and corrodes steel at a rate greater than 6.35 mm (0.250 inch) per year at a test temperature of 55°C (130°F); or (2) identifies waste that must be segregated because of its ability to extract and solubilize toxic contaminants (especially heavy metals) from other waste.

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 ignitable, corrosive, and/or reactive nature. A hazardous waste treatment process identified in R61-79.268.42 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 smaller 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 40 CFR 268.45 and other material is subject to regulation as debris if the mixture is comprised primarily of debris by volume based on visual inspection. [From 40 CFR 268.2(g)]

Decommissioning – (1) actions taken to reduce the potential health and safety impacts of DOE contaminated 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 stream's RCRA toxic designation rescinded.

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 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.

Disposal Facility – a facility or part of a facility at which waste is intentionally placed into or on the land or water, and at which waste will remain after closure.

Effluent – (1) airborne and liquid wastes discharged from a DOE 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 EPA, or under EPA 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, and other structures; their functional systems and equipment, including site development features such as landscaping, roads, walks and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical plant features that are subject to regulation under the RCRA program and the Pollution Control Act.

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 – liquid not absorbed into host material such that it could readily separate from the solid portion of a waste under ambient temperature and pressure, and spill and drain from its container.

Fuel Substitution (FSUBS) – fuel substitution in units operated in accordance with applicable technical operating requirements. A hazardous treatment process identified in R61-79.268.42 SCHWMR.

Generator – any person, by site, whose act or process produces hazardous waste identified or listed in South Carolina Hazardous Waste Management Regulation R61-79.261 [40 CFR 261] or whose act first causes a hazardous waste to become subject to regulation.

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 – liquid water occurring beneath the Earth's surface in the interstices between soil grains, in fractures, or in porous formations in a zone of saturation.

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 – material meeting the definition of debris per the August 18, 1992, LDR debris rulemaking [(R61-79.268.2(g) (SCHWMR)] that contains a hazardous waste listed in Subpart D of Part 261, or that exhibits a characteristic of hazardous waste identified in Subpart C of Part 261 [40 CFR 268.2(h)].

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) R61-79.261.3 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 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 mixed 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 R61-79.268.42 of SCHWMR.

Ignitability/Ignitable – a waste property describing RCRA characteristically hazardous waste with a flash point lower than 140°F.

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 40 CFR 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. A hazardous waste treatment identified in R61-79.268.42 of SCHWMR.

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 40 CFR part 264 Subpart 0 and part 265 Subpart 0. 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).

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 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 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.

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.

Leachate – any liquid, including any suspended components in the liquid, that has percolated through or drained from hazardous waste. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or groundwater.

Listed Waste – wastes listed as hazardous under R61-79.261 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 nannoCuries/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 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 R61-79.260.10 SCHWMR. A hazardous waste treatment process identified in R61-79.268.42 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. A hazardous waste treatment process identified in R61-79.268.42 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. A hazardous debris treatment identified in R61-79.268.45 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.

Mixed TRU (MTRU) Waste – Transuranic (TRU) waste that also includes hazardous materials as identified in R61-79.261, Subparts C and D.

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 characteristic. [R61-79.261.3(a)(2)]

Moratorium Waste – those Land Disposal Restriction (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. A hazardous waste treatment process developed in R61-79.268.42 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 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.

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 R61-79.268.2 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 – an authorization, license, or equivalent control document issued by South Carolina or EPA to implement the requirements of R61-79.124 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) – treatment of metals and other inorganics to form insoluble precipitates of oxides, hydrides, 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. A hazardous waste treatment process developed in R61-79.268.42 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 R61-79.261.23 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. A hazardous waste treatment process developed in R61-79L.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). A hazardous waste treatment process identified in R61-79.268.42 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 relevant to the procedures under this part. 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. 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. R61-79.268.42 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. Thus resulting 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.

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.

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 designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize, recover energy or material resources, or to render it nonhazardous, less hazardous, safer to transport, store or dispose of, or amenable for recovery, amenable for storage, or reduced in volume.

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, R61-79.270, R61-79.260 through R61-79.266.

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.

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 40 CFR 268.40, *Table Treatment Standard for Hazardous Wastes*.

Section 2.2 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, *DPSTP 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 process selection process appears in Sections 2.2.1 and 2.2.2. This process was completed for waste streams described in the DSTP. However, additional waste streams identified since the preparation of the DSTP require a technical option analysis for inclusion in the PSTP. As a result, it is appropriate to retain this section for the PSTP. Further justification for including this section is so that readers who are not familiar with the DSTP can understand preferred treatment options listed in the PSTP.

Options Evaluation Process

This section contains two subsections. Subsection 2.2.1 contains an overview of the three step process used to identify preferred options (POs). Subsection 2.2.2 contains detailed descriptions of each process step.

2.2.1 *<u>Process Methodology Overview</u>*

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 PSTP.

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 PSTP.

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 PSTP.

2.2.2 Process Methodology Detailed Explanation

For those low level mixed 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 process 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.

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

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
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, process go from laboratory scale directly to plant scale.	Process can accept a range of input but has limitations for expansion. Also, pilot scale tests are required before plant-scale design.	Process cannot be expanded to take advantage of economies of scale. Also, laboratory or pilot scale testing would be impractical, or not yield meaningful results. Plant-scale design must come directly from engineering calculations.
1%	Remedial Measures	Process failure or malfunction does not create a waste that cannot be treated by other means; alternative treatment methods for the original waste exist and can be implemented within three months of recognition of need.	Process failure or malfunction creates other wastes that must be characterized to determine treatability; alternative treatment methods must be developed to treat new waste created by the process malfunction.	Process failure or malfunction creates other wastes for which there is no known treatment; no alternative methods for treatment of original waste exist.

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

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
1%	Schedule For Treatment of Waste	A schedule for addressing and processing waste can be determined with high confidence.	Some technology issues can produce uncertainty in schedule development. System complexities may prolong schedule.	Availability, technology or flexibility issues severely limit confidence in developing schedules. Extensive training, system, and operational complexity may also create problems.
20%	PERSONNEL PARAMETERS			
6%	Consequence of Unmitigated Accident Scenarios	There are little or no facility emissions for routine operations or 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.

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

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
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 all with applicable regulations with little or no difficulty or with no process modifications.	Processes are in partial compliance with all applicable regulations with little or no difficulty. Full compliance may be achieved through requests for variances or with limited modifications to the process.	Majority of the applicable regulations cannot be met without vast modifications to the process or other extensive variances.
6%	Ability To Obtain A Permit	Permitting process is well-defined and relevant precedents for success have been established. Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with little or no difficulty.	Process or key elements have been permitted elsewhere, but some key differences may exist (for example, differences in waste streams, or waste stream characterization). Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with moderate difficulty.	The process is unproved technology or a new arena of application or the need for multiple permits builds in substantial permitting barriers. Similar processes have been previously permitted by the regulatory agencies (primarily SCDHEC) with extreme difficulty or have never been previously permitted.
4%	Waste Disposal	80% of both primary and secondary wastes have been rendered non-hazardous. The other 20% remain hazardous.	50% of both primary and secondary wastes have been rendered non-hazardous. The other 50% remain hazardous.	80% of both primary and secondary wastes remain hazardous. The other 20% have been rendered non-hazardous.

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

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
9%	PUBLIC ACCEPTANCE			
9%	Public Acceptance	Stakeholders accept the process and the risks. Similar processes have been publicly acknowledged by stakeholders as being acceptable.	Some stakeholder concerns that could affect successful utilization of the technology. Stakeholders have publicly stated reservations about the safety or effectiveness of similar processes.	Significant stakeholder concerns about process. Stakeholders have publicly stated disapproval about the safety or effectiveness of similar processes, or stakeholder opinion is unknown.
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.			
Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
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.

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

Wt.	Attribute	High Score Median 80	Medium Score Median 50	Low Score Median 20
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

SRS has attempted to work closely with the regulatory community to keep it abreast of STP developments. Regular meetings have been held with the South Carolina Department of Health and Environmental Control and the South Carolina Governor's Office to provide updates on the status of the STP development.

Public Participation

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 STP 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 has been incorporated into the PSTP. Comments, also accepted through the mail, have been considered in the development of the Proposed STP (PSTP).

Copies of the PSTP, Executive Summary, and other sites' plans have been placed in the Public Reading Room at USC-Aiken. The public has been 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 has been developed and issued to stakeholders. Stakeholders have been informed that comments on the PSTP may be submitted to SCDHEC.

Conclusion

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

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 regulators 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 radioactive oil (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. Twelve 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), LLW Lead (SR-W013), Gold Traps (SR-W024) and Tritiated Mercury (SR-W014), and their classification is relatively straightforward. Thus, there is a high degree of confidence that approximately 75% 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 Secretary of Energy is emphasizing WMin/PP, and on 12/27/94 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.

The 1991 Land Disposal Restrictions-Federal Facility Compliance Agreement (LDR-FFCA) between the Environmental Protection Agency, Region IV (EPA-IV) and SRS, effective in March 1991 and now amended by the LDR-FFCA Bridge Amendment effective June 20, 1994, has required a number of actions for WMin/PP. These include the segregating solvent contaminated wipes and nonhazardous waste, substituting nonhazardous solvents for hazardous solvents where possible, 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.

In response to environmental regulations and compliance agreements described in the preceding paragraphs, SRS has developed procedures which require waste generators to participate in WMin/PP activities. A Waste Minimization Group has been formed whose role is to coordinate WMin/PP activities, help waste generators identify opportunities to implement WMin/PP, prepare a sitewide WMin/PP plan and generate the annual waste reduction report, and other regular, 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 advising their organizations on actions to comply with regulatory and sitewide WMin/PP requirements and assisting their organizations with implementation of WMin/PP activities and remaining cognizant of opportunities for WMin/PP. 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 T/S/D facilities. In addition, regular 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 rate of mixed LLW 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 that 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.
- An affirmative procurement plan and procurement initiatives have been developed that encourage purchase of goods made from recycled material and/or products producing less, nonhazardous waste.
- 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 SST on canyon jumpers, replacement of cadmium plated HEPA filter frames with SST, reduction of lead-lined glovebox gloves, and use of nonhazardous scintillation fluids have significantly reduced mixed waste.

While not all of these actions have a direct affect 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 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.
- Replacement of mercury Springle pumps and Sargent-Welch duo-seal vacuum pumps in the Tritium Facility eliminates tritiated mercury and oil waste streams.
- 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 Proposed Site Treatment Plan

The following is provided for guidance in reviewing waste stream information in Volume II of the Proposed 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 PSTP, 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 PSTP has been modified from that of the *Draft Site Treatment Plan (DSTP)*, submitted August 30, 1994.

In the *Proposed Site Treatment Plan (PSTP)* waste streams have been 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 largest, most general waste stream class is the radiological group (mixed low-level, mixed transuranic, mixed high-level). The arrangement of waste by treatment facility allows the document to be assembled in a more logical manner. The new arrangement avoids fragmentation created by splitting waste matrix classes among treatment facilities and avoids unnecessary repetition in the document. The new waste stream arrangement will make the PSTP *Compliance Plan Volume* (Volume I) schedule lists simpler and easier to understand, and will make 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.

Waste streams have been 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. Differences in the waste stream list from the DSTP are summarized.

- The following waste streams have been eliminated because the waste has not been generated or has been managed in an appropriate manner 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

- The following waste stream are no longer listed in the Site Treatment Plan 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-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 Toxic Characteristic (TC) 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

- The following waste streams have been renamed for the PSTP, 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, Toxic Characteristic (TC) Contaminated Debris – Sitewide – formerly SR-W041C, Mercury Contaminated Recorder
SR-W063, Macroencapsulated Toxic Characteristic (TC) Waste – formerly Macroencapsulated Lead
SR-W068, Elemental (Liquid) Mercury – 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 are waste streams listed in the PSTP that were not in the DSTP.

SR-W064, IDW Soils/Sludges/Slurries
SR-W065, IDW Monitoring Well Purge/Development Water
SR-W066, IDW Steel and Metal Debris
SR-W067, IDW Personnel Protective Equipment (PPE) Waste
SR-W070, Mixed Waste from Laboratory Samples
SR-W071, Wastewater from TRU Drum Dewatering
SR-W072, Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations
SR-W073, Plastic/Lead/Cadmium Raschig Rings

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 PSTP 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 PSTP 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 for disposal at WIPP. The management of these waste streams is discussed in the TRU Waste Management Plan 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.

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 DSTP.

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 will be used for the next MWIR data call. Using this approach provides a conservative picture of the mixed waste inventories and does not significantly change the previously reported values. Similarly, this approach will result in discrepancies with some of the inventories reported in the MWIR by DOE-HQ but the magnitude of the discrepancies is small. 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 PSTP 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; over 100 m^3 difference due to void spaces.
  - SR-W023, Cadmium Safety/Control Rods, reported as net volume since the wasteform is not in a drum or box. Current storage for failed rods is in a container in satellite accumulation areas in the reactor disassembly basins while functional rods are in the reactor vessels waiting to be decommissioned.
- 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 1995-1999 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 FMWIR data call. This number also coincides with the value reported in the Waste Management Environmental Impact Statement (WM-EIS).

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).

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 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.

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.

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CHAPTER 3 LOW-LEVEL MIXED 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 – PSTP Volume II Waste Stream Order

Chapter 4.0 Transuranic (TRU) Waste

Section 4.1 TRU Mixed Waste Streams Management Plan

4.1.1 TRU Mixed Waste Stream Proposed for Shipment to WIPP

4.1.1.1 TRU Mixed 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 TRU Mixed Waste Streams Proposed for IDOA

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 Mixed Waste

Section 5.1 HLMW Treated Onsite in Existing Facilities

5.1.1 DWPF

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

5.1.2 Treatment in 90-Day Staging Area

5.1.2.1 Waste Streams Requiring Pretreatment before Vitrification

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

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

Table 2
Comparison of Waste Stream Locations – PSTP 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	*
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	3.1.2.1	3.1.2.1.A
SR-W005	Mark 15 Filtercake	3.1.2.1	3.1.2.1.B
SR-W006	Mixed TTA/Xylene – TRU	4.1.1	4.1.1.1.A
SR-W007	SRL (SRTC) Low Activity Waste	N/A	3.1.1.3.A
SR-W008	SRL (SRTC) High Activity Waste	N/A	3.1.1.3.B
SR-W009	Silver Coated Packing Material	3.1.3.1	3.1.3.1.A
SR-W010	Scintillation Solution	N/A	*
SR-W011	Cadmium-Coated HEPA Filters	3.1.2.1	3.1.2.1.C
SR-W012	Incinerable Toxic Characteristic (TC) 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
SR-W014	Tritium-Contaminated Mercury	3.1.5.1	3.1.5.1.A
SR-W015	Mercury/Tritium Contaminated Equipment	N/A	3.1.1.7.A
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	*
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	*
SR-W022	DWPF Benzene	3.1.1.1	3.1.1.1.E
SR-W023	Cadmium Safety/Control Rods	N/A	3.1.1.7.B
SR-W024	Mercury/Tritium Gold Traps	N/A	3.1.1.6.A
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.D
SR-W030	Spent Methanol Solution	N/A	*
SR-W031	Uranium/Chromium Solution	3.1.2.1	3.1.2.1.E
SR-W032	Mercury Contaminated Heavy Water	N/A	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	3.2	3.2.1.1
SR-W037	M-Area High Nickel Plating Line Sludge	3.1.2.1	3.1.2.1.F
SR-W038	Plating Line Sump Material	3.1.2.1	3.1.2.1.G
SR-W039	Nickel Plating Line Solution	3.1.2.1	3.1.2.1.H
SR-W040	M-Area Stabilized Sludge	N/A	*

Waste Stream No.	Waste Stream Name	Volume I Section Identification	Volume II Section Identification
SR-W041	Aqueous Mercury and Lead	3.1.1.2	3.1.1.2.A
SR-W042	Paints and Thinners	3.1.1.1	3.1.1.1.H
SR-W043	Lab Waste with Tetraphenyl Borate	N/A	*
SR-W044	Tri-Butyl-Phosphate & n-Paraffin– TRU	N/A	*
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.I
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	5.1.2.1.A
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	*
SR-W053	Rocky Flats Incinerator Ash	4.2.1	4.2.1.1.A
SR-W054	Enriched Uranium Contaminated with Lead	N/A	*
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	3.2	3.2.2.1
SR-W057	D-Tested Neutron Generators	N/A	*
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	N/A	5.1.2.1.B
SR-W059	Tetrabutyl Titanate (TBT)	N/A	*
SR-W060	Tritiated Water with Mercury	N/A	3.1.3.1.B
SR-W061	DWPF Mercury	N/A	3.1.5.1.C
SR-W062	Toxic Characteristic (TC) Contaminated Debris	3.1.3.1	3.1.3.1.C
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	N/A	3.1.1.6.B
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 Steel and Metal Debris	N/A	6.1
SR-W067	IDW Personnel Protective Equipment (PPE)Waste	N/A	6.1
SR-W068	Elemental (Liquid) Mercury	3.1.5.1	3.1.5.1.D
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	3.1.3.2	3.1.3.2.A
SR-W070	Mixed Waste from Laboratory Samples	3.1.1.1	3.1.1.1.N
SR-W071	Wastewater from TRU Drum Dewatering	3.1.1.1	3.1.1.1.O
SR-W072	Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations	N/A	3.1.1.7.C
SR-W073	Plastic/Lead/Cadmium Raschig Rings	3.1.1.1	3.1.1.1.P

* Waste stream eliminated or consolidated. See Section 2.6.1.

Section 3.1 Low Level Mixed 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.

Volume
- Current volume through 09/30/94 is 8.4 m^3.
- Expected 1995-1999 volume will be 5.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D001A (ignitable high TOC)
- D006A (TCLP Cd)
- D010A (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
- 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 stream.
- 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 indicates 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.

<u>Facility Status</u>

CIF is completely designed and as of December 31, 1994, construction was 95% complete. The facility is fully funded and anticipated to have construction complete by December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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 was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. 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.

Preparation for Operation

Construction is on schedule for the CIF.

3.1.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

The estimated cost to treat this waste stream, including 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)

3.1.1.2.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:

Spent solvent contaminated rags and wipes are generated sitewide in the clean up of interior spills and for decontamination. The stream is a collection of similar debris whose LDR treatment standards can be met by incineration followed by stabilization. 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 09/30/94 is 9.3 m^3.
- Expected 1995-1999 volume will be 2.6 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D004A – D011A (TCLP metals)
- D012 –D017 (organic pesticides)
- D018 –D043 (characteristic organics)
- F001 – F003, F005A (halogenated and nonhalogenated 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

  *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

3.1.1.2.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.

3.1.1.2.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 is completely designed and as of December 31, 1994, construction was 95% complete. The facility is fully funded and anticipated to have construction complete by December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register.

A treatment preparation step to repackage the waste to meet the CIF WAC is required. SRS does not believe the repackaging is a permitted activity. 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

Construction is on schedule for the CIF.

3.1.1.2.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.

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 Toxic Characteristic (TC) Material

3.1.1.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W012

The preferred treatment option for the Incinerable Toxic Characteristic (TC) Material waste stream is Incineration followed by Stabilization in the Consolidated Incineration Facility. 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 and various clean up materials 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 indicate 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 09/30/94 is 2.8 m^3.
- Expected 1995-1999 volume will be 1609.6 m^3. (Increase in generation from DSTP due to inclusion of ITP job control waste into this waste stream description)

Waste Stream Composition
- Organic debris

Waste Code
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D009B (high organic Hg)
- D009C (high inorganic Hg)
- D010A (TCLP Se)
- D011A (TCLP Ag)
- D018 (benzene)

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
- 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.

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}) emitter is 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. Interviews with the generators indicate the waste is D009A – TCLP for Hg, and the waste stream has been analyzed as such for its preferred treatment option. Prior to treatment at CIF, the waste will be analyzed and the determination will be made if the wastes from the Separation areas cleanups must be segregated and treated by way of IMERC or RMERC, due to mercury levels above 260 mg/kg. In the interim, the Incinerable Toxic Characteristic (TC) Material waste stream will carry D009B and D009C codes, since analysis is the only way to confirm the level of mercury.

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. Locations for these activities are not yet finally determined.

Facility Status

The CIF is completely designed and as of December 31, 1994 construction was 95% complete. The facility is fully funded and anticipated to have construction complete by December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register.

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.

Depending on the identification of preparation for treatment locations and the preparation step, permitting may be needed. SRS believes that the simple repackaging is not a permitted activity. Other activities such as crushing for the Laboratory Waste with Tetraphenyl Borate or cutting could be performed in facilities such as 645-2N under the permit modification expected to be issued first quarter 1995. Preparation steps for future waste generation cannot be identified until the nature of the waste is fully known. Other permitting issues will be determined once the location for treatment preparation has been fully identified.

Preparation for Operation

Construction is on schedule for the CIF.

3.1.1.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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 cost to prepare the waste to meet the CIF waste acceptance criteria is between $4 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.

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 are six feet long and two feet in diameter.

Volume
- Current volume through 09/30/94 is 260 m^3.
- There is no expected future generation. Operations which generated this waste closed on December 31, 1994.

Waste Stream Composition
- Organic debris

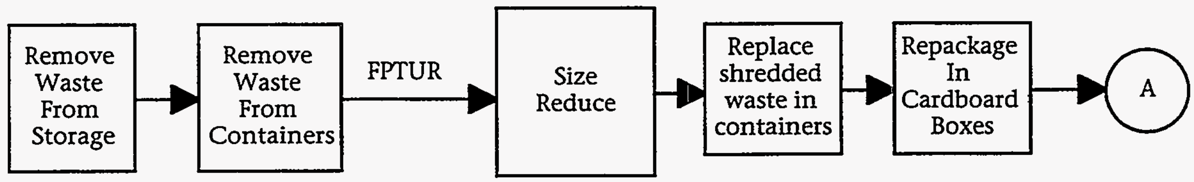
Waste Code
- F006 (metal plating line waste, without cyanide)

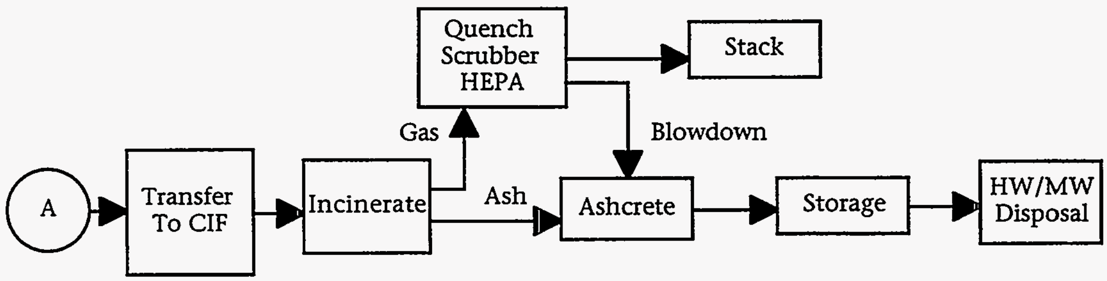
LDR Treatment Standard
- F006 = concentration based standards = 0.19-5.0 mg/l

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 0.0173 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 minute 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 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. However, preparation for treatment (i.e., size reduction and repackaging) will be needed before the waste can be accepted at CIF.

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

Facility Status

CIF is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part A Permit or alternative may be needed for activities to prepare waste for treatment

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register.

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.

It is anticipated that FPTUR will be prepared for treatment by shredding onsite in a vendor operated facility. A location for preparation for treatment activities has not been finally determined. Consideration is being given to locating equipment to prepare this waste for treatment in the Experimental Transuranic Waste Assay Facility (ETWAF) which is covered under part A interim status, or at one of the mixed waste storage buildings such as 645-2N

Preparation for Operation

Construction is on schedule for the CIF. However, a preparation for treatment step to size reduce and repackage the waste to meet the CIF WAC is required. Further detail on where this operation will be accomplished is being analyzed.

3.1.1.1.D.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste. 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. SRS is requesting SCDHEC/EPA agreement on regulatory issues for this waste which will affect permitting requirements for the preparation for treatment step for the proposed treatment option for this waste stream. Budget and scheduling uncertainties may arise until regulatory approval is complete.

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 1995-1999 volume is 1512 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.

Facility Status

The CIF is completely designed and as of December 31, 1994, construction was 95% complete. The facility is fully funded and anticipated to have construction complete by December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992 Federal Register.

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

Preparation for Operation

Construction is on schedule for CIF.

3.1.1.1.E.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

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.

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 09/30/94 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

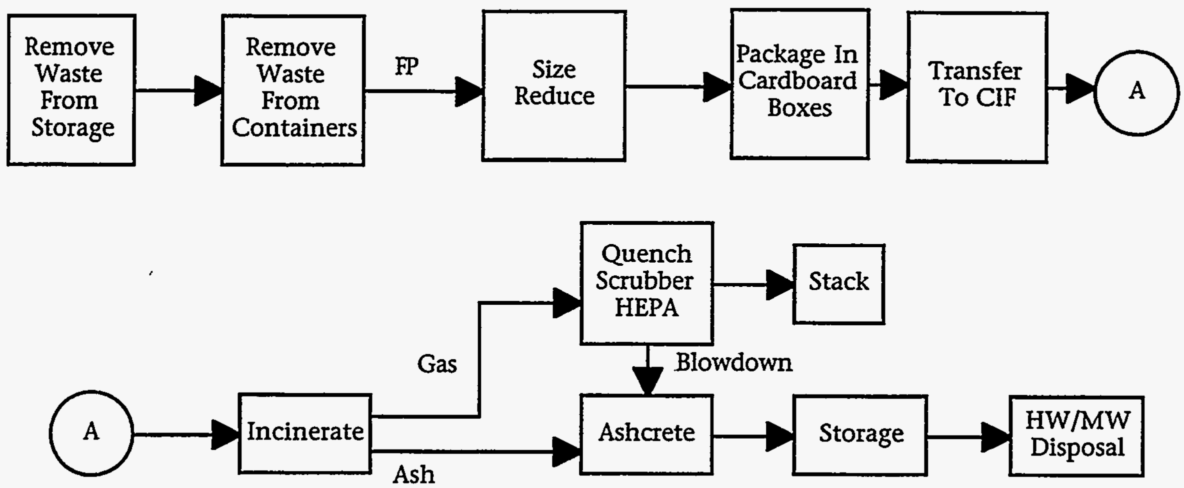
Waste Code
- F006 (metal plating line waste, without cyanide)

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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part A Permit or alternative may be needed for the preparation for treatment steps for the waste stream

CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

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.

Final determination has not been made regarding the preparation for treatment step for this waste. If shredding is to be done, preparation for treatment will occur in conjunction with the Filter Paper Take-Up Rolls waste (SR-W018). At this time, it appears that a simpler preparation step will occur such as folding or cutting which can be done in the mixed waste storage building such as 645-2N.

Preparation for Operation

Construction is on schedule for the CIF. However, a pretreatment step to repackage the waste to meet the CIF WAC is required. Further detail on where this operation will be accomplished is being analyzed.

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.

SRS is requesting SCDHEC/EPA agreement on regulatory issues offering the preparation for treatment requirements for the proposed treatment option for this waste stream. Budget and scheduling uncertainties may arise until regulatory approval is complete.

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 program for changing the refrigeration oil in some of the Separations Area chillers. 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. Contaminants in the Freon® (D019, D039, D040) also have been determined to make the waste oil a mixed waste.

Volume
- Current volume through 09/30/94 is 2.2 m^3.
- Expected 1995-1999 volume will be 2.0 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D007 (TCLP Cr)
- D008 (TCLP Pb)
- D019 (carbon tetrachloride)
- D022 (chloroform)
- D039 (tetrachloroethylene)
- D040 (trichloroethylene)

LDR Treatment Standard
- 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.

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 is completely designed and as of December 31, 1994, construction was 95% complete. The facility is fully funded and anticipated to have construction complete by December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter of FY 96.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992 Federal Register.

This waste stream is 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

Construction is on schedule for the CIF.

3.1.1.1.G.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

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.

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 09/30/94 is 5.4 m^3.
- Expected 1995-1999 volume will be 7.0 m^3.

Waste Stream Composition
- Organic sludge/particulate

Waste Code
- D001A (ignitable high TOC)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011A (TCLP Ag)
- D018 (benzene)
- D035 (methyl ethyl ketone)
- D038 (pyridine)
- F003 (xylene, acetone)
- F005A (nonhalogenated spent solvents)

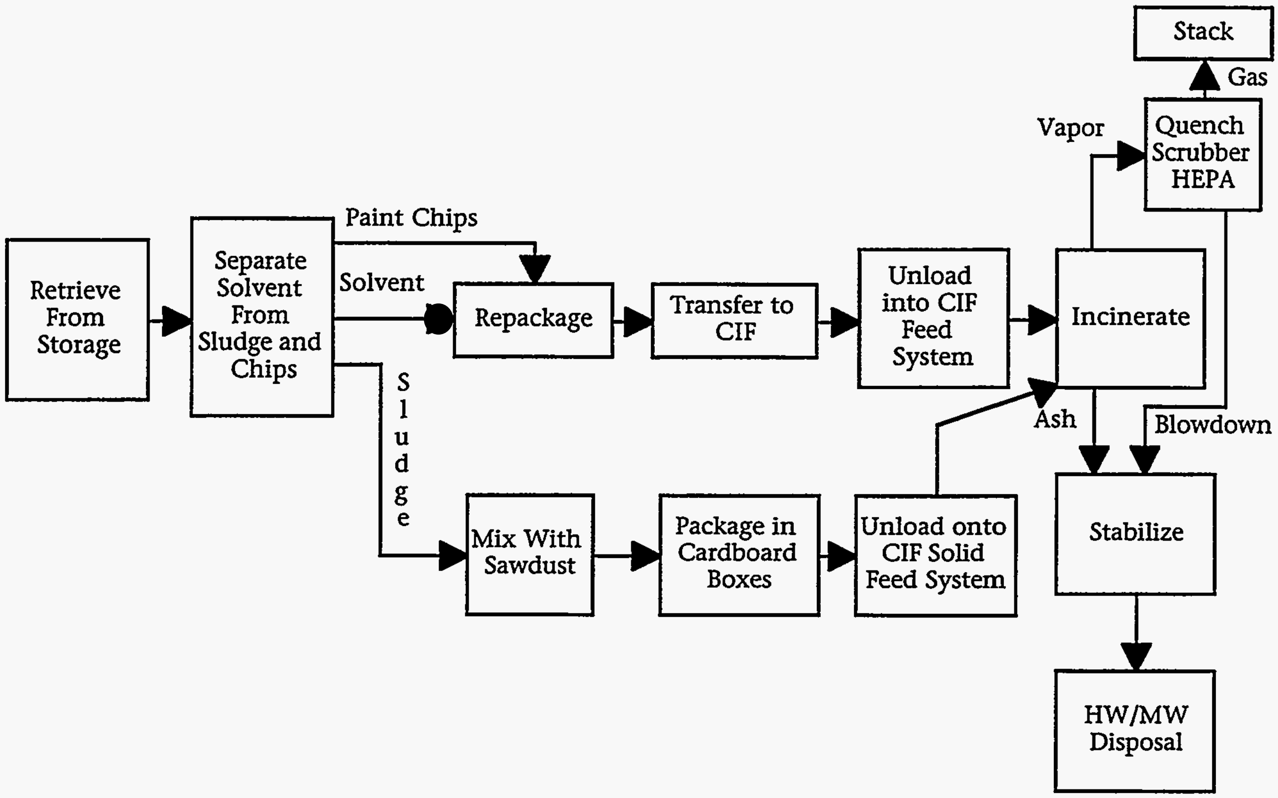
LDR Treatment Standard
- D001 specified technology = Recovery of Organics or Combustion
- D005 = concentration based standard = 100 mg/l
- D006 = concentration based standard = 1 mg/l
- D007 = concentration based standard = 5 mg/l
- D008 = concentration based standard = 5 mg/l
- D009 = concentration 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an EA was prepared for the CIF and a 60-day public comment period was held for the proposed FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992 Federal Register.

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

Construction is on schedule for the CIF. However, 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 the Mixed Waste Storage Building 645-2N under the modified Part B permit.

3.1.1.1.H.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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.

Volume
- Current volume through 09/30/94 is 119.6 m^3.
- Expected 1995-1999 volume generation is 54.5 m^3.

Waste Stream Composition
- Organic liquid

Waste Code
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D011A (TCLP Ag), D018 (benzene)
- D040 (trichloroethylene) nonwastewater

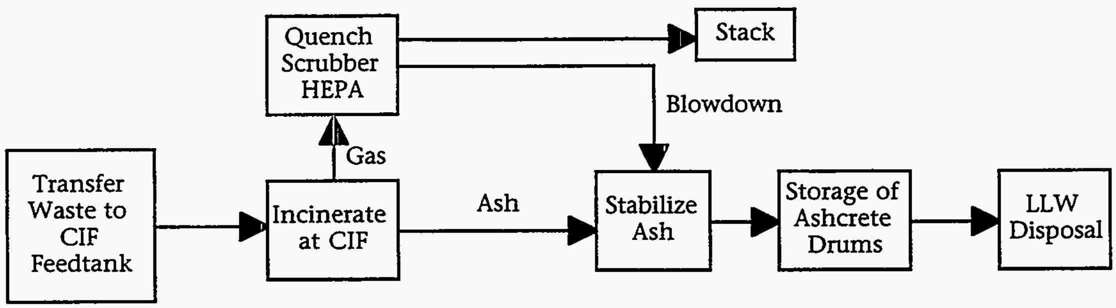
LDR Treatment Standard
- D008 = concentration based standard = 5 mg/l
- D009 = concentration based standard = 0.2 mg/l
- D011 = concentration based standard = 5 mg/l
- D018* = concentration based standard = 10 mg/kg
- D040* = concentration based standard = 6 mg/kg

  *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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

Regulatory Status

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

The CIF is RCRA Part B Permit, the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992, and was effective December 10, 1992. The NESHAP's construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an 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.

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

Construction is on schedule for the CIF. However, a blending or a program to reduce the radionuclide content of this waste stream needs to be developed and approved.

3.1.1.1.I.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. This is expected to take three years.

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 1995-1999 volume generation is 124 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 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

Preparation for Operation

Construction is on schedule for the CIF.

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 1995-1999 volume generation is 800 m^3.

Waste Stream Composition
- Aqueous liquid

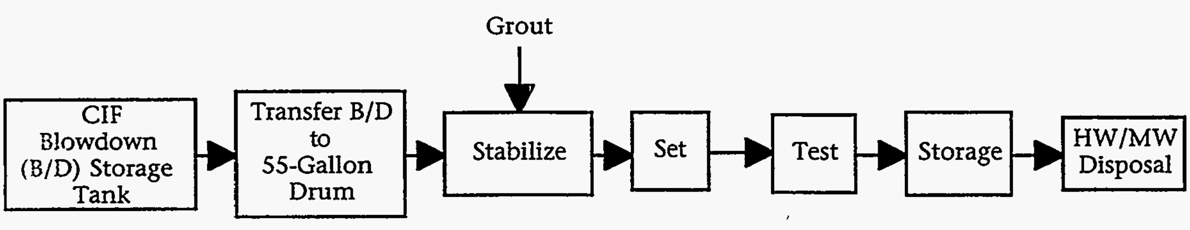
Waste Code
- The waste codes describing the CIF blowdown waste stream depend on the feed stream into CIF. Blowdown waste stream will contain all of the listed waste codes that are fed into the CIF. Consult the RCRA Part B Permit Application for a complete listing.

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 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. The start date to treat mixed waste is anticipated to be second quarter FY 96. Construction of the CIF is on schedule.

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

Since the treatment of CIF blowdown in the ashcrete portion of the facility was not a part of the original Part B Permit Application submittal for the CIF, a modification of the CIF RCRA Part B Permit was necessary and the modification application was submitted to allow for this treatment option. The treatment of the CIF Blowdown was addressed in Revision Two of the RCRA Part B Renewal Application for the CIF submitted June 17, 1994.

The major permits required for this treatment facility are:

a. RCRA Part B Permit
b. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions

The CIF received its RCRA Part B Permit effective November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date is December 10, 1992. The NESHAP Construction Permit for radionuclides was received on June 14, 1989; the NESHAP Exemption for Benzene Emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment (EA) was prepared for the CIF and a 60-day public comment period was held for the proposed Finding of No Significant Impact (FONSI). The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register.

3.1.1.1.K.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $23 million and $31 million.

Uncertainty Issues

Uncertainty exists regarding review and approval of the RCRA Part B modification for treatment of this waste. See assumption four in the Schedule Assumptions of Section 3.1.1 for the CIF in the *Compliance Plan Volume.*

Applicability of additional evaluation under NEPA creates uncertainty related to budget and schedule for this treatment option.

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. One, in particular, is a waste that consists of a fibrous media filter in a plastic frame used in Naval Fuels to remove particulates in the process flow stream. Mercury salt and particles of depleted uranium are the expected impurities.

Volume
- Current volume through 09/30/94 is 0.8 m^3.
- Expected 1995-1999 volume generation is 3.0 m^3.

Waste Stream Composition
- Heterogeneous debris

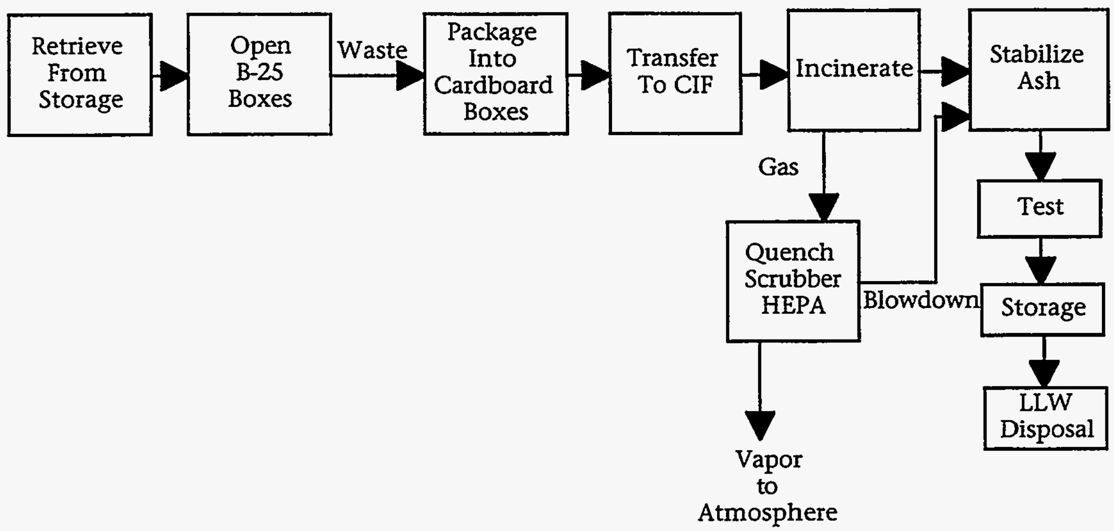
Waste Code
- D009A (low TCLP mercury)

LDR Treatment Standard
- 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 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 is completely designed and as of December 31, 1994, construction is ?? complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part B or alternative may be required for the treatment preparation step for this waste

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

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.

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. 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

Construction is on schedule for the CIF. However, a preparation for treatment 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.L.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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 09/30/94 is 951 m^3.
- No future waste generation is expected due to the solvent rag minimization program.

Waste Stream Matrix
- Organic debris

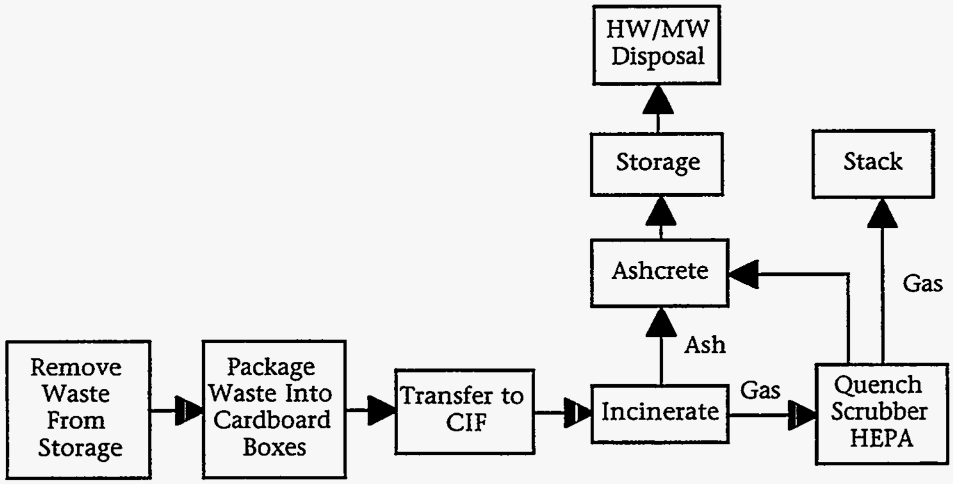
Waste Code
- F001-F003, F005A (halogenated and nonhalogenated spent solvents)

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 treated to meet the LDR alternative debris treatment technology.

3.1.1.1.M.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDOA 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be second quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part B Permit or alternative may be needed for the treatment preparation of this waste stream

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP's construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. 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 FONSI. The FONSI was issued by DOE-HQ in the December 23, 1992, Federal Register.

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.

Preparation for Operation

Construction is on schedule for the CIF. However, a treatment preparation step to repackage the waste to meet the CIF WAC is required. The repackaging step may include sorting to separate any material unacceptable to CIF. Options for accomplishing this operation are being analyzed. One alternative may be to utilize mixed waste storage buildings for the repackaging step.

3.1.1.1.M.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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. Treating design basis wastes is expected to take three years.

The estimated cost to treat this waste stream is between $7 million and $16.5 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.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 aqueous lab waste from the analytical testing of ground water samples taken from the site and processed at commercial, offsite laboratories.

Volume
- Future waste generation, 1995 through 1999, is 2.2 m^3.

Waste Stream Composition
- Aqueous liquid

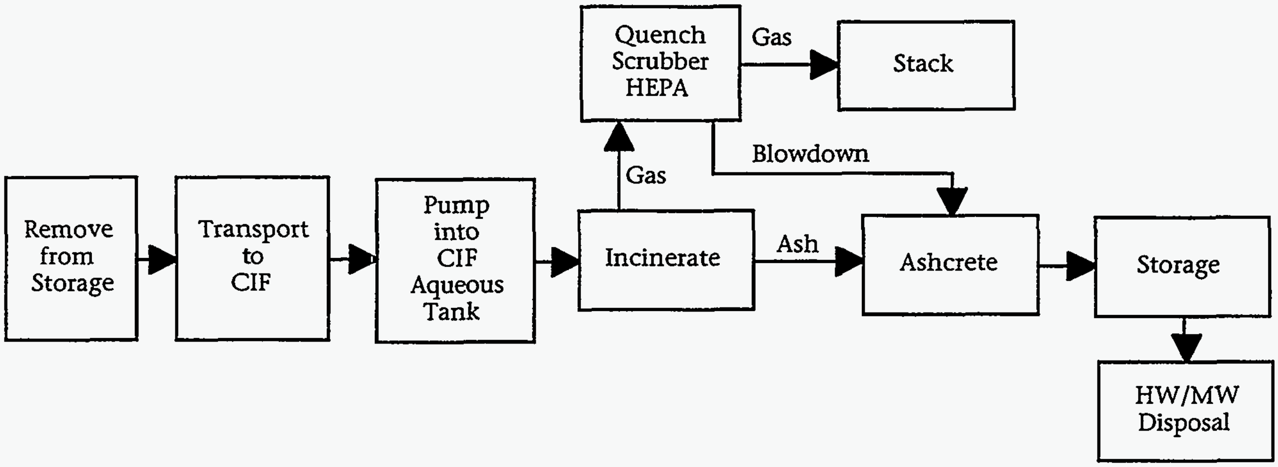
Waste Code
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010A (TCLP Se)
- D011A (TCLP Ag)
- F001, F002, and F005 (spent solvents – these waste codes pertain only to samples that may contain a listed waste)

LDR Treatment Standard
- 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
- F001, F002, and F005 = concentration based standards = 6.0-170 mg/kg, except for 2-Ethoxyethanol and 2-Nitropropane = Incineration

Waste Characterization
- Process knowledge used to characterize the waste stream
- Confidence level varies depending on the specific waste, it is generally medium to high.

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 above the F039 treatment standard concentration. If an organic is not present above F039 level, incineration would be considered impermissible dilution of a metal waste. Alternative treatment would need to be applied if this situation occurs.

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 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be secondary quarter FY 96.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part B Permit or alternative may be needed for the treatment preparation step for this waste stream

CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

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

Construction is on schedule for the CIF. However, 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.N.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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.

3.1.1.1.O SR-W071 Wastewater from TRU Drum Dewatering

3.1.1.1.O.1 GENERAL INFORMATION

Waste Stream Number: SR-W071

The preferred treatment option for the Wastewater from TRU Drum Dewatering 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.

Volume
- Current volume through 09/30/94 is 11.8 m^3.
- Future waste generation, 1995 through 1999, is 4.2 m^3.

Waste Stream Composition
- Aqueous liquid

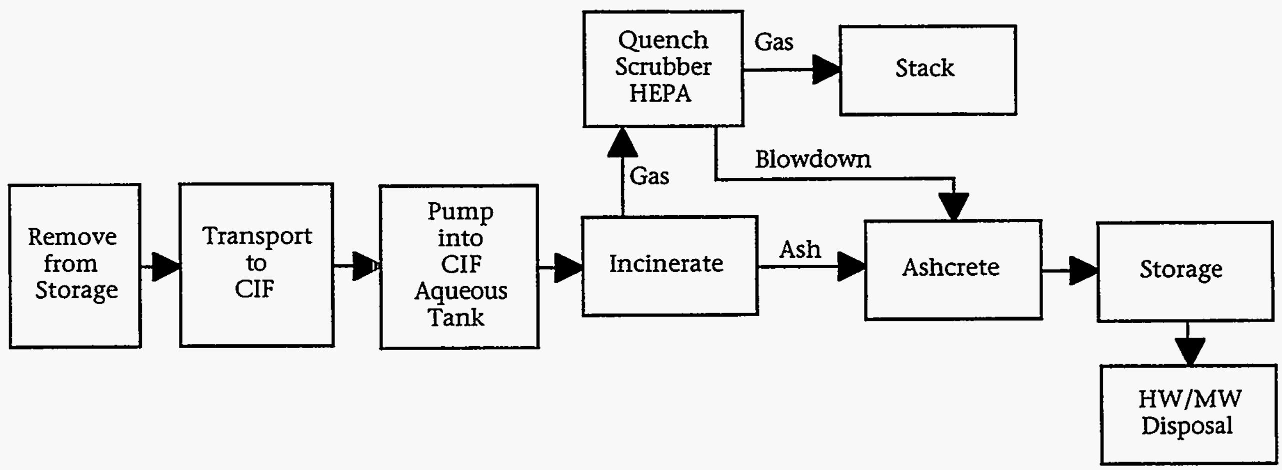
Waste Codes
- F001
- F002
- F003
- F005A (halogenated and nonhalogenated spent solvents)

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 2-Ethoxyethanol, 2-Nitropropane = Incineration

Waste Characterization
- Analysis of water recovered from the space between the drum and the liner. 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.

Radiological Characterization
- 10 to 100 nCi/g alpha emitters
- Contact handled

3.1.1.1.O.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. 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 above the F039 treatment standard concentration. If an organic is not present above F039 level, incineration would be considered impermissible dilution of a metal waste. Alternative treatment would need to be applied if this situation occurs.

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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be February 1996.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part B Permit or alternative may be needed for the treatment preparation of this waste stream

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

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

Construction is on schedule for the CIF. Further detail on where this operation will be accomplished is being analyzed.

3.1.1.1.O.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Operating budget funds will be used to finance the treatment of this waste.

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.

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 09/30/94 is 1.8 m^3.
- Future generation is not anticipated.

Waste Stream Composition
- Other organic particulates

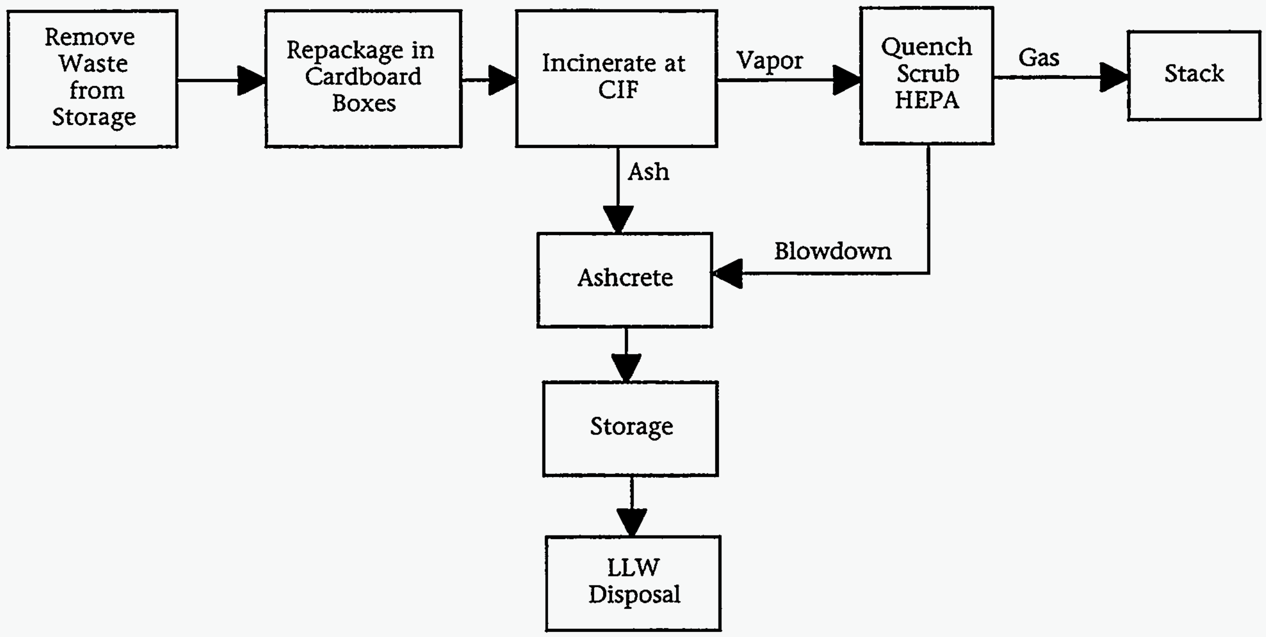
Waste Codes
- D006A (TCLP Cd)
- D008A (TCLP Pb)

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.

Radiological Characterization
- Radioactive contamination is below detection limits for alpha and beta/gamma.
- 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 is completely designed and as of December 31, 1994, construction is 95% complete. The facility is fully funded and is anticipated to have construction complete December 31, 1995. Start date to treat mixed waste is anticipated to be February 1996.

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. NESHAP for radionuclides and benzene
c. SCDHEC Air Quality Permit for process emissions
d. RCRA Part B Permit or alternative may be needed for treatment preparation of this waste stream

The CIF received its RCRA Part B Permit; the effective date was November 2, 1992. The Air Quality Construction Permit was issued on November 25, 1992; the effective date was December 10, 1992. The NESHAP construction permit for radionuclides was received on June 14, 1989; the NESHAP exemption for benzene emissions was received on August 18, 1989. Under the NEPA process, an Environmental Assessment 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.

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. 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

Construction is on schedule for the CIF. However, 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

Operating budget funds will be used to finance the treatment of this waste.

The estimated cost to treat this waste stream is between $1.5 million and $4 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.

3.1.1.2 F AND H EFFLUENT TREATMENT FACILITY (ETF)

3.1.1.2.A SR-W041 Aqueous Mercury and Lead

3.1.1.2.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W041

The preferred option for the Aqueous Mercury and Lead waste stream is treatment in the F- and H-Effluent Treatment Facility (ETF) using Ion Exchange.

Background Information:

A portion of the waste stream consists of one 6-liter and one 2-liter bottle of aqueous mercury and one 4-liter bottle of aqueous lead generated from analytical support for the Naval Fuels Development Facility (779-A). The other portion is a drum of rinsate transferred from SR-W049 (Tank E-3-1 Cleanout Material) with a low level of mercury.

Volume
- Current volume through 09/30/94 is 0.3 m^3.
- No future waste generation is expected because waste was generated from a one time cleanouts.

Waste Stream Composition
- Aqueous liquid

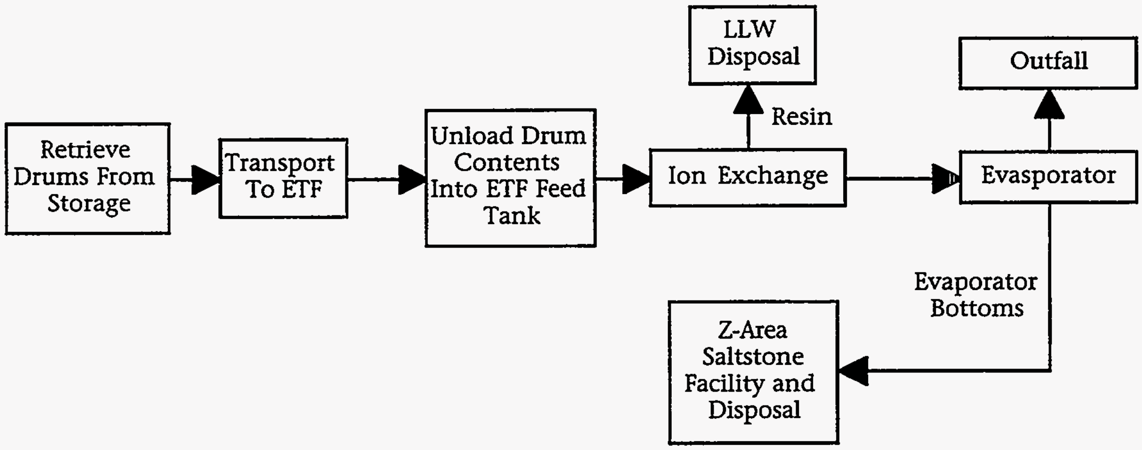
Waste Code
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D009C (high Hg contains inorganics) wastewater

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

3.1.1.2.A.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. The introduction of the Aqueous Mercury and Lead waste stream to the F-Area and H-Area Effluent Treatment Facility (ETF) will require approval from SCDHEC. Since treatment of this waste stream does not require any change in the treatment process, no permit modification is required. However, for approval to add this waste stream to F-Area and H-Area ETF, SRS must demonstrate through a treatability study that it is possible to treat the waste in that facility. The preferred treatment option is a wastewater treatment facility. The discharge from this wastewater treatment facility is covered by an NPDES permit and must meet those requirements rather than LDR requirements. However, any wastewater sludges that are determined to be characteristically hazardous must be treated per LDR standards prior to disposal. It is not anticipated that treatment of this waste will generate characteristically hazardous sludges.

Ion exchange in the F-Area and H-Area ETF would provide a treated waste stream that would comply with the requirements in the ETF permit and allows this waste stream to be treated at an existing facility with little or no additional modification. Sludges from the F-Area and H-Area ETF are stabilized in the Z-Area Saltstone Facility. This small volume, one time generation waste stream can be assimilated into the F-Area and H-Area ETF treatment process without an impact on the capacity of the facility or without modification of the treatment system to accept the waste.

3.1.1.2.A.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDOA Performed

- Records indicate very successful treatment of similar waste streams by this treatment facility. Treatment system represents proven technology.
- There is a significant waste volume reduction by treatment with this option. Volume reduction estimated at 20:1 results in minimal secondary waste for disposal.
- Treatment option is an existing, onsite facility. Addition of this waste stream requires no extra equipment or personnel.
- Permit requirements for this waste stream treatment are simple and straightforward.

Facility Status

Both the F-Area and H-Area ETF and the Z-Area Saltstone Facility are fully operational.

Technology

Ion exchange to remove the ionic mercury and lead is a proven technology and one of the current treatments available at this wastewater treatment facility.

Regulatory Status

This facility is operating under an NPDES permit issued to SRS on July 1, 1988. A request for permission to treat this waste stream must be submitted to EPA/SCDHEC to approve the ion exchange treatment method with regard to the LDR treatment standard.

Preparation for Operation

No physical preparation or modification would be required to treat this waste stream since the site will seek permission to introduce the waste stream into the ETF through the ETF laboratory drain system (ETF is hardpiped to F-Area and H-Area Outside Facilities and since this waste stream is only 12 liters in volume, the laboratory seems appropriate for this small volume to get to the ETF).

3.1.1.2.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Treatment cost comes from the operating budget. The estimated cost to treat this waste stream is less than $450,000.

Uncertainty Issues

The LDR regulations (40 CFR 268.40) list the treatment standard for mercury wastewater with a mercury concentration of ≥260 mg/kg as .2 mg/l. However, an LDR background document (preamble) indicates that high levels of mercury may need to be treated with a roasting or retorting technology (a mercury recovery process). SRS believes that treating this small amount of aqueous mercury (~55 gallons) through a wastewater treatment unit (ion exchange process) is appropriate. Preamble language is intended to protect against improper treatment of elemental or organic mercury rather than inorganic mercury found in this waste. SRS has sought EPA/SCDHEC concurrence with this treatment technology for the aqueous mercury portion of the waste stream. EPA/SCDHEC agreement with the preferred treatment option is forthcoming.

3.1.1.3 SAVANNAH RIVER TECHNOLOGY CENTER (SRTC) MIXED WASTE STORAGE TANKS

3.1.1.3.A SR-W007 SRL (SRTC) Low Activity Waste

3.1.1.3.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W007

The preferred treatment option for SRL (SRTC) Low Activity Waste is Ion Exchange and Neutralization in the SRTC Low Activity Waste Storage Tanks.

Background Information

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).

Volume
- Current volume through 09/30/94 is 58.6 m^3.
- Expected volume 1995-1999 will be 375 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive)
- D007A (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, and U^{235}.

3.1.1.3.A.2 TECHNOLOGY AND CAPACITY NEEDS

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 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 treatment capacity of ion exchange and neutralization in the SRTC Low Activity Waste Storage Tanks is 1500 m^3/yr which provides sufficient capacity to treat existing waste volumes, plus those estimated to be generated over the five-year projection period of the MWIR (75 m^3/yr).

3.1.1.3.A.3 TREATMENT OPTION INFORMATION

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.

The facility is currently operating under RCRA Interim Status.

3.1.1.3.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The facility is funded as a part of the operating costs of the support facilities serving SRTC. The estimated cost to treat this waste stream is less than $200,000.

Uncertainty Issues

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

3.1.1.3.B SR-W008 SRL (SRTC) High Activity Waste

3.1.1.3.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W008

The preferred treatment option for the SRL (SRTC) High Activity Waste is Ion Exchange and Neutralization in the SRTC High Activity Waste Storage Tanks.

Background Information:

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 gloveboxes and usually has a total activity of more than 1,000 disintegrations per minute per milliliter (d/m/ml).

Volume
- Current volume through 09/30/94 is 72.2 m^3.
- Expected 1995-1999 volume will be 375 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002A (corrosive)
- D007A (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 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.

3.1.1.3.B.2 TECHNOLOGY AND CAPACITY NEEDS

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 completion of all the possible waste codes.

Treatment capacity of ion exchange and neutralization in SRTC high activity waste tanks is 210 m^3/yr which provides sufficient capacity to treat existing waste volumes plus those estimated to be generated over the five-year projection period of the MWIR (75 m^3/yr).

3.1.1.3.B.3 TREATMENT OPTION INFORMATION

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.

The facility is currently operating under RCRA Interim Status.

3.1.1.3.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The facility is funded as a part of the operating costs of the support facilities serving SRTC. The estimated cost to treat this waste stream is less than $200,000.

Uncertainty Issues

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

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 1995-1999 volume generation is 32.6 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}, Ru^{106}, Sb^{125}, and I^{129}.
- Waste is remote handled.
- Mixed low-level waste

3.1.1.4.B.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 forthcoming.

Since the ITP Facility has not started its normal operations, failure rate of the filters is not 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. The same treatment process will be submitted for the LW filters.

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.

<u>Uncertainty Issues</u>

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. Ion exchange and heavy water recycling processes exist in the D-Area facilities. SRS is currently developing a plan to treat SR-W032 prior to October 1995 to take advantage of the facility's processing capability prior to shutdown (scheduled for FY 97). If treatment is completed prior to October 1995, this waste stream will be removed from the STP.

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 09/30/94 is 9.6 m^3.
- No future waste generation is expected because the laboratory has modified the test using mercury as a tracing agent since the test generated a mixed waste.

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.

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.

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.

SRS has reached an agreement with the South Carolina Department of Health and Environmental Control (SCDHEC) to transfer a portion of the site hazardous waste storage capacity to D Area so that the 46 drums of mercury-contaminated heavy water can be moved to D Area for temporary storage while processing for recycling the heavy water is occurring. The transfer will require the submittal of a Part A modification to SCDHEC.

As an alternative, SRS may transfer one stream at a time to the D-Area processing facility for mercury removal. This procedure would not require a permit since there are no storage activities being carried out in D Area. Under this alternative, no transfer or permit modification activities are required.

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

3.1.1.6.A SR-W024 Mercury/Tritium Gold Traps

3.1.1.6.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W024

The preferred treatment option for Mercury/Tritium Gold Traps is Amalgamation. The waste stream already meets the treatment standard.

Background Information:

This waste stream contains gold foil which traps elemental mercury entrained in process gases in the tritium facility. A typical trap consists of a stainless steel cylindrical housing that is 38 inches high and 2 inches in diameter that contains gold foil on 16 evenly spaced trays.

Volume
- Current volume through 09/30/94 is 2.3 m^3.
- Expected 1995-1999 volume will be 0.2 m^3.

Waste Stream Composition
- Elemental mercury

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 is estimated to be 1.6 Ci/g.
- Tritium is present.
- Waste is contact handled.
- Mixed low-level waste

3.1.1.6.A.2 TECHNOLOGY AND CAPACITY NEEDS

Mercury is as an impurity that must be removed from the tritium gas to meet the stringent purity standards set for the final tritium product. Through analysis on the tritium gas operation, the Savannah River Site made the regulatory interpretation (ESH-FSS-920721, dated September 28, 1992) that amalgamation of mercury in the tritium processing operations meets the specified treatment for waste elemental mercury (D009D – elemental mercury).

3.1.1.6.A.3 TREATMENT OPTION INFORMATION

Mercury pumps move the tritium gas through the tritium process. The radioactive elemental mercury that exits the pump and becomes entrained in the tritium gas must be removed to meet the DOE's stringent purity standards for tritium gas. These Mercury/Tritium Gold Traps remove the radioactive elemental mercury from the product gas via amalgamation, which also is the prescribed treatment technology for this waste stream when it exits the unit in which it was generated. To protect personnel and reduce radiation exposure, the entire Mercury/Tritium Gold Traps is taken out of service and replaced at a frequency to ensure product consistency. Therefore, the radioactive elemental mercury is treated per the required technology and can be disposed in the HW/MW Disposal Facility, in accordance with the amalgamation treatment for mercury in the Third Final Rule.

SRS transmitted the regulatory analysis of this process to EPA Region IV in September 1992. On October 2, 1992, EPA Region IV agreed that the gold traps met the LDR treatment standard of amalgamation. A copy of the SRS regulatory analysis is enclosed in the reference document of the PSTP.

3.1.1.6.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

There is no actual waste treatment cost associated with the use of gold foil to capture mercury in the tritium facility since this is part of the tritium production process. The preparation of gold foil to serve as the amalgamation unit is done at SRS. The canister in which the foil is housed is fabricated onsite from metal pipe. After the foil has been reacted, the canisters are sealed and overpacked with Pearlite© in a stainless steel drum. A drum is considered filled when two canisters have been overpacked. The drum lid is then welded shut. The cost associated with the waste stream is the cost of preparing the waste canisters and sealing the storage drum. This cost is approximately $1500 per event.

The estimated cost to treat this waste stream is less than $30,000.

Uncertainty Issues

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

3.1.1.6.B SR-W063 Macroencapsulated Toxic Characteristic (TC) Waste

3.1.1.6.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W063

The preferred treatment option for Macroencapsulated Toxic Characteristic (TC) Waste is the alternative debris technology of Macroencapsulation. The waste stream already meets the treatment standard.

Background Information:

This future waste stream consists of a wide variety of miscellaneous macroencapsulated toxic characteristic metal items (lead, cadmium, etc.) contaminated with radioactive materials. The majority of the lead is encapsulated in stainless steel. The lead items include lead counterweighted jumpers (lead welded in pipe for balancing jumpers), cesium removal columns (CRC) (lead sandwiched between stainless steel for shielding purposes), draw-off valves, flush valves and discarded equipment (same description as CRC configuration). These wastes are used as shields from radioactivity (e.g., around pipes in the tank farms), as counterweights, or serve as parts of other devices. The majority of the radioactive contamination should be surface contamination. The waste is generated in reactor areas, fuel and target areas, separations areas, waste management areas, and laboratories. Future generation rates are dependent on site transition and decommissioning activities.

Volume
- Current volume through 09/30/94 is 0 m^3.
- Expected 1995-1999 volume will be 42 m^3.

Waste Stream Composition
- Metal debris

Waste Code
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D008C (radioactive Pb solids)
- D009A (TCLP Hg)
- D010A (TCLP Se)
- D011A (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 or macroencapsulation
- 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 unknown – future waste
- Waste is contact handled.
- Mixed low-level waste

3.1.1.6.B.2 TECHNOLOGY AND CAPACITY NEEDS

The debris characterized into this waste stream already meet the alternative debris technology and the specified technology for lead of macroencapsulation. This is based on the original construction of the equipment which has the hazardous TC metal constituent of concern completely encapsulated.

3.1.1.6.B.3 TREATMENT OPTION INFORMATION

None. This future waste stream will meet the LDR treatment standards and requires no further treatment. Macroencapsulation requires disposal in a RCRA Subtitle C unit at this time.

3.1.1.6.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget

There is no actual waste treatment associated with treatment since the equipment's original fabrication meets treatment standards.

Uncertainty

None

3.1.1.7 WASTE STREAMS TREATED IN 90-DAY STAGING AREAS

3.1.1.7.A SR-W015 Mercury/Tritium Contaminated Equipment

3.1.1.7.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W015

The preferred treatment option for the Mercury/Tritium Contaminated Equipment waste stream is Macroencapsulation in a stainless steel box in a 90-day staging area. Existing inventory is in stainless steel boxes which meet the debris technology of Macroencapsulation.

Background Information:

This waste stream consists of equipment used in the tritium process, the majority of which is failed or retired pumps used to pump tritium. Mercury was drained and poured from the pumps, but residual amounts still remain. Mercury is used as a pumping medium for the tritium gas. Lead may be present on some of the equipment as lead/tin solder from cooling coil construction or collars for shielding that are an integral part of the equipment.

Volume
- Current volume through 09/30/94 is 9.9 m^3.
- Expected 1995-1999 volume will be 253.2 m^3.

Waste Stream Composition
- Inorganic debris

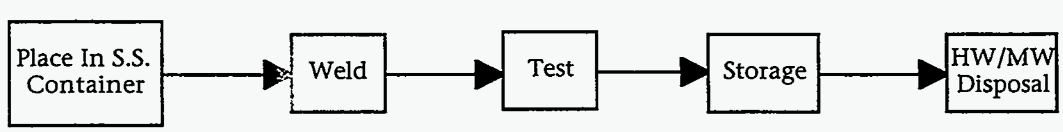
Waste Code
- D008A (TCLP Pb)
- D009A (TCLP Hg)

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 low-level waste

3.1.1.7.A.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred options is shown above. 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. There are a number of treatment alternatives for debris, but the only alternative that both satisfies treatment for lead and mercury and is a practical treatment for highly tritiated waste is Immobilization using Macroencapsulation. The preferred option of Macroencapsulation in a stainless steel box meets the debris rule standard for the treatment of the waste codes found in this waste stream.

There are no capacity needs identified for treating as a 90-day generator.

3.1.1.7.A.3 TREATMENT OPTION INFORMATION

This waste stream is generated by tritium operations and decontamination of obsolete tritium facilities. Due to safety and health concerns surrounding tritium, failed and retired equipment contaminated with mercury were welded into engineered stainless steel boxes for long-term storage, designed to withstand tritium offgassing for 100 years (half life of tritium is 12 years). When the LDR Debris Rule (57 FR 37194-37282, dated August 18, 1992) was promulgated, the performance standard for macroencapsulation stated the "encapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes)." This form of storage (welding in stainless steel boxes) meets the macroencapsulation requirements; a document review to verify contents of the currently stored waste boxes has been completed. Macroencapsulation of a debris that is contaminated with a toxic characteristic metal, such as mercury or led, meets the LDR alternative debris technology and may be disposed of in the hazardous waste/mixed waste disposal facility.

Furthermore, future spent and retired equipment can now be considered handled under normal operations but regarded as waste treatment as a 90-day generator rather than waste packaging for transfer into RCRA storage. Current procedures require mercury-contaminated equipment to be drained, then stored in satellite accumulation areas until sufficient quantities dictate removal and a box can be constructed. The pumps are moved into a staging area where they are welded into the engineered box. The box is then transferred to a RCRA mixed waste storage facility for eventual disposal at the Hazardous Waste/Mixed Waste Disposal Vaults (not yet constructed).

Option Support Justification – IDOA Performed

- Waste already in storage meets debris technology of macroencapsulation and meets LDR requirements.
- Future waste can be treated without a permit as a 90-day generator.
- Treatment option results in a treated waste that requires no additional processing before disposal.
- Treatment process requires little equipment.

Facility Status

The process of macroencapsulating tritiated equipment in a tritium facility has been demonstrated.

Technology

The alternative immobilization debris technology of macroencapsulation is simple and can be performed in the Tritium Facility under special procedures; work has to be done in plastic suits.

Regulatory Status

Macroencapsulation would be performed on pumps and equipment coming out of service. This may be done in a staging area under 90 days.

Preparation for Operation

An appropriate training program, inspection records, and a contingency plan will be developed and maintained.

3.1.1.7.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This treatment is funded by the current tritium operations budget.

The estimated cost to treat this waste stream is between $1 million and $ 2.2 million.

Uncertainty Issues

There are no uncertainties identified for this waste stream at this time. Toxic Characteristic (TC) Contaminated Debris (SR-W062) describes toxic characteristic waste in permitted storage that must be treated in a permitted TSD.

3.1.1.7.B SR-W023 Cadmium Safety/Control Rods

3.1.1.7.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W023

The preferred treatment option for Cadmium Safety/Control Rods is Macroencapsulation in a cask as a 90-day generator.

Background Information:

Cadmium rods encapsulated in stainless steel are used to control neutron flux in the reactors. Most rods are one inch in diameter and 22 feet long. There also are some smaller rods that were used in a test reactor. Cadmium is used as a neutron poison in the nuclear fission process.

Volume
- Current volume through 09/30/94 is 0.3 m^3.
- Expected 1995-1999 volume will be 3.2 m^3.

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
- Alternate 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

3.1.1.7.B.2 TECHNOLOGY AND CAPACITY NEEDS

Cadmium Safety/Control Rods meet the definition of debris because they exceed the 60 mm size requirement and are a manufactured object. This waste stream is deemed inherently hazardous due to its fabrication with the toxic metal cadmium. Therefore, the debris must be immobilized. The regulatory definition of Macroencapsulation is application of a surface coating or use of a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media. In the fabrication of the Cadmium Safety/Control Rods a stainless steel sheathing is applied over the entire area of each rod effectively serving to macroencapsulate the cadmium.

3.1.1.7.B.3 TREATMENT OPTION INFORMATION

SRS intends to store the Cadmium Safety/Control Rods in an existing cask until disposal facilities are available. Utilization of the existing storage cask saves considerable fabrication cost. However, the cask is not quite long enough to house the longest rods. To utilize the cask, the rods must be bent or cut. The determination has been made that it is most feasible to cut the rods. Such action would not expose cadmium since the cadmium does not run the full length of the rod. However, cutting the rods would affect the integrity of the stainless steel sheath, and thus require re-encapsulation in the cask by means of seal welding. Starting first quarter CY95, the rods will be cut, placed in the cask and sealed. This decision is documented in correspondence between SRS and SCDHEC regarding the *Cadmium Control and Safety Rod Management Plan* (Roberts to Wilson September 8, 1993, and Thompson to Roberts, November 9, 1993). A copy of this correspondence can be found in the Reference Document of the PSTP.

3.1.1.7.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

There is one available cask of sufficient size to contain all waste Cadmium Safety/Control Rods. Since the cask is presently available, no cost is listed for its fabrication. Introduction of the rods into the existing cask is estimated to cost $75,000. This cost is associated with the handling of the rods after they are cut. The cask will be transported to each of the four reactors where the rods are stored and the rods will be placed into the cask. Sealing the cask and testing the seal are included as a part of the cost estimate. There are other indirect costs associated with handling the rods prior to placing them in the cask. These costs include removing any lead snubbers left on the rods, equipping and modifying the saws at each of the reactors used to cut the rods, and preparing the cask for the receipt of the rods. Costs for these activities are not included in the $75,000 estimate.

The estimated cost to treat this waste stream is between $600,000 and $1.5 million.

Uncertainty Issues

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

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

3.1.1.7.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W072

The preferred treatment option for the Supernate or Sludge Contaminated Debris from High-Level Waste (HLW) Operations is an alternative debris technology (either extraction or immobilization technologies) in a 90-day staging area. If extraction is effective, waste is disposed of as low-level waste; if the extraction is ineffective, the waste is immobilized in a stainless steel box and disposed of as mixed waste.

Background Information:

This future waste stream consists of a wide variety of metal debris and other metal items contaminated with radioactive materials and characteristically hazardous waste. The waste is derived from contact with high-level radioactive waste with the majority of the radioactive contamination being surface contamination. Future generation rates are dependent upon construction activities, operations and maintenance activities, and site decontamination and decommissioning activities.

Volume
- Current volume through 09/30/94 is 0 m^3.
- Expected 1995-1999 generation volume will be 1,065 m^3.

Waste Stream Composition
- Inorganic debris

Waste Code
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007 (TCLP Cr)
- D008 (TCLP Pb)
- D009 (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
- D009 = concentration based standard = 0.2 mg/l
- D010 = concentration based standard = 5.7 mg/l
- D011 = concentration based standard = 5.0 mg/l
- D018* = concentration based standard = 10 mg/kg
- Alternative 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.

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is medium since this waste stream had not been generated yet.

Radiological Characterization

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

3.1.1.7.C.2 TECHNOLOGY AND CAPACITY NEEDS

Decontamination of equipment and other metal debris is a suitable alternative debris technology (extraction technologies include water washing, acid washing, etc.) to meet LDR treatment standards. The metal debris would be size reduced, if necessary, followed by either an extraction or immobilization technology. The wash stream containing the sludge or supernate residues would be transferred to the High-Level Waste tank farm for final treatment in the Defense Waste Processing Facility (DWPF). The "clean" debris, no longer RCRA hazardous, would be boxed and disposed of in the appropriate low-level waste disposal (non-mixed) facility. Waste unable to be "cleaned" will be macroencapsulated and disposed of in the Hazardous Waste/Mixed Waste Disposal Facility.

3.1.1.7.C.3 TREATMENT OPTION INFORMATION

SRS is currently exploring decontamination debris treatment option for metal debris contaminated with supernate or sludge from HLW operations in a tank farm maintenance facility. The study is also examining the possibility that extraction debris technology performance standards may not be met in certain cases and that a macroencapsulation debris treatment would be implemented for the debris to meet LDR standards. Conceptual plans are to treat the waste within 90 days. This waste stream is anticipated to be generated in mid-1995 and confidence is high that treatment within 90 days can be developed and achieved.

Option Support Justification – IDOA Performed

The option analysis evaluated treatments using decontamination and macroencapsulation for treating this waste. The decontamination treatment at INEL Idaho Chemical Processing Plant (ICPP) was the offsite option evaluated. The extraction technologies at SRS were chosen because:

- treatment would meet LDR standards without major project authorization
- permit would not be required because of ability to treat in 90 days
- treatment residues would be eventually sent to DWPF for vitrification

Facility Status

The 299-H Maintenance Facility is existing and has capability to decontaminate small equipment. An evaluation is being performed to develop the size reduction capability to handle the larger equipment and debris.

Technology

Extraction technologies (water washing, acid washing, etc.) are alternative debris technologies and widely used. Macroencapsulation is also a proven technology.

Regulatory Status

Current plans are to treat as a 90-day generator. Evaluation of the facility is being developed.

3.1.1.7.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

At present there is no budget allocation for treatment of this waste stream. Estimated cost to treat this waste is between $10 million and $24 million.

Uncertainty Issues

Evaluation to treat as a 90-day generator is not complete and other options (i.e., treatment in a containment building under interim status) may need to be chosen if the analysis shows this option is unfeasible).

Section 3.1.2 Onsite Treatment in New Facilities

3.1.2.1 M-AREA VENDOR TREATMENT PROCESS

3.1.2.1.A SR-W004 M-Area Plating Line Sludge from Supernate Treatment

3.1.2.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W004

The preferred treatment option for M-Area Plating Line Sludge from Supernate Treatment is Stabilization by Vitrification in the M-Area Vendor Treatment Process.

Background Information:

This waste stream is a sludge generated from the treatment of the supernate through the Dilute Effluent Treatment Facility (DETF) and stored in the Process Waste Interim Treatment/Storage Facility (PWIT/SF) in M Area.

Volume
- Current volume through 09/30/94 is 850 m^3.
- Expected 1995-1999 volume will be 20 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
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based upon knowledge that the process generates a listed hazardous waste.
- TCLP leachate results are Pb <0.09 mg/l, Cr <0.01 mg/l, Ni <0.11 mg/l, and Cd <0.005 mg/l

Radiological Characterization
- Total activity is 0.015 Ci.
- Alpha emitters include U^{234}, U^{235}, 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 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 100-200 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.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.

Facility Status

The M-Area Vendor Treatment Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

The NEPA documentation has been prepared and an Engineering Assessment conducted. A Finding of No Significant Impact was issued on August 1, 1994.

A Part A revision to transfer storage capacity to M Area for storage by waste before and/or other treatment was submitted to SCDHEC in May 1994. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required 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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.B SR-W005 Mark 15 Filtercake

3.1.2.1.B.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 Process.

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 09/30/94 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}, and U^{238}.
- Waste is contact handled.
- Mixed low-level waste

3.1.2.1.B.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 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 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.

Facility Status

The M-Area Vendor Treatment Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required 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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.C SR-W011 Cadmium-Coated HEPA Filters

3.1.2.1.C.1 DESCRIPTION OF WASTE STREAM

Waste Stream Number: SR-W011

The preferred treatment option for Cadmium-Coated HEPA Filters is Acid Leaching in M-Area followed by Stabilization by Vitrification in the M-Area Vendor Treatment Process.

Background Information:

This waste stream is high efficiency particulate air (HEPA) filters used to filter ventilation air from the reactors. The filter frames are hazardous due to cadmium plating on the metal frames. Replacement units are stainless steel framed filters. Some filter material is glued onto the frames while other waste containers hold the metal frames only (filters removed). Waste is stored in 12 mil plastic within carbon steel B-25 boxes.

Volume
- Current volume through 09/30/94 is 100.2 m^3.
- No future waste generation is expected because HEPA filters with cadmium coated filter frames are no longer used at this site and all cadmium filters have been removed from service and collected.

Waste Stream Composition
- Cadmium containing metal debris

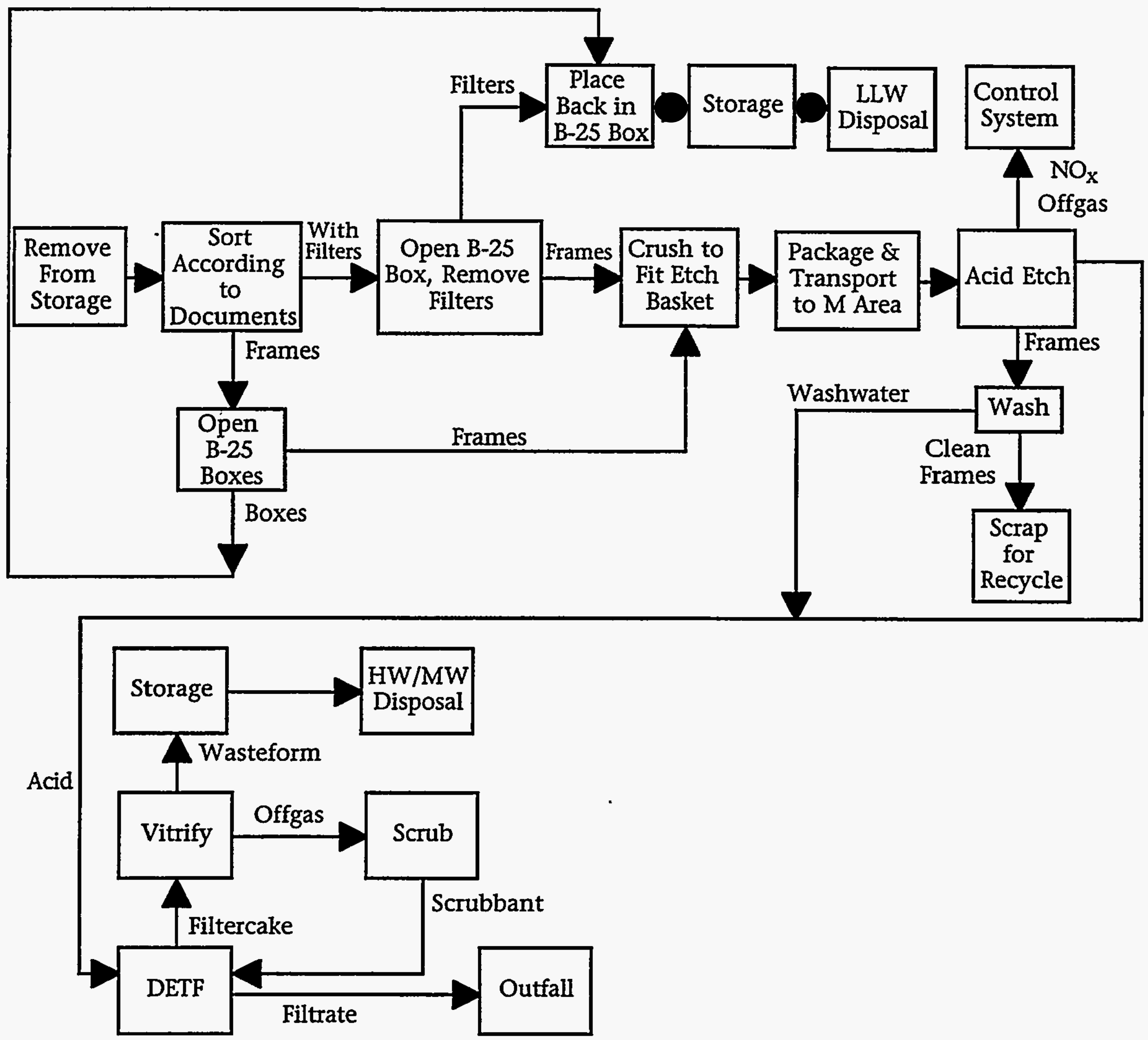
Waste Code
- D006A (TCLP Cd) nonwastewater

LDR Treatment Standard
- D006A = concentration based standard = 1.0 mg/l
- Alternate debris technology may be applied

Waste Characterization
- Sampling and analysis used to characterize the waste stream.
- Confidence level is high based on analytical 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

3.1.2.1.C.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred options is shown above. This waste stream qualifies as a debris. It can be treated by one of 17 debris technologies or it can be treated to the concentration based standard of 1.0 mg/l cadmium (TCLP).

M Area has facilities which can perform the acid leaching operation and are adequately sized to handle the volume of waste. Equipment to perform this process will be needed. The actual volume of waste to be treated after etching is small and can be managed in the M-Area Vendor Treatment Process without difficulty.

3.1.2.1.C.3 TREATMENT OPTION INFORMATION

The preferred option is to dissolve the cadmium by utilization of existing equipment in M Area for acid leaching of the frames. Dissolved cadmium leaching solution can be stored in M Area PWIT/SF and treated in M-Area LETF with the sludge vitrified in the M-Area Vendor Treatment Process. The remainder of the waste, which is acid leached filter frames minus the cadmium, will be handled as scrap metal.

Capacity requirements for treatment of this waste stream are one-time or campaign-based. The waste is no longer generated. The M-Area LETF is currently permitted as an industrial wastewater treatment facility. However, acid leaching is not one of its capabilities. Therefore, a permit modification to the wastewater permit may be necessary. Acid leaching and precipitation are well established and reliable technologies.

The permit applications for the M-Area Vendor Treatment Process were submitted June 24, 1994, to comply with the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement. This waste stream will not be a part of the initial permit application submittal. As a result, to receive approval from SCDHEC to treat this waste in the Vitrification facility, a treatability study to show that this waste can be properly treated in the M-Area Vendor Treatment Process will be needed. Since no change in the vitrification treatment process will be needed to treat this waste, a permit modification for the industrial wastewater permit for the M-Area Vendor Treatment Process should not be required.

Since this waste stream is not in the original evaluation for treatment in the M-Area Vendor Treatment Process, it will be necessary to include an evaluation of the Cadmium-Coated HEPA filter waste stream in the NEPA documentation. As directed by identification as a preferred treatment option for the Cadmium-Coated HEPA Filters, the Waste Management EIS will supply the required evaluation.

Option Support Justification – IDOA Performed

- Waste stream volume reduction of 5:1 as opposed to volume increase with other options. Etched filters are salvageable as scrap metal. Represents good waste minimization practice. Treated waste in very stable end form.
- It utilizes existing facilities and requires minimal adjustments of existing vendor contract.
- Permit modification requirements to allow treatment of this waste stream are simple and straight forward.
- It is cost-effective treatment.

Facility Status

The 313-M or the 321-M facility that will perform the acid leaching and chemical precipitation step for the cadmium coated HEPA filter frames exists but will require some minor modifications to be converted for cadmium etching. The 313-M and 321-M facilities are, however, scheduled to be shut down by 1997 as part of the changing missions at SRS. Current shutdown plans are being organized by the Reactor and Reactor Materials line organization. This option may require modification of plans in M Area to allow the continued operation or restart of Building 313-M or 321-M until SR-W011 has been processed.

The M-Area Vendor Treatment Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. This 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 would need to be modified to include this as well as the other additional wastes in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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. Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the M-Area plating sludges and solutions.

Regulatory Status

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

As directed by identification as a preferred treatment option for SR-W011, the Waste Management Environmental Impact Statement (WMEIS) will supply the required evaluation.

A Part A revision storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within 6 months (December 1994). 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. Delay in approval of any of the required permits could delay the startup of the treatment process.

3.1.2.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

This line item is not in the budget. The treatment requires budget planning and funding to be requested. Process location and equipment must be secured and the LETF industrial wastewater permit modified. The contract with vendor for waste stream treatment must be adjusted.

The cost to treat this waste stream is not included in the five-year plan or any annual operating plan. The estimated cost to treat this waste stream is between $1.5 million and $4 million.

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.

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 these waste streams can be treated in M-Area facilities to meet the regulatory standards. If approval is denied, budget and schedules for treatment of this waste stream will be impacted.

Uncertainty also exists regarding container storage permit requirements. Should SCDHEC requires a Part B permit for container storage cost will be increased and the treatment schedule lengthened.

3.1.2.1.D SR-W029 M-Area Sludge Treatability Samples

3.1.2.1.D.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 Process.

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 09/30/94 is 1.0 m^3.
- Expected 1995-1999 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

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
- Total activity is 0.0176 Ci.
- 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

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.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 Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required 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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.E SR-W031 Uranium/Chromium Solution

3.1.2.1.E.1 GENERAL INFORMATION

Waste Stream Number: SR-W031

The preferred treatment option for the Uranium/Chromium Solution waste stream is Stabilization by Vitrification in the M-Area Vendor Treatment Process.

Background Information:

This waste stream is a combination of two one-time waste generation. 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 09/30/94 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

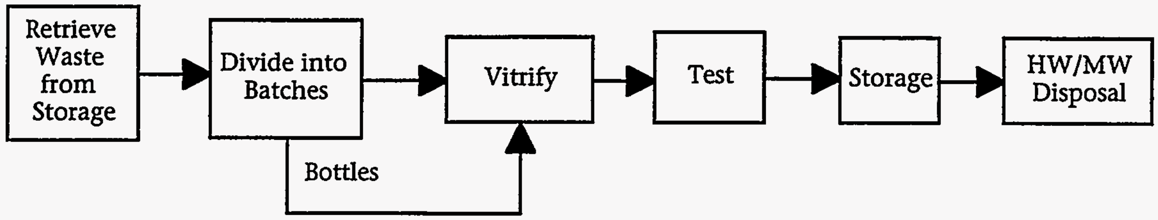
Waste Code
- D007A (TCLP Cr)

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.E.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above.

The M-Area Vendor Treatment Process 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.

Also, since this waste stream is not on the original list for treatment in the M-Area Vendor Treatment Process, it will be necessary to include an evaluation of the uranium/chromium solution waste stream in the NEPA documentation. The DSTP provided information to the Waste Management EIS which will supply the required NEPA documentation to evaluate this waste stream. 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.E.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 or a vitrification process was capable of producing a final wasteform 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 wasteform, with the least volume and was the most cost-effective.

In addition to the volume of this and other waste streams, there are six original waste streams at M Area which have vitrification in the M-Area Vendor Treatment Process 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.

It has been the intention of SRS to permit the treatment of waste in the M-Area Vendor Treatment Process by an industrial wastewater permit since the vitrification facility is an extension of the M-Area Liquid Effluent Treatment Facility and therefore a part of that treatment train. The M-Area Liquid Effluent Treatment Facility is permitted as an industrial wastewater facility. Preliminary response from SCDHEC indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable, and a wastewater permit application was submitted on June 24, 1994.

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

- Treatment option produces a very stable wasteform that requires no additional treatment for disposal.

- Treatment results in extensive waste volume reduction of greater than 5:1.
- Treatment option utilizes an existing onsite treatment facility.

Facility Status

The M-Area Vendor Treatment Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include this as well as the other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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. Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the M-Area plating sludges and solutions.

Regulatory Status

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for Process Emissions

As directed by identification as a preferred treatment option for Uranium/Chromium Solution, the Waste Management EIS will supply the required evaluation.

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required permits could delay the startup of the treatment process.

3.1.2.1.E.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 between $400,000 and $950,000.

Uncertainty Issues

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.

Uncertainty also exists regarding permit requirements for container storage. Should SCDHEC determines that a Part B permit is required for container storage, increased cost and a lengthened schedule will result.

3.1.2.1.F SR-W037 M-Area High Nickel Plating Line Sludge

3.1.2.1.F.1 GENERAL INFORMATION

Waste Stream Number: SR-W037

The preferred treatment option for M-Area High Nickel Plating Line Sludge is Stabilization by Vitrification in the M-Area Vendor Treatment Process.

Background Information:

This waste stream is an inorganic sludge generated from the treatment of M-Area production wastewaters 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.

Volume
- Current volume through 09/30/94 is 1579 m^3.
- No future waste generation is expected because the manufacturing process which generated this waste is no longer operational.

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 11.05 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

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 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.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 Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required 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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.G SR-W038 Plating Line Sump Material

3.1.2.1.G.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 Process.

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 09/30/94 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
- D007A (TCLP Cr) nonwastewater

LDR Treatment Standard
- D007 = concentration based standard = 5.0 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.G.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.G.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 Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required permits could delay the startup of the treatment process.

3.1.2.1.G.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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.H SR-W039 Nickel Plating Line Solution

3.1.2.1.H.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 Process.

Background Information:

This waste is plating line solution generated by the shut down of the M-Area process line.

Volume
- Current volume through 09/30/94 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
- D002A (corrosive)
- D008A (TCLP Pb) wastewater

LDR Treatment Standard
- D002 = specified technology = Deactivation
- D008 = concentration based standard = 5.0 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.H.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 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.H.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 Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. However, the vendor contract would need to be modified to include other additional wastes identified by the PSTP in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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

SRS intends to permit the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

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. The application is presently under review.

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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required permits could delay the startup of the treatment process.

3.1.2.1.H.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 Process. The six waste streams are SR-W004, SR-W005, SR-W029, SR-W037, SR-W038, and SR-W039. The estimated cost for the M-Area Vendor Treatment Process is between $18 million and $24 million.

The current SRS five-year plan includes funding for M-Area Vendor Treatment Process at the "Target Level" only for fiscal years 1995 and 1996. The Annual Operating Plan has sufficient funds to support M-Area activities for fiscal year 1994.

Uncertainty Issues

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

3.1.2.1.I SR-W048 Soils from Spill Remediation

3.1.2.1.I.1 GENERAL INFORMATION

Waste Stream Number: SR-W048

The preferred treatment option for the Soils from Spill Remediation waste stream is Pulverization and Slurrying in M Area followed by Stabilization by Vitrification in the M-Area Vendor Treatment Process.

Background Information:

This waste consists of soils, sand, and associated debris (rocks, wood, etc.) resulting from cleanup activities of spills and remedial actions around the site due to immediate spills or accidents surrounding operations. This waste stream does not include any soils generated from Environmental Restoration activities.

Volume
- Current volume through 09/30/94 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)
- D006 (TCLP Cd)
- D007 (TCLP Cr)
- D008 (TCLP Pb)
- D009 (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.

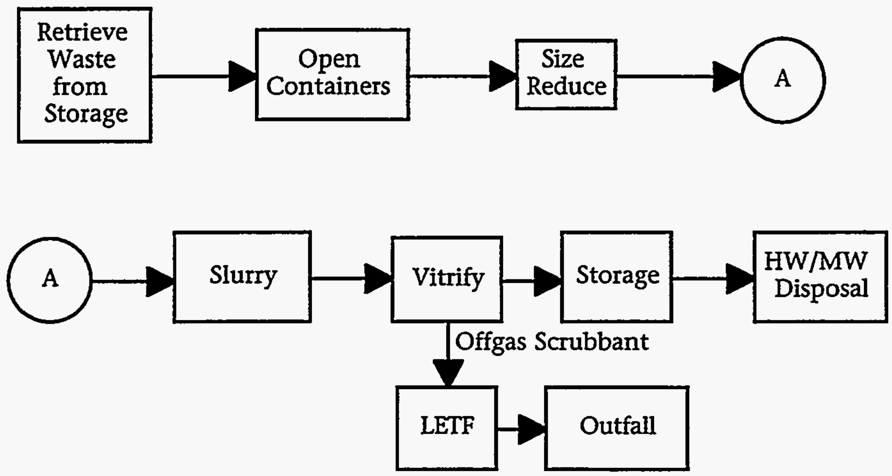
Waste Characterization

- 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

3.1.2.1.1.2 TECHNOLOGY AND CAPACITY NEEDS



The process flowsheet for the preferred option is shown above. EPA has committed to promulgating separate LDR treatment standards for soils because soils differ significantly from other waste. EPA has stated that treatment technologies and treatment standards set for other waste matrices are not appropriate for soils. However, if soils are treated prior to EPA standards for soils being promulgated, the soils would need to be treated to the levels noted below or the site would seek a treatability variance.

Treatability studies have shown that metallic sludges have been effectively sequestered in the glass matrix created by this M-Area Vendor Treatment Process, that leaching has not occurred, and the treatment standards have been met. While it may be necessary to perform treatability studies on soils to verify that they can be successfully treated by this process, indications are that vitrification can meet treatment standards for the waste codes in this waste stream.

Treatment of this waste stream by the M-Area Vendor Treatment Process is not a part of the present contract. If the vendor is to treat this waste stream, arrangements will be needed to adjust the contract. This also will require funding adjustments.

The M-Area Vendor Treatment Process will be designed to treat waste at a rate of 5000 kg/day of glass.

3.1.2.1.1.3 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 wasteform suitable for disposal.

- The treatment option produces a significantly volume reduced wasteform 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 Process is completely designed, with a contract awarded to the vendor for treating M-Area plating sludges and solutions. This 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 would need to be modified to include this as well as the other additional wastes in the cost, storage, and other pertinent areas affected by the increase of waste volume.

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. Treatability demonstrations for this waste stream may or may not have to be conducted, depending on its similarity to the M-Area plating sludges and solutions.

Regulatory Status

SRS intends to permit preparation for treatment and the treatment of waste in the M-Area Vendor Treatment Process 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. Preliminary response from SCDHEC has indicated agreement that permitting the vendor treatment facility under a wastewater permit is possible and acceptable. Under the requirements of the Land Disposal Restrictions Federal Facility Compliance Agreement, SRS submitted permit applications to SCDHEC for the M-Area Vendor Treatment Process facility on June 24, 1994. Permit modification will be necessary to include the soil from Spill Remediation waste stream in waste to be treated by the M-Area Vendor Treatment process.

Major permits required are:

a. Modification to the M-Area Industrial Wastewater Treatment Permit
b. Interim Status Closure of the M-Area PWIT/SF
c. Container Storage Permit
d. SCDHEC Air Quality Permit for process emissions

As directed by identification as a preferred treatment option for soils from spill remediation, the Waste Management EIS will supply the required evaluation.

A Part A revision to transfer container storage capacity to M Area for storage of waste before and/or after treatment was submitted to SCDHEC in May 1994. The application is presently under review.

Since this waste stream was not identified in the original industrial wastewater permit application made for the M-Area Vendor Treatment Process, it will be necessary to request a permit modification in order to treat this waste stream in the M-Area Vendor Treatment 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). Since the major permit is a modification to the existing wastewater treatment permit, approval is anticipated within six months (December 1994). 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. Delay in approval of any of the required permits could delay the startup of the treatment process.

Waste soil will require treatment preparation through processing for size reduction and creation of a homogeneous material. It is anticipated that this operation is permitable under a modification to the existing industrial wastewater permit. Equipment for this process must be acquired.

3.1.2.1.1.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Negotiations will need to be opened with the Vendor to address the additional waste streams. Funding for treating the M-Area wastes via vitrification has already been budgeted. This stream, in addition to others identified in the PSTP, is not anticipated to inflate the cost of the Vendor treatment, due to its low volume in comparison to the M-Area plating sludges and solutions.

The estimated cost to treat this waste stream is between $2.5 million to $6 million.

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.

Uncertainty exists regarding approval for treatment of this waste stream, including the preparation for treatment step, under the industrial wastewater permit for M Area. If approval is denied budget and schedules for the treatment of this waste stream will be impacted. SRS has received verbal agreement from SCDHEC to permit the preparation for treatment and treatment steps for this waste under an industrial permit step.

Other regulatory issues involving treatment and permit alternatives need to be resolved. Should SCDHEC determine that a Part B permit for container storage is required, increased cost and lengthened schedule will result.

Section 3.1.3 *Onsite Treatment in Planned Facilities*

3.1.3.1 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 stainless steel box in one of the existing canyon 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 09/30/94 is 10.2 m^3.
- Expected 1995-1999 volume will be 3.1 m^3.

Waste Stream Composition
- Uncategorized inorganic particulate

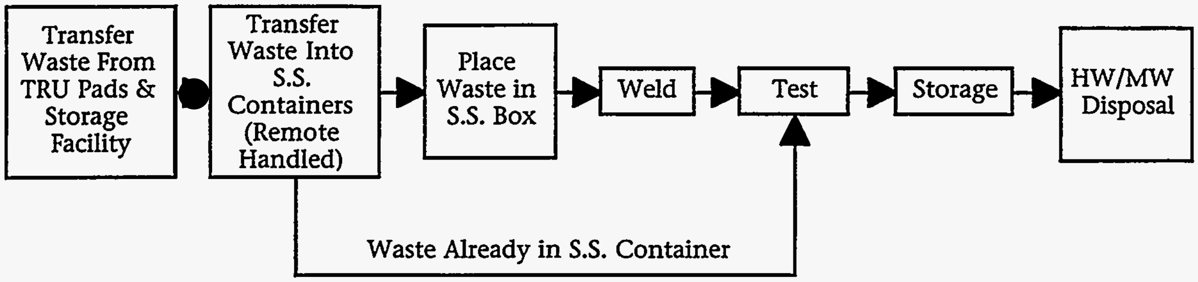
Waste Code
- Nonwastewater D011A (TCLP Ag)
- D008C (Elemental Pb)

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 judgment 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, treatment could be performed in a containment building at SRS where appropriate equipment is available to perform macroencapsulation in a stainless steel container by remote handling under conditions for maximum worker safety.

Treatment in a containment building will require compliance with Subpart DD of Part 264 or 265 of the RCRA regulations. SRS intends to request a modification of its RCRA Part A in order to immobilize this waste stream.

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 is simple to permit.

- The final wasteform is suitable for transport and disposal without additional treatment. Waste is highly radioactive and requires remote handling. Utilization of canyon facilities as a containment building increases safety through reduced exposure and management of the waste by experienced personnel.

Facility Status

A containment building uses a facility or part of a building which meets the design parameters set forth in 40 CFR Part 264 or Part 265, Subpart DD, to treat or store hazardous waste. This facility would have to be granted Interim Status and have the appropriate equipment installed. Portions of the 221-F and 221-H Canyon buildings are candidate facilities for this treatment since both facilities have ventilation and remote handling capability to perform the macroencapsulation.

Technology

Welding in a stainless steel container is a simple function the Separations facilities can do remotely.

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 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.

SRS proposed to carry out macroencapsulation in a canyon facility to utilize remote handling capabilities for this highly radioactive waste stream. SRS has requested Part A interim status expansion for the canyon facility as a containment building to perform macroencapsulation of this waste.

Preparation for Operation

Besides the conditions listed under Facility Status and meeting the design parameters set forth in 40 CFR Part 264 or Part 265, Subpart DD, a Waste Analysis Plan, operational procedures, a log book including compliance and inspection plans, and appropriate training would have to be completed.

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 $3 million and $7 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 approval of a RCRA Part A Expansion of Interim Status for the treatment of this waste. Approval of Part A lies with EPA. However, SCDHEC must agree for the purpose of the Site Treatment Plan. Denial of the Part A by EPA in favor of a Part B Permit application for treatment in a containment building or disagreement by SCDHEC for inclusion in the Site Treatment Plan will result in budget and schedule impacts for the treatment of this water and have a potential influence on the preferred option.

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 macroencapsulation of the existing container in a stainless steel box. Because this waste is a one-time generator and a small volume (i.e., a single custom made container) welding the box shut and verifying the integrity of the welds can take place in a maintenance facility. A regulatory discretion or treatability variance will need to be granted for this alternative treatment.

Background Information:

Waste is highly tritiated heavy water with a small amount of mercury that has been absorbed 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 silicon gel. However, there are no free liquids in this container.

Volume
- Current volume through 09/30/94 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, which is absorbed on silica gel, also contains 3 or 4 droplets of elemental mercury. 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 into another configuration 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. A white paper is being developed to show macroencapsulation of this waste protects the environment from mercury migration and leaving the waste in its container is the best solution, from a safety and health standpoint.

Facility Status

None

Technology

None

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 will develop a treatability variance on macroencapsulating the current package to meet the concentration based standard of 0.2 mg/l without TCLP testing. This small waste is in a safe storage configuration and is not an endangerment to human health and the environment. This waste went into storage prior to the LDR effective date, and the treatability variance has been deferred to a later time.

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

None

3.1.3.1.C SR-W062 Toxic Characteristic (TC) Contaminated Debris

3.1.3.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W062

The preferred treatment option for the Toxic Characteristic (TC) Contaminated Debris Macroencapsulation in Polymer by a Vendor. This option will share facilities with the preferred option.

Background Information:

This waste stream consists of non-combustible debris (metal, floor tiles, fluorescent light bulbs, broken thermometers, instruments, and other equipment) contaminated with mercury and radionuclides. Note this is a different stream from SR-W015 (Mercury/Tritium Contaminated Equipment). This waste requires a permitted TSD for treatment.

Volume
- Current volume through 09/30/94 is 6.2 m^3.
- Expected 1995-1999 generation volume will be 5 m^3.

Waste Stream Composition
- Inorganic debris

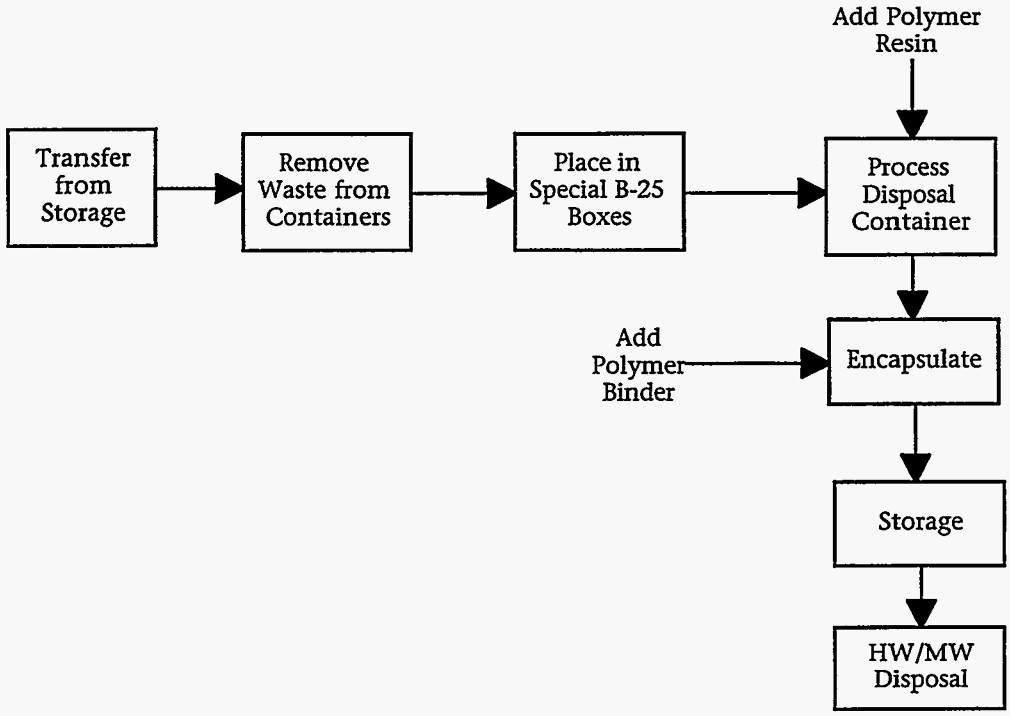
Waste Code
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg) Nonwastewater

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
- 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

3.1.3.1.C.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.

3.1.3.1.C.3 TREATMENT OPTION AND SUPPORT DATA

This option treats the constituent of concern, toxic characteristic metals, by encapsulating the contaminated waste in a corrosion-resistant box. The waste will be placed in a container and encapsulated with polymer.

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.

Facility Status

For waste in permitted storage, a containment building 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

EPA and 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.

3.1.3.1.C.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.

Uncertainty exists regarding approval of a RCRA Part B permit application for the treatment of this waste. Approval for Part B lies with EPA. However, SCDHEC must agree for the purpose of the Site Treatment Plan.

Future wastes, similar to this stream, are anticipated to be generated as a result of Transition and D&D activities.

3.1.3.2 VENDOR

3.1.3.2.A SR-W069 Low-Level Waste (LLW) Lead – to be Macroencapsulated

3.1.3.2.A.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 encapsulation 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 09/30/94 is 73.5 m^3.
- Expected 1995-1999 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)

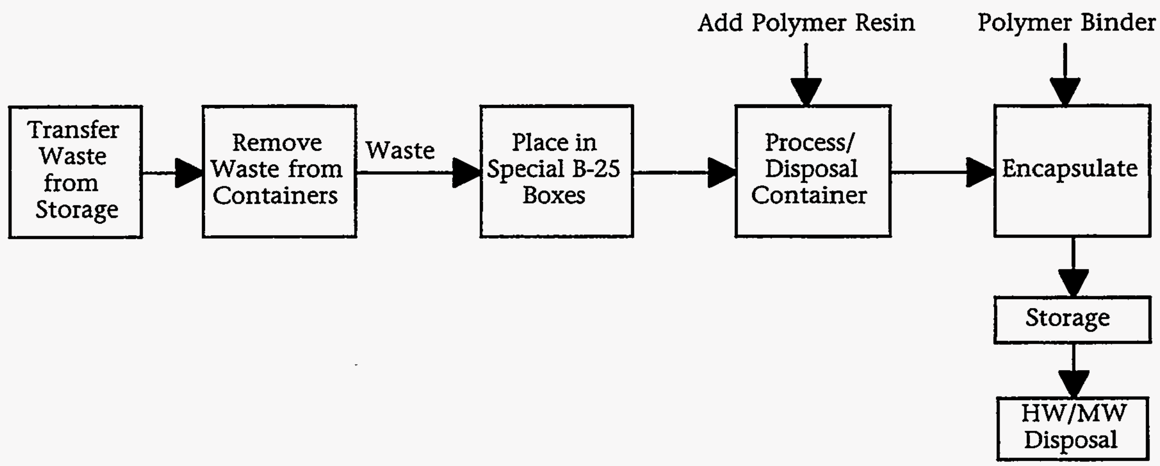
Waste Code
- D008A (TCLP Pb)
- D008B – (lead acid batteries)
- D008C – (elemental Pb)

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.A.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 is seeking approval from SCDHEC through the STP process to macroencapsulate this portion of the waste stream. Final approval for macroencapsulation of the lead acid battery component of the waste stream may have to be requested from EPA via a treatability variance application.

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 SCDHEC to macroencapsulate the small quantity of drained lead acid batteries rather than the lead acid batteries by the specified technology.

3.1.3.2.A.3 TREATMENT OPTION INFORMATION

A 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. SRS anticipates treatment and storage for macroencapsulation of this waste stream will be covered by a RCRA Part B permit.

3.1.3.2.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The estimated cost to treat this waste stream is between $12 million and $26 million.

Uncertainty Issues

SRS will request SCDHEC 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 09/30/94 is 82.2 m^3.
- Expected 1995-1999 generation volume will be 30 m^3.

Waste Stream Composition
- Elemental lead

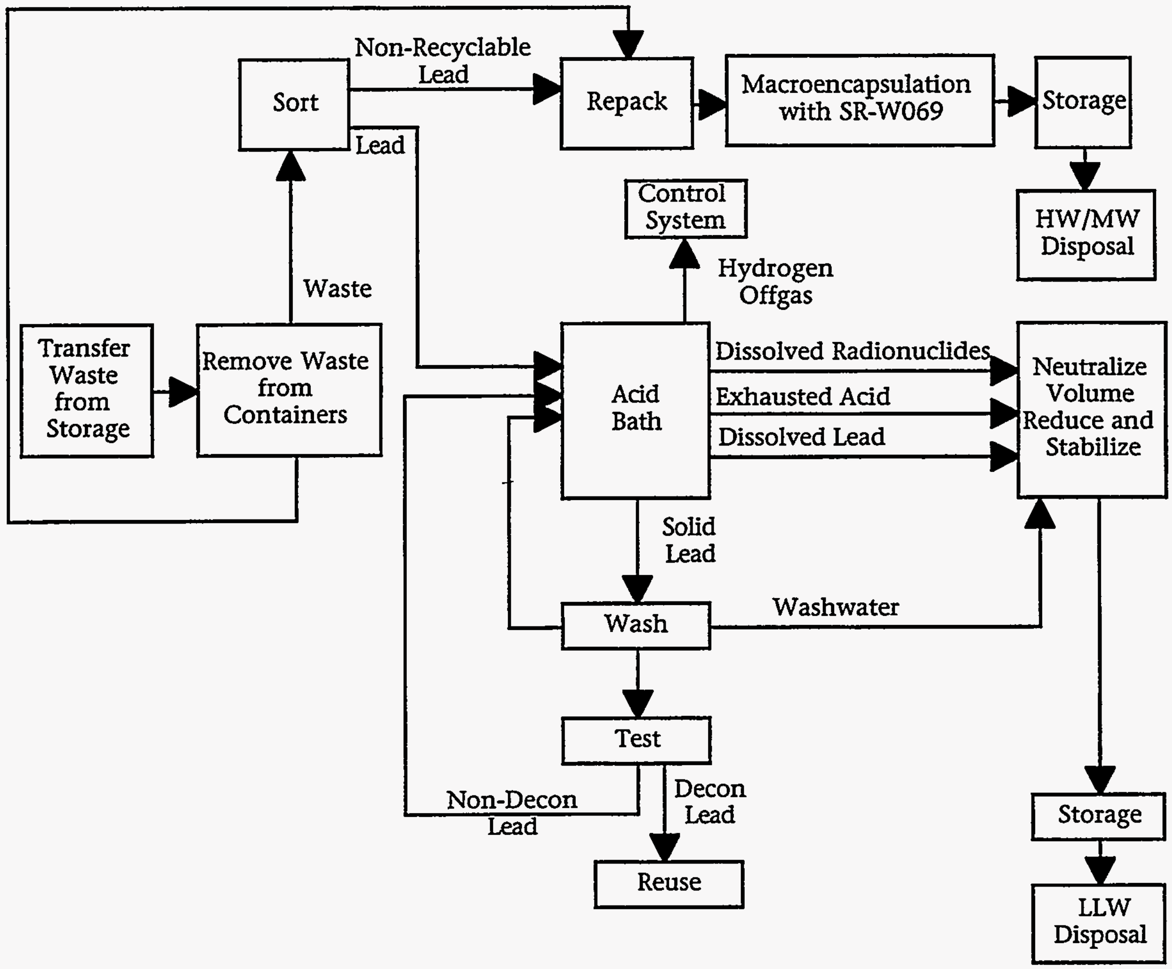
Waste Code
- D008C – (elemental Pb)

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 emitter (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. 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. Therefore, no treatment permits are required on the part of SRS. Since the material to be recycled has been declared a waste, there will be requirements for the proper labeling and transportation of the waste to the vendor for recycling. Waste generated from the recycling activities must be disposed 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, logistics of returning decontaminated lead to SRS, and wasteform of unusable lead generated from recycling.

Technology

Lead decontamination using an acid bath to remove the surface activated lead is a proven technology.

3.1.4.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

The treatment option represents a proposal submitted by a vendor. SRS is negotiating a contract with the vendor to initiate decontamination of this lead waste stream. Before recycling activities can begin, contract arrangements must be made which include budget approval.

The estimated cost to treat this waste stream is less than $650,000.

Uncertainty Issues

This technology is standard for decontaminating lead for re-use. However, the waste's radiation level in relation to the vendor treatment facility's WAC has not been fully analyzed.

Transportation of this waste stream to the offsite vendor for treatment raises questions not yet evaluated regarding approval by affected state agencies (e.g., receiving state and corridor states) and their stakeholders .

There is some uncertainty with an offsite option selection until completion of negotiations, administrative procedures, and verification of appropriate treatment are finalized.

Section 3.1.5 Offsite DOE Facilities

3.1.5.1 INEL WASTE ENGINEERING DISPOSAL 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 09/30/94 is 0.3 m^3.
- Expected 1995-1999 generation 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.

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 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 reduced to 1.2 m^3 from 1.4 m^3 when one 55-gallon drum of rinse material from this clean up was moved into waste stream SR-W041, due to waste matrix similarity.

Volume
- Current volume through 09/30/94 is 1.2 m^3.
- No future waste generation is expected as this was a one-time generation.

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.

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-W061 DWPF Mercury

3.1.5.1.C.1 GENERAL INFORMATION

Waste Stream Number: SR-W061

The preferred treatment option for the DWPF 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 is a future waste stream. This waste will be produced by the recovery of mercury from the DWPF vitrification of high level waste process. Mercury is introduced into the separations process as a catalyst in metal dissolution and eventually collects in the high-level liquid waste (reference streams SR-W016 and SR-W017).

Volume
- Current volume through 09/30/94 is 0.00 m^3.
- Expected 1995-1999 generation volume will be 0.9 m^3.

Waste Stream Composition
- Elemental Mercury

Waste Code
- D009D (elemental Hg)

LDR Treatment Standard
- D009 = specified technology = Amalgamation

Waste Characterization
- Process knowledge used to characterize the waste stream.
- Confidence level is high based on the waste composition being mercury.

Radiological Characterization
- Unknown, future waste

3.1.5.1.C.2 TECHNOLOGY AND CAPACITY NEEDS

Different DOE amalgamation units were evaluated and the 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

- 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

The INEL/WEDF – Amalgamation Unit is a planned and approved facility addition (i.e., conceptual design has been completed and funding approved for continued development of the facility).

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 small and has been incorporated into the cost reported under waste stream SR-W068 (Elemental (Liquid) Mercury).

Uncertainty Issues

This technology is the specified technology for treating mercury. Transportation of this waste stream to the INEL for treatment raises uncertainties regarding approval by affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

There is some uncertainty about an offsite option selection until completion of negotiations, administrative procedures, and verification of appropriate treatment are finalized.

Uncertainties exist for DOE sites regarding permitting status for treatment facilities slated to receive SRS wastes for treatment.

3.1.5.1.D SR-W068 Elemental (Liquid) Mercury

3.1.5.1.D.1 GENERAL INFORMATION

Waste Stream Number: SR-W068

The preferred treatment option for the Elemental (Liquid) *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 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).

Volume
- Current volume through 09/30/94 is 0.1 m^3.
- Expected 1995-1999 generation volume will be 0.2 m^3.

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

3.1.5.1.5.2 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.

3.1.5.1.5.3 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.

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

3.1.5.1.5.4 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 approval by affected state agencies (e.g., receiving state and corridor states) and their stakeholders.

There is some uncertainty about an offsite option selection until completion of negotiations, administrative procedures, and verification of appropriate treatment are finalized.

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 waste stream is Wet Oxidation in the DOE Mobile Reactive Metals Unit.

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 0.8 m^3.
- No future waste generation is expected. Off-specification material was stored in an Reactive 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

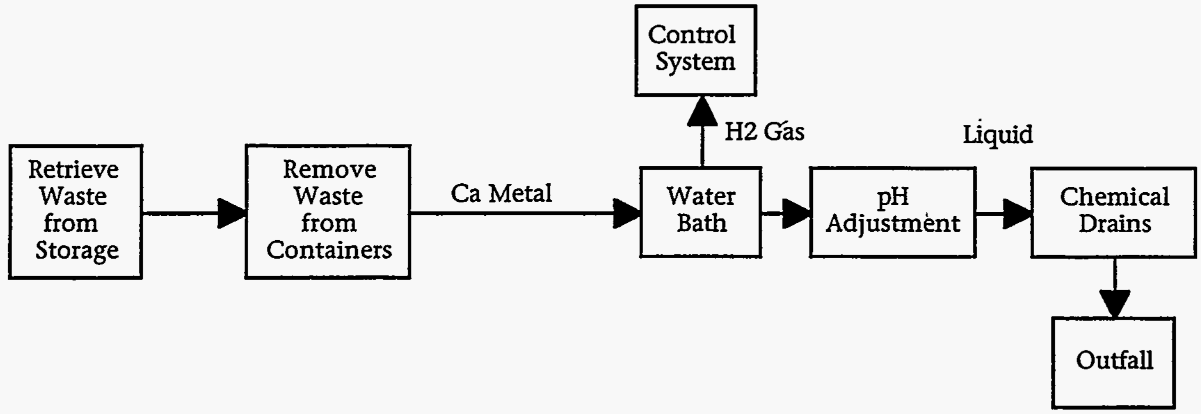
Waste Code
- D003D (water reactive) nonwastewater

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 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

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. SRS intends to request a modification of its RCRA Part A Permit Application in order to treat this waste stream.

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. No cost estimate or schedule is available.

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

The regulator status of a mobile, self-contained treatment facility has to be determined.

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

When the DOE mobile facility will begin to be constructed is uncertain.

Uncertainty exists regarding the permit approvals necessary for operation of the mobile treatment facility on site. If approval of a RCRA Part A Permit Application for the treatment of this waste is needed, the approval lies with EPA. SCDHEC must agree also in the content of the Site Treatment Plan. Unresolved concerns from EPA or SCDHEC will result in budget and schedule impacts for the treatment of this waste and have a potential influence by the preferred option.

Section 3.2 Waste Streams Requiring Technology Development

Section 3.2.1 DOE Mobile Treatment Facility Requiring Development

3.2.1.1 SR-W036 Tritiated Oil with Mercury

3.2.1.1.1 GENERAL INFORMATION

Waste Stream Number: SR-W036

The preferred treatment for Tritiated Oil with Mercury is treatment in a DOE Mobile Packed Bed Incinerator Unit.

Background Information:

This waste stream consists of used oil from pumps and compressors in the tritium facilities. The oil is contaminated with tritium and possibly 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 interferences. The possibility of mercury contamination has been established, but the concentrations have not been quantified.

Volume
- Current volume through 09/30/94 is 17.2 m^3.
- Expected 1995-1999 generation volume will be 2.2 m^3.

Waste Stream Composition
- Organic liquid

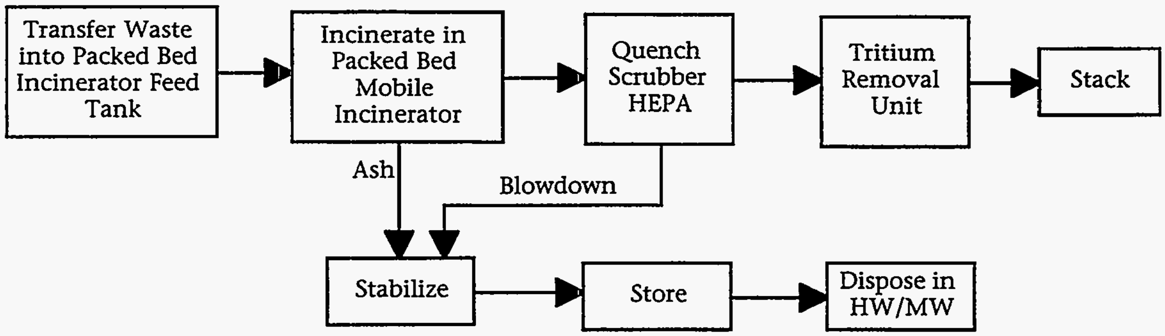
Waste Code
- D009E (hydraulic oil contaminated with Hg and radioactive materials)

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

3.2.1.1.2 TECHNOLOGY AND CAPACITY NEEDS



The DOE mobile packed incinerator burns the oil; captures the radioactive constituent of concern, tritium; collects the hazardous constituent, mercury, in the offgas scrubber effluent; and stabilizes it. High tritium oils are a problem if incineration of these oils creates large releases of tritium to the atmosphere; therefore, the DOE mobile packed bed incinerator will incorporate a method of controlling tritium releases to atmosphere.

3.2.1.1.3 TREATMENT OPTION INFORMATION

This technology incinerates the oil in a packed bed incinerator and captures the tritium released during the process. The hazardous constituent, mercury, will be vaporized in the incinerator; so it must be captured in the offgas scrubber and the scrubber effluent must be stabilized.

Incineration of the tritiated oil in a DOE mobile bed incinerator is preferred because:

- It is the preferred option of the DOE Option Analysis Team (OAT).
- Incineration in a packed bed incinerator should reduce the volume of waste going to disposal by 5:1.
- DOE mobile units will be designed to handle a variety of waste streams.
- That the treatment system is mobile will minimize the potential for exposure during transportation.
- This process has potential application in the commercial world.

Facility Status

This waste has been accepted for treatment by the Packed Bed Reactor (MD-S801) mobile unit. According to data from the Mound Plant, which is involved in the design of the unit, this reactor was originally intended for destruction of PCBs. The design appears to be capable of being adapted for treatment of oil contaminated with tritium. No research or design of a tritium control system for the Packed Bed Reactor exists to verify this assumption. Funding has not been approved for this project. No cost estimate or schedule is available.

3.2.1.1.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Development, design, and construction of the DOE mobile packed bed has not been funded by DOE. The estimated cost to operate the mobile facility at SRS is between $3 million and $7 million.

Uncertainty Issues

When the DOE mobile packed bed incinerator will begin to be designed and constructed is uncertain. The incineration system currently exists at Los Alamos National Laboratory as a bench-scale experimental unit, which is experiencing operation problems. The original concept of the packed bed incinerator was to burn PCBs; tritium capture has not yet been considered.

Uncertainty exists regarding the permit approvals necessary for operation of the mobile packed bed incinerator on site. If approval of a RCRA Part A permit application for the treatment of this waste is needed, that approval lies with EPA until SCDHEC is granted regulatory approval authority for Part A interim status expansion.

SCDHEC must agree also in the content of the Site Treatment Plan. Unresolved concerns from EPA or SCDHEC will result in budget and schedule impacts for the treatment of this waste and have a potential influence by the preferred option.

Before treatment for the oil can be addressed, analytical characterization of the oils needs to be performed. High tritium oils could not be characterized at SRTC due to tritium activities being higher than allowed for the SRTC labs. Reliable tritium assays for the oils are needed to ensure the waste oil does not exceed the design specification of the treatment or disposal facility. An analytical technique needs to be developed which will give reliable mercury concentration assays for high tritium oils. The technique needs to measure mercury in the elemental, ionic, and possibly organo-metallic form, and must be done in a manner which protects the technician from tritium assimilation.

Section 3.2.2 *Waste Stream Requiring Uranium Management Technology Development*

3.2.2.1 SR-W056 Job Control Waste with Enriched Uranium and Solvent Applicators

3.2.2.1.1 GENERAL INFORMATION

Waste Stream Number: SR-W056

The preferred treatment option has not been identified. A research program must be pursued to develop feasible options.

Background Information:

This waste stream is job control wastes such as plastic huts, protective clothing, contaminated metal tools, glass bottles, paper, etc., that were declared hazardous due to the likelihood of being mixed with solvent contaminated rags. The waste is contaminated with enriched uranium from the Naval Fuels (NF) Facility, which is no longer operational. The amount of enriched uranium is sufficient to cause concerns about criticality if treatment should cause the uranium to concentrate.

Volume
- Current volume through 09/30/94 is 260 m^3.
- No future waste generation is expected because the Naval Fuels manufacturing process which generated this waste, is no longer operational.

Waste Stream Composition
- Organic debris

Waste Code
- F001
- F002
- F003
- 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
- Alternative debris technology may be applied

Waste Characterization
- Process knowledge used to characterize the hazardous components of the waste stream.
- Confidence level is medium based on the use of process knowledge to characterize the hazardous components of the waste and the use of the mixture rule, declaring low-level job control waste mixed if it was suspected that solvent wipes could have been placed in the box or drum. The confidence level of the amounts of enriches uranium in the containers is high based on extensive documentation.

Radiological Characterization
- The 90-cubic foot boxes contain 146-246 grams of U^{235}.
- The 55-gallon drums contain 0-115 grams U^{235}.
- This waste is contact handled.
- Mixed low-level waste

3.2.2.1.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream meets the LDR definition for debris and can be treated by one of the alternative debris technologies or it can be treated to the concentration based treatment standard.

Although CIF will have spare capacity to treat other SRS wastes in addition to the design basis waste streams, the possibility of critical amounts of U^{235} accumulating in the ashcrete system disqualifies CIF as a treatment option. Other treatment and administrative alternatives must be pursued until they can be realistically evaluated to determine a preferred option.

Three possible methods for treatment of this waste exist:

1. Reprocess at a vendor to recover and reuse significant amounts of U^{235}.
2. Recharacterize the waste so that it can be handled as low-level waste.
3. Macroencapsulate in stainless steel over-pack containers.

Unlike treatments for other mixed waste streams, SRS is not currently in possession of sufficient information about the above options to make a realistic evaluation. Thus a research program must thoroughly investigate these options before IDOAs can be done and a preferred option selected. The total cost of researching the above options is estimated to be less than $2 million and would take about two years to complete.

3.2.2.1.3 TREATMENT OPTION AND SUPPORT DATA

3.2.2.1.3.1 Reprocess to Recover U^{235}

Option Support Justification

Reprocessing this material to recover the U^{235} would be done by a vendor. One or more vendors have the experience to extract and recover U^{235}.

Program Status

A program to determine the technological and administrative viability of vendor reprocessing of SR-W056 to recover U^{235} consists of these steps:

- Vendors with the capability to reprocess this material must be identified.
- Contact must be made with the vendors to determine their interest.
- Feasibility of sending SRS material to the vendor must be determined.
- Cost of reprocessing must be estimated.
- End-use of recovered material must be specified.
- Time to reprocess must be estimated.
- Disposal of residuals must be determined.
- Legal and regulatory ramifications must be determined.
- Expectations of regulators must be satisfied and concerns allayed.

Technology

Technology is now in use to recover U^{235} from scrap materials. Treatability demonstrations for this waste stream may have to be conducted, depending on its similarity to the materials the vendor's process is designed to handle.

Regulatory Status

The major permits required for this process must be determined.

Preparation for Operation

SRS Operations' role must be determined.

3.2.2.1.3.1 Recharacterize as Low-Level Waste

Option Support Justification

The data in the MWIR, which lead to the classification of this waste as mixed, were intended to be as conservative as possible. Recently, historical information has indicated that the solvents used with the job control waste were not F-listed materials. If chemical analyses and documentation can be obtained to show that the solvents used were not F-listed, but D001 ignitable materials, a strong case can be made to recharacterize this material. If samples of the job control waste do not fail the flash point test or other criteria, the waste would not be characterized as hazardous and could be handled as low-level waste.

Program Status

A recharacterization program would consist of these steps:

- Gather existing documentation on the solvents that may be present in this waste
- Interview personnel who generated this waste
- Determine analytical requirements and availability of analytical equipment
- Develop analytical techniques
- Develop a statistical sampling plan
- Sample and analyze the vapor space of the waste containers
- Prepare and present the recharacterization notice to SCDHEC
- Determine waste treatment options made feasible by recharacterization

Technology

Technology to sample and analyze the contents of waste containers is currently under development.

Regulatory Status

No major permits required for sampling and analysis have been identified.

Preparation for Operation

SRS Operations' role must be determined.

3.2.2.1.3.3 Macroencapsulation in Stainless Steel Over-pack Containers

Option Support Justification

Waste is currently in steel containers (55-gallon drums and B-25 boxes), which have a relatively short service live after disposal. Overpacking these containers in stainless steel boxes would prolong the integrity of the containment. Overpacking the existing containers without opening them has the added advantage of preventing any airborne spread of radioactivity.

Program Status

A program to determine the technological and administrative viability of macroencapsulating this waste by placing the existing containers in stainless steel overpacks would consist of these steps:

- Determine the number and size of overpacks needed
- Develop draft procedures for overpacking the waste containers
- Calculate the geometry of the disposal array of overpacked containers to reduce the probability of a critical incident to an incredible level
- Determine the administrative controls needed to ensure use of a geometrically favorable disposal container array in disposal operations
- Determine the impact on HW/MW disposal facilities and operations of disposing of this waste as a mixed waste
- Estimate the cost of overpacking and disposing of the overpacked wastes

Technology

Technology exists to overpack these waste containers and dispose of them safely.

Regulatory Status

The major permits required for this process must be determined.

Preparation for Operation

SRS Operations' role must be determined.

3.2.2.1.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

3.2.2.1.4.1 Reprocess to Recover U^{235}

Budget Status

Operating budget funds will be used to finance the research of this option. It is estimated that SRS will invest approximately 8000 manhours over a two-year period to determine the feasibility of vendor reprocessing. The cost of this part of the research program would be less than $600,000.

Actual cost to treat the waste stream must be determined.

Uncertainty Issues

Technology to reprocess U^{235} scrap exists. Uncertainties arise regarding the ability of a vendor to handle SRS material and regulatory requirements that affect use of a vendor's process for material recovery.

3.2.2.1.4.2 Recharacterize as Low-Level Waste

Budget Status

Operating budget funds will be used to finance the research of this option. It is estimated that SRS will invest approximately 6000 manhours over a one-year period to develop and implement a recharacterization program. The cost of the program would be less than $500,000.

Uncertainty Issues

Special sampling and analytical methods for vapor within a waste container are under development and have not been demonstrated. The analytical program must be developed both technically and administratively.

3.2.2.1.4.3 Macroencapsulate in Stainless Steel Overpack Containers

Budget Status

Operating budget funds will be used to finance the research of this option. It is estimated that SRS will invest approximately 10,000 manhours over an 18-month period to determine the feasibility of macroencapsulation by overpacking the existing containers in stainless steel boxes. The cost of this part of the research program would be less than $750,000.

Actual costs to treat the waste stream must be determined.

Uncertainty Issues

The requirements for avoiding criticality while handling and disposing of this waste must be determined. The impact of such requirements on operations may jeopardize the viability of this option.

Section 3.3 Low-Level Mixed 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 09/30/94 is 2744.8 m^3.
- 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 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)
- D003D
- D004A
- D006A
- D007A
- D008A
- D009A
- D011A (TCLP metals)
- D018-D019
- D022-D026 (characteristic organics)
- F001-F003
- F005A (halogenated and nonhalogenated spent solvents)
- P012
- P015
- P048
- P113
- P120 (acutely toxic commercial chemical wastes)
- U002

- U032
- U052
- U080
- U133
- U134
- U144
- U151
- U154
- U161
- U209
- U211
- U220
- U226
- U239 (commercial chemical wastes)

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 = 0.75 mg/LTCP-160 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 (macroencapsulated) to meet LDR requirements and disposed onsite. For the remaining MLLW portion, the acceptable treatment option (stabilization by vitrification) to meet LDR requirements could concentrate the TRU fraction equal to or greater than 100 nCi/g. Therefore, vitrified waste equal to or greater than 100 nCi/g will be considered for disposal at WIPP. Vitrified waste less than 100 nCi/g will be disposed onsite.

3.3.1.1.A.3 TREATMENT OPTION STATUS AND UNCERTAINTIES

<u>Budget Status</u>

Current plans are to construct a TRU Waste Certification/Characterization Facility (TWCCF) to characterize this waste stream. According to the WMEIS, the TWCCF will cost between $72 million and $101 million and operate 20 years. This facility is currently unfunded. Additional cost information can be found in Chapter 4, Section 4.1.B, of this volume.

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 explored 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 09/30/94 is 8.0 m^3.
- Expected 1995-1999 volume will be 308 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D001C (Ignitable)
- D003D
- D004A
- D006A
- D007A-D009A, D011A (TCLP metals)
- D018-19, D022-26 (characteristic organics)
- P012 (acutely toxic commercial chemical wastes)
- P015
- P048
- P113
- P120
- U002 (commercial chemical wastes)
- U032
- U052
- U080
- U133
- U134
- U144
- U151
- U154
- U161
- U209
- U211
- U220
- U226
- U239

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 (macroencapsulated) to meet LDR requirements and disposed onsite. For the remaining MLLW portion, the acceptable treatment option (stabilization by vitrification) to meet LDR requirements could concentrate the TRU fraction equal to or greater than 100 nCi/g. Therefore, vitrified waste equal to or greater than 100 nCi/g will be considered for disposal at WIPP. Vitrified waste less than 100 nCi/g will be disposed onsite.

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. According to the WMEIS, the TWCCF will cost between $72 million and $101 million and operate 20 years. This facility is currently unfunded. Additional cost information can be found in Chapter 4, Section 4.1.B, of this volume.

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.

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CHAPTER 4 TRANSURANIC MIXED WASTE

Section 4.1 Transuranic Mixed 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 with regards to mixed transuranic (MTRU) waste is to segregate MTRU wastes from mixed low-level wastes; to maintain the MTRU wastes in safe interim storage; to characterize, certify, 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 at WIPP. Compliance with the requirements of the Federal Facility Compliance Act (FFCAct) and the Resource Conservation and Recovery Act (RCRA) Land Disposal Restrictions (LDR) for MTRU waste will be achieved using the RCRA No Migration Petition (NMP) approach provided in the Code of Federal Regulations Title 40 Part 268.6.

Under this strategy, no treatment, other than that necessary to meet WIPP WAC is anticipated. However, DOE is undertaking a comprehensive systems prioritization method (SPM) approach to identify experiments, modeling, engineering design, and waste acceptance criteria (WAC) that are needed to support regulatory compliance. The SPM is designed to address regulator and stakeholder concerns early and throughout the process; to lead to a scientifically sound Performance Assessment (PA) in demonstrating regulatory compliance; and to be more efficient and cost-effective. The SPM process allows for total system analysis and comprehensive stakeholder input into regulatory compliance. The SPM, along with the performance assessment (PA), and the EPA No Migration Determination (NMD) will ascertain what treatments, if any, will be required to ensure disposal compliance.

DOE commits to begin discussions with involved regulatory agencies regarding potential alternative treatment options for MTRU waste in January 1998 if DOE fails to declare operational readiness for WIPP by that time, or at such earlier time as DOE announces a delay in the opening of WIPP substantially beyond January 1998 or at such time when ongoing analysis (SPM or performance assessment) demonstrates that LDR treatment will be required for disposal compliance. Once DOE and regulatory agencies have negotiated a schedule, DOE will submit modifications to the STPs for MTRU waste, no sooner than twelve months after agreement is reached.

DOE is actively gathering inventory and characterization data for input into the performance assessment and preparing several regulatory submittals to EPA to demonstrate compliance. The current plan is to submit a draft compliance certification package to EPA in March 1995, a No Migration petition to EPA by May 1995, a revised RCRA Part B Permit Application to the New Mexico Environment Department by June 1995, a final Compliance Certification Package (including final Performance Assessment results) to EPA by December 1996, and the final WIPP-WAC by June 1997. Disposal of contact handled (CH) TRU waste will begin in June 1998, followed by remotely handled (RH) TRU waste in June 1999. These dates are contingent upon permit approval, certification of disposal compliance, and determination of No Migration from the appropriate regulators and are subject to availability of funds.

In the interim, site-specific information is included in the section, "Site MTRU Waste Management Approach," to outline activities being performed at the Savannah River Site (SRS) to maintain safe, compliant storage, waste characterization activities, and other activities planned to support the ultimate goal of shipment to, and disposal at, WIPP.

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. Finally, SRS TRU waste is DOE defense-related TRU-type waste.

In 1970, the Atomic Energy Commission (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 for permanent storage, contamination free, within 20 years.

In 1974, the Savannah River Site (SRS) procedures for storing TRU waste were modified to reflect the Atomic Energy Commission (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 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 and 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. Efforts are underway to remove the rainwater from these drums and store the dewatered drums on TRU pads with weather enclosures to prevent further intrusion. Currently, 17 of 19 TRU pads at SRS are permitted 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 Transuranic Waste Management Plan recognizes the uncertainty in the current WIPP program and provides for 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" issues.

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 current 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, three 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.

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)	2744.8
SR-W026	Thirds/TRU Job Control Waste	67.0
SR-W027	Solvents/TRU Job Control Waste	4873.2
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g (MLLW managed as TRU)	8.0

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 waste will be sent to WIPP. The remaining mixed low-level component will be treated and disposed onsite. 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 in the *SRS Transuranic Waste Management Plan* that follows. In addition, SRS has developed In-Depth Option Analysis (IDOA) for the less than 100 nCi/g mixed low-level waste streams.

SRS Transuranic Waste Management Plan

The SRS Transuranic Waste Management Plan supports and is in alignment with National TRU Program initiatives. The *SRS Transuranic Waste Management Plan* identifies the specific activities necessary to safely store and manage TRU waste, including the developmental steps for potential treatment options. Execution of this plan should allow SRS to ship waste to the WIPP at the appropriate time.

Plan Assumptions

The *SRS Transuranic Waste Management Plan* 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 Transuranic Waste Management Plan* addresses the following key issues:

- SRS TRU Waste Management efforts 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), and an initial draft is expected early 1995. Final criteria defining characterization and waste certification requirements are not expected until 1996.
- The unavailability of adequate 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 *TRU Waste Management Plan* addresses the following activities and provides a path forward for resolution:

- Interim storage
- TRU waste retrieval
- Treatment studies
- Data collection
- 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 is developing 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. This Interim Strategy, which is still under development, is expected to be approved by DOE and implementation started early FY 95. In addition, excess facilities such as the SRS reactor buildings are being considered for storage of TRU and MTRU wastes. Achieving a longer term safety envelope is the basis for this consideration. Also, SRS plans to provide an overall mixed TRU Waste Storage Plan to South Carolina Department of Health and Environmental Control

(SCDHEC) in May 1995. This plan will include current mixed TRU waste inventories and future generation through the year 2000.

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, overpack, and restore the drums in a safe configuration under weather enclosures. In addition, an activated carbon filter will be inserted in the drum lids to prevent gas accumulation, and headspace samples will be taken to determine volatile organic compounds (VOCs) as part of a baseline waste characterization process. This project is funded under Line Item 90-D-176 and is a high priority. Drum retrieval is scheduled to start in late FY 97 or early FY 98.

Treatment Studies

The baseline assumption is that all TRU waste ($\geq$100 nCi/g) generated and stored at SRS will eventually be shipped to WIPP under the No-Migration Petition. The possibility exists that treatment will be required for TRU waste before shipment to the WIPP. This treatment may be required to meet LDR requirements or it may be required before shipping high activity (Plutonium-238) fraction waste to WIPP. Plutonium-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) vehicle. 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. Plutonium-238 represents 36% of the TRU waste volume at SRS and 68% of the total curies.

Treatment studies will be conducted to evaluate potential technologies for treating TRU waste so SRS waste can meet the LDR requirements. Treatment studies also 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. The Office of Technology Development (OTD) has funded several treatment activities at SRS including vitrification and plasma arc demonstrations. Both treatment technologies provide stable wasteforms and destroy organics and hazardous constituents. These technologies could allow SRS TRU waste to meet LDR requirements. Efforts are underway to develop a plasma arc demonstration using simulated TRU waste in FY95. Vitrification activities also are underway to show that this technology will work with these waste streams.

Furthermore, acid digestion technology is being developed that will destroy organics. Plans are to complete development of this technology in FY 96 provided funding is available. 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 also is assumed that WIPP will receive a No-Migration Petition and that SRS will be granted an LDR treatability variance for 10-100 nCi/g waste (if required).

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. SRS also is investigating the potential shipment of TRU waste to other DOE sites. These sites would certify and prepare this waste for eventual shipment to WIPP.

Data Recovery and Transcription

Plans are to transfer paper and electronic records, including the COBRA records, into the Waste Information Tracking System (WITS) database to allow easy data manipulation. WITS will be evaluated to determine its potential applications to future processing, characterization, certification, and transportation requirements. This program will be aligned with the *Container Management Plan* defined in Chapter 7. The upgrade of this data management system, including both hardware and software, will begin in FY 95.

TRU Waste Certification/Characterization

SRS wastes currently managed as TRU do not meet E-Area Vault, shallow-land, 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 equal to or 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. According to the Waste Management Environmental Impact Statement (WMEIS) the TWCCF will cost between $72 million and $101 million, and operate 20 years. This facility is scheduled to come on line in year 2007. 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 low-level mixed waste. This waste will be treated (if required) and disposal 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 disposal after characterization, and the remaining waste will require limited processing before final disposal in the WIPP. Containers such as drums will require minimal processing before waste characterization in the TWCCF and potential processing. 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 first assayed in the TWCCF using a box portal monitor and then opened, unless it is remotely-handled (RH) waste, by facility personnel. Remotely-handled (RH) waste boxes will be opened using remote manipulators and cranes. 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, sludges, liquid, job control waste, aerosol cans, etc. Remotely-handled (RH) waste will be handled remotely in a separate processing area. Waste types requiring processing such as solidifying sludges and liquids 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 of 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, head-gas sampling, repackaging records, etc. Based on the characterization data, each waste container will be sent to a treatment process (e.g., macroencapsulation or vitrification), beneficial recycle/reuse, WIPP disposal, RCRA disposal, or low-level vault disposal. WIPP is schedule to startup in 1998. Below are several cost estimates (FY 94 dollars) for characterizing and disposing current inventories and projected generation according to the WMEIS.

- Waste sort and assay - $131.4M
- Disposal at WIPP - $203.9M
- Vitrification - $186.5
- Direct vault disposal of LLW portion - $1.3K per m^3

<u>Alpha Vitrification Facility</u>

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 the 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 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, Shallow Land Disposal Facility, or the Waste Isolation Pilot Plant (WIPP).

According to the WMEIS AVF will have the capacity to treat approximately 400 m^3 of waste per year for 18 years. The AVF is in the pre-conceptual phase of development and is unfunded. Estimates are the AVF will cost between $202 million and $282 million to construct.

Containment Building

A containment building is proposed that will be used to prepare waste for treatment or direct disposal in RCRA facilities. This facility will process both newly generated and stored mixed wastes. The waste types entering this facility will include glass and metal debris, bulk, lead heterogeneous debris, and inorganic and organic debris.

The Containment Building will consist of five processing bays. These bays are Container Open and Sort, Size Reduction, Decontamination, Macroencapsulation, and Repackaging and Characterization. Waste will be processed through each bay if needed.

The Container Open and Sort Bay will provide equipment to open mixed waste containers, remove the waste, and sort it. This bay will have container opening equipment, sorting tables, gloveboxes, etc. The Size Reduction Bay will include equipment such as shredders, shears, bandsaws, etc. This equipment will size reduce waste to facilitate subsequent processing. The Decontamination Bay will have equipment for activities such as degreasing, washing down equipment with water, and carbon dioxide (CO_2) pellet blasting. The wasteforms generated from decontamination activities will be classified as low-level waste or low-level mixed waste. The Macroencapsulation bay will have equipment to package debris waste in stainless containers (welded closed) and to macroencapsulate lead by surface coating. Macroencapsulation of some wasteforms will permit direct disposal of this waste in RCRA disposal facilities. The Packaging Bay will have equipment to repackage waste for final disposal in RCRA facilities or treatment. Liquid wastes generated in the decontamination bay will be treated onsite.

According to the WMEIS, the Containment Building will have the capacity to process 3000 m^3 of waste per year for 20 years. This building is in the pre-conceptual phase of development and is unfunded. Estimates are the Containment Building will cost between $120 million and $168 million to construct and will come on line 2006.

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. Further characterization of this waste is needed.

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 treated (macroencapsulated) to meet LDR requirements and disposed onsite. For the remaining MLLW portion, the acceptable treatment option (stabilization by vitrification) to meet LDR requirements could concentrate the TRU fraction equal to or above 100 nCi/g. Therefore, vitrified waste equal to or above 100 nCi/g will be considered for disposal at WIPP. Vitrified waste less than 100 nCi/g will be disposed onsite.

TRU Plan Flow Chart

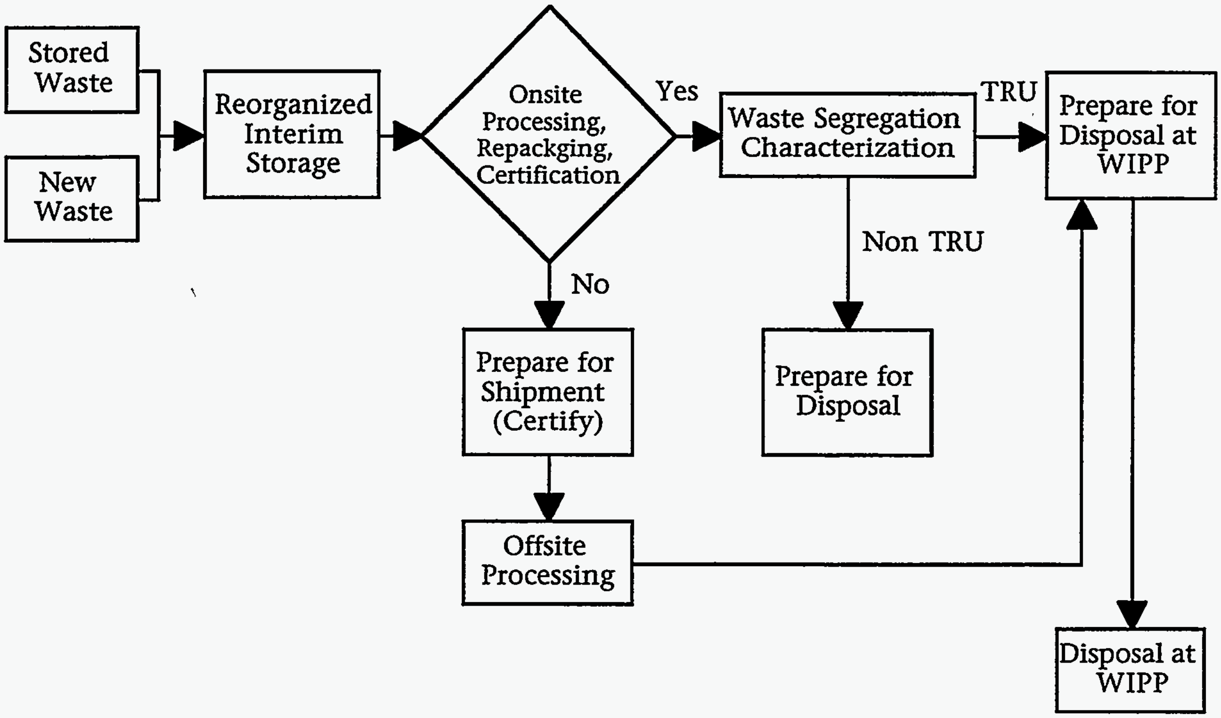
A flow chart has been developed that outlines waste activities identified in the *TRU Management Plan*. This flow chart follows the planned TRU waste activities listed below:

- TRU waste in mounded storage will be retrieved and placed in reconfigured storage.
- TRU waste storage configurations will be entered into the WITS data management system.

- TRU waste packages that meet transportation requirements but require processing to meet WIPP-WAC may be sent to other non-SRS facilities for processing.

- 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 both for the LDR component of the waste and for possibly stabilizing the TRU isotopes which may be required for shipment and disposal.



4.1.1 *TRU Mixed Waste Streams Proposed for Shipment to WIPP*

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 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 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 09/30/94 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 TRU Waste Management Plan* in Section 4.1.B of this document.

4.1.1.1.A.3 TREATMENT OPTION INFORMATION

Please see the *TRU Waste Management Plan* in Section 4.1.B of this chapter.

4.1.1.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

A TRU Waste Certification/Characterization Facility (TWCCF) is planned that will characterize this waste stream. Estimates are the TWCCF will cost between $72 million and $101 million and will operate 20 years. This facility is unfunded. Preparation of SRS TRU waste for shipment to WIPP will cost approximately $328 million. WIPP disposal will cost approximately $204 million.

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.

Volume
- Current volume through 09/30/94 is 67 m^3.
- Expected 1995-1999 volume will be 241 m^3.

Waste Stream Composition
- Organic debris

Waste Code
- D001C (Ignitable)
- D003D
- D004A (TCLP Ag)
- D006A
- D007A-D009A
- D011A
- D018-D019 (characteristic organics)
- D022-D026
- P012 (acutely toxic commercial chemical wastes)
- P015
- P048
- P113
- P120
- U002 (commercial chemical products)
- U032
- U052
- U080
- U133
- U134
- U144
- U151
- U154
- U161
- U209
- U211
- U220
- U226
- U239

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
- Contains Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241}, U^{233}, H^3, Co^{60}, Cs^{137}, and other isotopes (transuranics and alpha emitters)
- Waste is contact 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 TRU Waste Management Plan* 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 TRU Waste Management Plan*. 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 TRU Waste Management Plan* in Section 4.1.B of this chapter.

4.1.1.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

A TRU Waste Certification/Characterization Facility (TWCCF) is planned that will characterize this waste stream. Estimates are TWCCF will cost between $72 million and $101 million and will operate 20 years. This facility is unfunded. Preparation of SRS TRU waste for shipment to the WIPP will cost approximately $328 million. WIPP disposal will cost approximately $204 million.

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 waste materials 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 09/30/94 is 4873.2 m^3.
- 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 (Ignitable)
- D003D
- D004A (TCLP metals)
- D006A
- D007A-D009A
- D011A
- D018-D019 (characteristic organics)
- D022-D026
- F001-F003, F005A (halogenated and nonhalogenated spent solvents)
- P012 (acutely toxic commercial chemical wastes)
- P015
- P048
- P113
- P120
- U002 (commercial chemical wastes)
- U032
- U052
- U080
- U133
- U134
- U144
- U151
- U154
- U161
- U209
- U211

- U220
- U226
- U239

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.
- Contains Pu^{238}, Pu^{239}, Pu^{240}, Pu^{241}, Pu^{242}, Am^{241}, U^{233}, H^3, Co^{60}, Cs^{137}, and other isotopes.
- 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 TRU Waste Management Plan.* There are no technology or capacity needs to discuss at this time.

4.1.1.1.C.3 TREATMENT OPTION INFORMATION

Please see the *TRU Waste Management Plan* in Section 4.1.B of this chapter.

4.1.1.1.C.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

A TRU Waste Certification/Characterization Facility (TWCCF) is planned that will characterize this waste stream. Estimates are TWCCF will cost between $72 million and $101 million and will operate 20 years. This facility is unfunded. Preparation of SRS TRU waste for shipment to the WIPP will cost approximately $328 million. WIPP disposal will cost approximately $204 million.

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 Transuranic Mixed Waste Stream Proposed for IDOA

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 09/30/93 = 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
- D004A (TCLP As)
- D005A (TCLP Ba)
- D006A (TCLP Cd)
- D007A (TCLP Cr)
- D008A (TCLP Pb)
- D009A (TCLP Hg)
- D010A (TCLP Se)
- D011A (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.

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 correspondence from Rocky Flats, this waste stream is:

> "...technical 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 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.

CHAPTER 5 HIGH-LEVEL MIXED WASTE

Section 5.1 High-Level Mixed 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 09/30/94 is 53,800 m^3.
- Expected 1995-1999 volume will be 5464 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002C (corrosive high-level waste)
- D005B (high-level waste Ba)
- D007B (high-level waste Cr)
- D008D (high-level waste Pb)
- D009F (high-level waste Hg)
- D011B (high-level waste 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^{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 are sent to the high-level waste tank farm, and are 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

<u>Budget Status</u>

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

Uncertainty Issues

Applicability of additional evaluation under the National Environmental Policy Act (NEPA) creates uncertainty related to budget and schedule for this treatment option. SRS is reevaluating the DWPF through a Supplemental Environmental Impact Statement to assess any additional environmental risks in light of modifications made to DWPF to improve efficiency and reduce risk factors. The results of this reassessment could dictate additional modification in the design or operation of the DWPF.

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 09/30/94 is 73,240 m^3.
- Expected 1995-1999 volume will be 9,970 m^3.

Waste Stream Composition
- Aqueous liquid

Waste Code
- D002C (corrosive high-level waste), D005B (high-level waste Ba), D007B (high-level waste Cr), D008D (high-level waste Pb), D009F (high-level waste Hg), D011B (high-level waste 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^{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 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.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 are sent to the high-level waste tank farm are 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

Applicability of additional evaluation under the National Environmental Policy Act (NEPA) creates uncertainty related to budget and schedule for this treatment option. SRS is re-evaluating the DWPF through a Supplemental Environmental Impact Statement to assess any additional environmental risks in light of modifications made to DWPF to improve efficiency and reduce risk factors. The results of this reassessment could dictate additional modification in the design or operation of the DWPF.

Section 5.1.2 HLMW Treated Onsite in Existing Facilities

5.1.2.1 WASTE STREAMS REQUIRING PREPARATION BEFORE VITRIFICATION

5.1.2.1.A SR-W050 Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations

5.1.2.1.A.1 GENERAL INFORMATION

Waste Stream Number: SR-W050

The preferred treatment option for the Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations is treatment in the "SRTC 90-day Containment Building" by Vitrification in the STRC small scale vitrification unit.

Background Information:

This waste is generated by laboratory research, development and analytical programs at the SRTC to support the DWPF operations. Waste comes from demonstrations of the DWPF and ITP process samples to support DWPF operations.

Volume
- Current volume through 09/30/94 is 0.1 m^3.
- Expected 1995-1999 volume will be 0.4 m^3.

Waste Stream Composition
- Organic sludge/particulate

Waste Code
- D007B (high-level waste Cr)
- D009F (high-level waste Hg)
- D018 (benzene) nonwastewater

LDR Treatment Standard
- D007B, D009F = specified technology = Vitrification of high-level mixed radioactive wastes
- D018 = concentration based standard = 10 mg/kg

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

Radiological Characterization
- Total activity is <1000 uCi/g.
- Beta/gamma emitters (Cs^{137} and Sr^{90}) are present.
- Waste is remote handled.
- High-level waste.

5.1.2.1.A.2 TECHNOLOGY AND CAPACITY NEEDS

This waste stream is a combination of laboratory waste generated from DWPF Tank Farm analyses and laboratory waste to be generated in the future from routine quality assurance and quality control activities to be performed by SRTC for the ITP Facility. The existing SRTC 90-day Containment Building will be utilized to carry out the preferred treatment option. Budgeting will be a routine part of the normal operating activities for SRTC.

The future samples will originate at the ITP Facility during a step to prepare the high-level liquid waste for vitrification at the DWPF. Because of the source of the waste, these samples are highly radioactive and require remote handling. In addition, once the samples have been collected and the Quality Assurance and Quality Control testing completed, there is no practical and safe method of reintroducing them into the tank farm or the ITP Facility without dissolving the precipitated solids and render the waste RCRA non-hazardous. SRTC can further treat these samples by neutralization, chemical oxidation, and ion exchange to meet the LDR standards and offer proper protection to workers with its remote handling equipment and shielded laboratories. Residues will be vitrified.

5.1.2.1.A.3 TREATMENT OPTION INFORMATION

Regulatory Status

Such treatment action is done in the SRTC Containment Building in which the waste is treated within 90 days of the generation date. Notification of the intent to treat in the containment building was provided to EPA Region IV on August 6, 1992.

5.1.2.1.A.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Costs for operating the SRTC 90-day Containment Building for processing the mixed waste to support high-level waste processing demonstrations is $23,200 per year. This figure is based on processing one batch per month, using 16 operator hours for the process, facility, and costs of chemicals.

The estimated cost to treat this waste stream is less than $100,000.

5.1.2.1.B SR-W058 Mixed Sludge Waste with Mercury from DWPF Treatability Studies

5.1.2.1.B.1 GENERAL INFORMATION

Waste Stream Number: SR-W058

The preferred treatment option for the Mixed Sludge Waste with Mercury from DWPF Treatability Studies waste stream is treatment as 90-day generator at SRTC followed by vitrification.

Background Information:

This waste stream consists of high-level waste supernate, sludge, and salt samples from the tank farm and mercury contamination generated during DWPF treatability studies. The waste mercury sludge has dried and caked onto eight centrifuge tubes and a glass bottle. The waste is stored in a satellite accumulation area metal can in a shielded cell at SRTC. The waste stream was reported incorrectly as mixed low-level waste in the final Mixed Waste Inventory Report; it is actually high-level waste. Analysis has shown that mercury contamination is sufficiently low enough to allow acid dissolution followed by mercury separation with aqueous waste going to the High-Level Waste Tank Farm for processing in the DWPF. If high-level vitrification is not the preferred process for this small quantity of waste, SRS will need to request DHEC to approve an alternative treatment.

Volume
- Current volume through 09/30/94 is 0.1 m^3.
- No future waste generation is expected (one time generation).

Waste Stream Composition
- Organic debris – glass

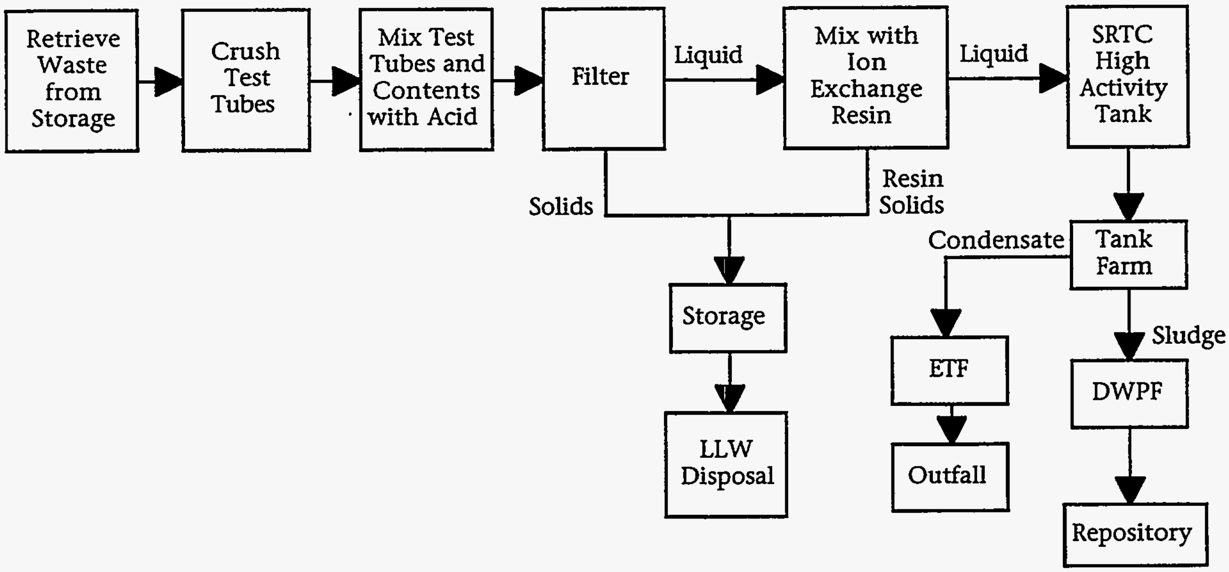
Waste Code
- D009F – (high-level waste Hg) nonwastewater

LDR Treatment Standard
- D009F = specified technology = Vitrification of high-level mixed radioactive wastes

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

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

5.1.2.1.B.2 TECHNOLOGY AND CAPACITY NEEDS



One possible process flowsheet to treat this waste is shown above. The D009F waste code for this waste stream has a specified technology of vitrification of high-level mixed radioactive waste.

5.1.2.1.B.3 TREATMENT OPTION INFORMATION

Option Support Justification – IDOA Performed

- Capacity exists at the Savannah River Technology Center to treat the waste stream.
- Treatment at the satellite location requires remote handling of the waste, thus reducing worker exposure risk
- Treatment at the satellite area (and in a 90-day Containment Building) eliminates permit requirements.

Regulatory Status

Because the waste is in a satellite accumulation area, the waste can be treated in a 90-day accumulation area, administered under RCRA Sec. 262.34, without a permit.

5.1.2.1.B.4 TREATMENT OPTION STATUS AND UNCERTAINTIES

Budget Status

Budget impact for treating this waste stream should be administered as a part of the SRTC operating budget.

The estimated cost to treat this waste stream will accompany the treatment proposal.

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 which did not undergo any in-depth options analysis. 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. Deactivation activity may also generate future wastes, but the volumes have not yet been determined. SR personnel are working to define deactivation.

Section 6.1 Environmental Restoration Waste

The SRS Environmental Restoration (ER) Mission is to clean up inactive waste sites and decommission surplus facilities to ensure 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. This program will be accomplished over a 30-year period. 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, 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 RCRA permit, closure and groundwater corrective action requirements, settlement agreements, and consent orders. Known mixed wastes for which a cleanup decision is scheduled within the next five years and for which treatment in accordance with the Resource Conservation and Recovery Act (RCRA) LDRs may be required, are identified below for general planning purposes. Due to the uncertainty of how these ER wastes ultimately will be managed, their inclusion into the Plan Volume of this Site Treatment Plan (STP) (and therefore the specification of how and when they will be treated) will not occur until a final cleanup decision (i.e., Comprehensive Environmental Response Compensation and Liability Act (CERCLA) ROD or equivalent document) has been reached. This final decision will be made in compliance with applicable statutory/regulatory requirements and, where appropriate, established schedules in existing compliance agreements/orders.

One element of the ER program is the investigation of waste units. Environmental investigations typically employ activities such as drilling and excavating, which produce investigation byproducts. These byproducts may include purge water, drill cuttings, drilling fluids, well development water, decontamination solutions, and personal protective equipment (PPE). 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 for these potentially contaminated by-products is Investigation Derived Waste (IDW).

An *Investigation Derived Waste Management Plan* is under development to describe how IDW generated during characterization and assessment activities will be managed. Two programs exist under this management plan; management of IDW derived from listed hazardous waste sources and management of IDW derived from nonlisted (hazardous characteristic only) sources. For those wastes derived from listed hazardous waste sources, finalization of this section of the management plan will be contingent upon promulgation of a proposed rule regarding petitions for "contained-in" determinations so that environmental media may be excluded from management as a hazardous waste. The EPA "contained-in" policy requires media which contains a listed hazardous waste to be managed as if it were a hazardous waste. IDW from nonlisted sources is categorized as purge water resulting from groundwater sampling or investigation byproducts resulting from waste site investigation activities. Purge water from individual wells with constituent concentrations (hazardous and radiological, with the exception of tritium) exceeding 10 times the established health based levels (HBLs) will be containerized and treated at existing SRS treatment facilities such as the F-Area/H-Area Effluent Treatment Facility (F/H ETF). Purge water from listed sources has not yet been removed as the site is developing an in-depth options analysis and a path forward in treatment. Solid and slurry byproducts, including contaminated PPE, from investigation activities with constituent concentrations exceeding proposed RCRA Subpart S action levels, will be managed as IDW at the waste unit within the area of contamination (AOC) until remediation or dispositioning under a final ROD. A flowchart illustrating the IDW management strategy is shown in Figure 6.1. Implementation of the *IDW Management Plan* as written should result in little or no mixed waste generation. Since the *Draft Site Treatment Plan*, ER has developed four general IDW waste stream records per the Mixed Waste Inventory Report.

SR-W064 IDW Soils/Sludges/Slurries: This ER waste stream includes soil cuttings, drillings, turbid development water, etc., with soil being the matrix of the waste. Depending on the site of the remediation activity, metal and organics may be present. Radionuclides also will vary according to remediation source. The SRS ER Department will take soil samples from surface and down to 20 feet with hand auger coring devices. Approximately 60 monitoring wells per year will be installed with mud rotary drilling rigs.

SR-W065 IDW Monitoring Well Purge/Development Water: Wastewater from monitoring wells where the unit is managed as having a listed waste (i.e., comes from a contained-in petition area). When a monitoring well is installed, water is pumped until the water discharge is clear (i.e., well development water). When the well is sampled, two volumes of water are purged before the sample is taken.

SR-W066 IDW Steel and Metal Debris: Tools and equipment used in the insertion of sampling devices into soils and sediments of waste sites to obtain samples of said soils and sediments, then to transfer samples into containers appropriate for transportation. Examples include drill bits, split spoons, and augers.

SR-W067 IDW Personnel Protective Equipment (PPE) Waste: This waste stream includes plastic glovebox (PVC), plastic film (polyethylene, polypropylene), coveralls (PVC, Tyvek) gloves, shoe covers, and associated waste. Waste matrix includes paper, cloth, plastic, and wood. As with the other four IDW streams, radiological levels and hazardous constituent levels depend on the source location.

These waste summaries are a summary of the MWR waste record and provide a general overview of the potential mixed waste generated by ER activities. These records are not to preclude the record of decision (ROD) process, but give an overview of ER activities and its potential to generate mixed waste.

The values presented in Table 6.1.1 are preliminary estimates because of the nature of the ER program. Without comprehensive data on contaminant types and concentrations combined with operational information for specific response actions, the types and volumes of waste that will be generated can only be roughly estimated. Table 6.1.1 supplies an estimate and projection of mixed waste that may be generated by SRS ER activities. These values have been adjusted and updated.

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 soil, sludge, and liquids will result from cleanup activities such as excavation, dredging, and pumping at these sites. Many remediation sites are currently in the assessment phase, so the nature and extent of contamination has not yet

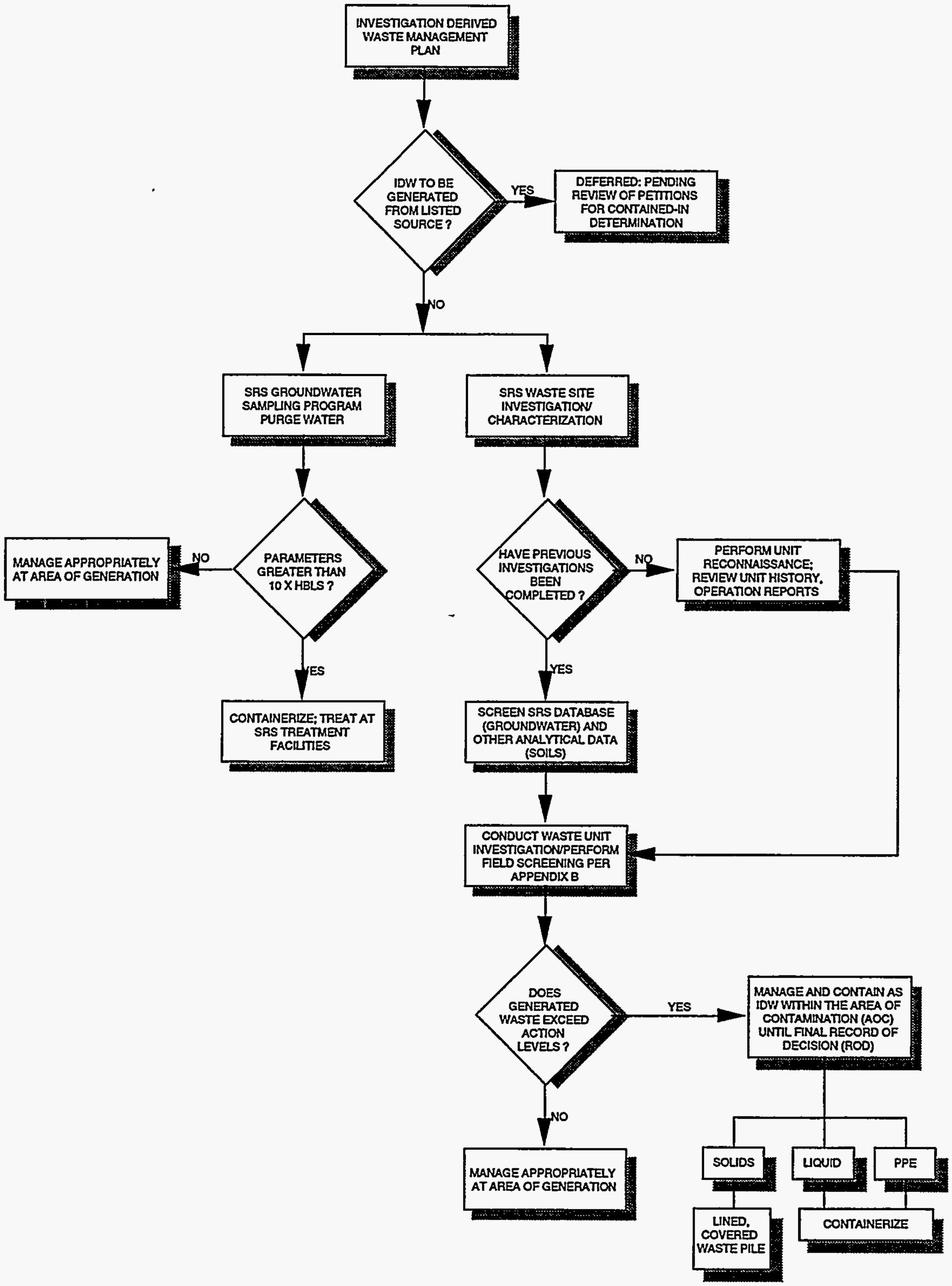


Figure 6.1 – Investigation Derived Waste Management Strategy

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 sites 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.

Because this information is not available for ER, the waste inventories and projections in this report are based on generally conservative assumptions. 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 6.1.1. The identification of new mixed waste streams resulting from ER activities will occur after a decision document such as a 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, insufficient detail is available 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.

For the reasons discussed above, the volumes projected for the ER sites are estimates only. The volume of mixed waste generated is also dependent upon the funding available to begin environmental restoration activities, in a given year, that could subsequently generate mixed waste. 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 waste that is subject to LDR varies according to the remedy selected; for example, in situ treatment will not generate mixed waste 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.

Table 6.1.1 – Estimated Mixed Generation at Environmental Restoration Sites

Calendar Year	Source Location	Waste Stream	EPA Waste Code/Isotopes	Volume
1994	Burial ground complex	Soil samples, clothing	Metals, analysis needed/Am^{241}, Cd^{137}, Cs^{137}, Pu^{238}, Sr^{90}, U^{235}, H^3	80 m^3 total waste stream volume for the year
	Burial ground monitoring wells	Purge water	Analysis needed/U^{238}, Cs^{137}, H^3	
	Old burial ground solvent tanks	Sludge, soil, equipment, tools, clothing	Metals and organics/many isotope types	
	L-Area Oil & Chemical Basin	Sludge, soil, clothing, tools	Organics, analysis needed/U^{235}, U^{238} and other fission byproducts	
	Misc. other waste units	Purge water and IDW soils/solids	Analysis needed	980 m^3
1995	Burial ground monitoring wells	Purge water	Analysis needed/U^{238}, Cs^{137}, H^3	50 m^3 total waste stream volume for the year
	Old burial ground solvent tanks	Sludge, soil, equipment, tools, clothing	Metals, organics/many isotope types	
	Separations Equipment Development Lab	to be determined	Metals/Pu^{239}, U^{235}	
	Misc. other waste units	Purge water and IDW soils/solids	Analysis needed	847 m^3
1996	Burial ground monitoring wells	Purge water	Analysis needed/U^{238}, Cs^{137}, H^3	50 m^3 total waste stream volume for the year
	Old burial ground solvent tanks	Sludge, soil, equipment, tools, clothing	Metals, organics/many isotope types	
	Separations Equipment Development Lab	to be determined	Metals/Pu^{239}, U^{235}	
	Misc. waste units	Purge water and IDW soils/solids	Analysis needed	592 m^3
1997	to be determined	to be determined	To be determined	60 m^3 (estimated and extrapolated from previous years)
	Misc. waste units	Purge water and IDW soils/solids	Analysis needed	610 m^3
1998	Misc. waste units	Purge water and IDW soils/solids	Analysis needed	638 m^3

Mixed waste expected to be generated by ER actions are listed in the SRS LDR Federal Facility Compliance Agreement (LDR FFCA). Mixed waste generation estimates as developed for the WM-EIS planned case are listed in Table 6.1.1 at the end of this section. 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. It has purposefully been made conservative. For example, purge water is listed as a future mixed waste, although purge water is IDW and is expected to be managed according to the IDW Management Plan, which will result in little or no mixed waste generation.

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. 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. Neither of these facilities has been characterized, and 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.

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. The D&D Forecast covers a thirty-year time period. However, only a five year forecast is included to be consistent with other PSTP 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 1999.

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. Systems Engineering will update the forecasts 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).

Assumptions

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 1995 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 maintènance (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 1995 through 1999. The five-year forecast was developed from consideration of wastes generated from D&D of 53 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.

1995 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)* (C)	20230	21380(a)	10110	35920	37560	0
230	H	Demonstration Waste Incinerator (C) (b)	2310	2150**	920	4620	6600	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 1995	272390	100470	67110	115150	53350	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
† These are concrete structures. After the breakers have been removed, there should be little or no RCRA or TSCA waste.

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) (a)	20230	21380-	10110	35920	37560	0
230	H	Demonstration Waste Incinerator (b)	2310	2150	920	4620	6600	0
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 1996	123370	56170	35700	90630	46000	39000

* assume 13500 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 fuel UST; estimate includes equipment removal and decon only

1997 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 1997	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

1998 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 1998	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

1999 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 1999	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

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CHAPTER 7 STORAGE

DOE is committed to storing mixed waste in compliance with RCRA storage requirements in 40 CFR 264 or 40 CFR 265 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 are either current stored wastes, or they will 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 requires notification to regulators of the generation of new LDR waste streams and estimates of future generation of LDR wastes. The LDR-FFCA formalizes a plan for the mixed waste treatment facilities and includes schedules, permitting requirements, and compliance issues. The LDR-FFCA has been 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 is signed and becomes effective.

Section 7.1 Existing SRS Mixed Waste Storage Capacity

Mixed waste falls into three categories as mixed low-level waste (MLLW), mixed transuranic (TRU) 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 (Building 643-43E is completed but not yet operating). These facilities have either been approved for interim status under RCRA Part A or permitted by a RCRA Part B Permit. Additional interim status storage space has been requested from SCDHEC (see 7.2.2).

Each of these storage facilities is described in Section 7.1.1.3, Description of MLLW Facilities. Table 1, titled, "Mixed Low-Level Waste – 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

In addition, some MLLW is stored on TRU pads 6 through 13.

The Consolidated Incineration Facility (CIF) container and tank storage areas are not included as they are not currently in use. These areas are currently under construction, although these areas are not intended to be long term storage facilities. Waste will be temporarily stored in these areas while it is awaiting incineration, storage, disposal at 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 planned to undergo 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 to the RCRA Part A. During the closure of tanks S29 through S30, wastes will be transferred to tanks S33 through S36, and 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) the SRS will submit a final revision to the RCRA Part A changing the capacity of the Burial Ground Solvent Tanks S23-S30 to zero and the Liquid Waste Solvent Tanks S33 through S36 to 200,000 gallons or less.

Table 1 – Mixed Low-Level Waste – Storage Capacity

Mixed Low Level Waste Container Storage

Facility Name	Storage Area	Location	RCRA Status	Storage Capacity* Volume in Gallons (Cubic Meters)
Hazardous Waste Storage Facility	Mixed Waste Building N Area	645-2N	B	153,780 (582)
Mixed Waste Storage Building	E Area	643-29E	A	31,750 (120)
Mixed Waste Storage Building	E Area	643-43E	A	309,375 (1171)
Mixed Waste Storage Shed	M Area	316-M	A	30,800 (117)
TRU Pads	E Area	Pads 6-13	A	N/A**
			TOTAL	525,705 (1990)

Mixed Low-Level Waste Tank Storage

Facility Name	Storage Area	Location	RCRA Status	Storage Capacity* Volume in Gallons (Cubic Meters)
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	S23-30	A (to be closed)	200,000 (757)
Liquid Waste Solvent Tanks	H Area	S33-36	Approved (new construction)	
			TOTAL	2,598,040 (9,834)

* This capacity is that allowed by RCRA Part A or Part B Permits

** There is no MLLW related excess capacity on the TRU pads. The MLLW in storage on the TRU pads uses storage space assigned to mixed TRU waste.

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 the Table 2.

Table 2 – MLLW Stored Inventory and Excess Capacity

Mixed Low-Level Waste Container Storage

Facility	Stored Inventory in gallons (cubic meters)	Excess Storage Capacity in gallons (cubic meters)
Mixed Waste Building 645-2N	147,356 (557.7)	6,424 (24.3)
Mixed Waste Storage Bldg. 643-29E	16,396 (62.1)	15,354 (58.1)
Mixed Waste Storage Bldg. 643-43E	0 (0)	309,375 (1171.0)
Mixed Waste Storage Shed 316-M	7,353 (27.8)	23,447 (88.8)
TRU Pads 6-13	347,520 (1315.4)	N/A*

Mixed Low-Level Waste Tank Storage

Facility	Stored Inventory in gallons (cubic meters)	Excess Storage Capacity in gallons (cubic meters)
Process Waste Interim Treatment/Storage Facility	408,453 (1546.0)	1,787,277 (6764.9)
DWPF Organic Waste Storage Tank**	0 (0)	150,000 (567.8)
SRL Mixed Waste Storage Tanks	39,340 (148.9)	12,970 (49.1)
Burial Ground Solvent Tanks***	31,000 (117.3)	169,000 (610.1)

* There is no MLLW related excess capacity on the TRU pads. The MLLW in storage on the TRU pads uses storage space assigned to mixed TRU waste. Therefore the TRU pads are shown to have no MLLW capacity.

** Operational, but the waste being stored is not mixed. This facility will not begin storing mixed waste until DWPF begins processing radioactive waste.

*** Available storage capacity is limited to Tanks S29 and S30 (46,350 gallons total capacity, 15,550 gallons excess capacity) due to secondary containment requirements precluding use of Tanks S23 through S28.

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 located in each cell. 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 pad is curbed and includes a concrete sump to collect any leaks so that any 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]) 20-90 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 and includes a sump to collect any leaks so that any liquids found in the sump can be checked for radioactivity. If present, additional analysis is made for RCRA constituents.

Waste to be stored in the building is contained in 55-gallon drums (0.2 m^3), 20-90 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 concrete pad within the building serves as the storage area and it 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.

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 have 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 were 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 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 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.

The number and/or capacity of each liquid waste solvent tank may increase, but the total capacity for the Liquid Waste Solvent Tanks will not exceed 200,000 gal.

7.1.2 Mixed TRU Waste

Mixed TRU waste is stored on 17 storage pads at the burial ground in E Area. The management of mixed TRU waste on the TRU waste storage pads includes waste with TRU constituents above 10 nCi/g since SRS does not presently have the capability to distinguish between wastes that are below 100 nCi/g from that above 100 nCi/g.

The 17 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 through 17 are managed as a RCRA Subpart I Container Storage Unit. Pad 6 is partially covered with soil. Additional interim status storage space has been requested from SCDHEC (see 7.2.2).

Storage containers on the pads consist mainly of 55-gallon (0.2 m^3) carbon steel and galvanized steel drums. Other containers include concrete culverts that contain either 55-gallon (0.2 m^3) drums or small polyboxes, large carbon steel boxes, and steel and concrete casks.

7.1.2.1 Mixed TRU Waste Storage

Storage pads 1 through 17 have been granted Interim Status to store an aggregate of 4,631,000 gallons (17,528 m^3) of mixed TRU waste. The pads were permitted incrementally as the need for storage space evolved over time as follows:

Pads 1-5	1,111,000 gallons	(4,205.1 m^3)
Pads 6-13	2,035,000 gallons	(7703.0 m^3)
Pads 14-17	1,485,000 gallons	(5,620.7 m^3)
TOTAL	4,631,000 gallons	(17,528.3 m^3)

In 1989, the SRS was granted a variance from a portion of the South Carolina Hazardous Waste Management Regulations (SCHWMR), R.61-79.265.35 and 265.173(c) and (d) for Pads 6-13. These sections of the regulations describe 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 14-17 was granted to the SRS on June 2, 1993. The Conditional Variance was issued to the SRS through December 31, 1998, after which time all containers on pads 14 through 17 must meet the aisle space requirements.

In March 1989, SRS discovered that rainwater had infiltrated some of the drums stored on concrete pads via filter vents. Subsequently, in February of 1991, SRS submitted a dewatering plan to the South Carolina Department of Health and Environmental Control (SCDHEC) that outlined a procedure for dewatering the drums. The SRS is dewatering 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.

The storage pads are addressed in the LDR-FFCA. These documents describe how the containers used for storage of LDR mixed waste on pads will be managed. The agreements discuss what sump contents will be analyzed, the configuration of waste containers on the pads, how the pads will be inspected, and how the waste containers on pads will be labeled.

7.1.2.2 Mixed TRU Waste Stored Inventory

The inventory of mixed TRU waste stored on pads 6 through 17 is 1,663,500 gallons (6,296.4 m^3). Of this stored volume 347,520 gallons (1,315.4 m^3) is MLLW and 1,316,000 gallons (4,981 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) was thus subtracted from the total volume for pads 1 through 17 giving a difference of 3.52 million gallons (13,323.2 m^3) of interim status capacity associated with only pads 6 through 17. The excess capacity of 1,856,500 gallons (7,026.9 m^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 for mixed TRU waste by 347,520 gallons (1,315.4 m^3) of MLLW stored on TRU pads 6 through 17. Relocating the MLLW to an approved MLLW storage area will provide a mixed TRU waste excess capacity of 2,204,020 gallons (8,342.2 m^3).

7.1.2.3 Description of Mixed TRU Waste Storage Pads

TRU pads 1 through 6 are located in the southeastern tip 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 17 are located adjacent to each other in approximately the center of the 643-7E SWDF. TRU pads 7 through 17 are not covered with soil and are not expected to be covered because of the impending startup of a federal repository.

Each of the 17 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 managing 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 Radiologically

Controlled Area and will be associated with radioactively contaminated waste, they will be disposed of as low-level waste after serving their function.

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 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 inventory of HLW in storage in the F-Area and H-Area Tank Farms is 130,581 m^3 as of June 1994. The excess available capacity is 4133 m^3. This capacity does not take into account dedicated capacity for emergency storage and processing of HLW for final disposal or space in the Type I or II tanks which cannot receive additional HLW, or the Type IV tanks which are used to store only low activity waste.

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 treated wastewater (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 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 when it begins operation.

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 removed from service and is not included in this discussion.

The total storage capacity for the F-Area and H-Area Tank Farms is 35.1 million gallons (132,854 m^3). This storage capacity is based on the total space available in the Type III/IIIA tanks. The excess storage capacity is obtained by subtracting the current waste inventory contained in the Type III/IIIA tanks from the total available storage capacity.

Tank Type	Area	No. of Tanks	Capacity (M/gallons)
I*	F	8	0.75
I*	H	4	0.75
II*	H	3	1.03
III/IIIA	F	10	1.3
III/IIIA	H	17	1.3
IV*	F	4	1.3
IV*	H	4	1.3

*These tanks do not meet secondary containment criteria as described in the FFA and are therefore not used to calculate the total and excess storage capacity. However, these tanks currently contain waste that has been included in the current waste inventory.

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 waste have been determined as a result of studies that have recently been completed. The mixed TRU waste study included a detailed evaluation of future generation, an assessment of the current storage configurations and storage capabilities, and an determination of what additional storage facilities will be required. A companion study of containerized mixed low-level waste (MLLW), which was only recently initiated, has thus far produced limited results as presented in this report. This study is continuing, and the results and conclusions from this effort will not be available until spring of 1995. The preliminary results, however, provide insight to the current storage status and capability.

The quantities of future mixed TRU waste generation presented in the following paragraphs are the best estimates available. The estimates of containerized MLLW are tentative and subject to confirmation when the work in progress is completed. The action to gain interim status for specific existing potential storage areas as discussed in Section 7.2.2 is proceeding to support current storage needs.

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 Mixed Low-Level Waste

Future MLLW waste projections for which storage provisions are required fall into two categories: (a) those which have been forecasted by waste generators which use prior experience and current knowledge to forecast continuing waste volumes to be generated, and (b) projections for more recently identified waste streams that were previously somewhat obscure and have been addressed as wastes that must also be considered and waste volumes estimated for the 1993-1997 period. These two categories are discussed separately in the following paragraphs.

7.2.1.1 Continuing Operations Waste Generation

Forecasted future MLLW wastes from continuing operations of waste generators for the 1993-1997 period are shown in Table 3. This table also includes the present excess capacity from Table 2 for comparison. This table shows that there is sufficient storage capability in the MLLW storage facilities to accommodate present storage needs and future generation of these types of wastes for the 1993-1997 period.

For all practical purposes, Building 645-2N is presently filled to capacity and can accommodate no additional waste. The storage area in Building 643-29E is presently used and cannot accommodate additional waste. The 31,750 gallon capacity listed in Table 2, "MLLW Stored Inventory and Excess Capacity," for Building 643-29E is based on 210 55-gallon drums and 30 90-ft^3 boxes being stored. This calculation does not account for other containers such as concrete culverts and specially designed boxes that are currently stored in Building 643-29E. The presence of such odd-shaped containers explains why Building 643-29E is noted as full when 15,354 gallons remain in its RCRA Part A permit capacity (denoted as Excess Storage Capacity in Table 2).

The mixed waste storage shed 316-M has about a quarter of its capacity utilized and can accommodate additional waste.

Building 643-43E will provide the largest storage facility. Operational status is not expected until March 1995. Once operational, it has a relatively large capacity for storage.

The plan for interim waste storage includes removal of approximately half of the 347,520 gallons (1,315.4 m^3) of solid MLLW from TRU pads 6 through 13 and moving it to a MLLW storage facility to restore this storage area to mixed TRU waste storage. The specifics of how much can be relocated yet remains to be determined. When the Part B Permit application under review by SCDHEC is approved this waste could be relocated to the 20 through 22 group of storage pads. Obtaining interim status capacity of 600,000 gallons (2,271 m^3) from the capacity of pads 6 through 17 for the M-Area pad (315-4M) will provide for storage of 200,000 gallons (757 m^3) of M-Area stabilized sludge and 400,000 gallons (1,514 m^3) of CIF stabilized ash and blowdown.

7.2.1.2 Recently Projected Wastes

Generation of additional mixed low-level wastes have been projected for which storage needs are required. These MLLWs are as follows:

• One cask containing cadmium control rods from the reactors	Approximately 13.2 m^3 in 1996
• Two shipments of ITP/late wash filters, container approximately 6' x 6' x 16' L	Approximately 32.6 m^3 over 1995-1999
• Tank farm debris (MLLW) consisting of various equipment items and metal debris. The waste containers may be a mixture of B-25/B-12 boxes, 55-gallon drums and special containers.	Estimated at 1,600 m^3, over 1995-1999
• Job control wastes contaminated with Toxicity Characteristic constituents and radioactivity from sitewide sources, waste containers may be predominantly 55-gallon drums	Estimated at 1,610 m^3 over 1995-1999
• Decontamination and decommissioning (D&D) of 232-F; various containers, mostly waste boxes and some drums	Estimated at 253 m^3, mid-1996 through 1997

The total of these quantities of wastes is over 3,500 m^3. In addition, there are in the range of a few hundred or so cubic meters of MLLW to be stored consisting of numerous other smaller sources of waste, that taken individually are not large, but taken in the aggregate cannot be ignored. The total waste volume requiring storage provisions is then approximately 3,800 m^3. The above volumes include estimated adjustments to account for containers and void spaces inside of the containers and, therefore, may represent larger volumes than the waste stream volumes. The adjusted volumes are those that must be considered for storage of the waste containers.

Clearly, the aggregate of these volumes, approximately 3,800 m^3 (1.004 million gallons) projected over the next five years, will far exceed all currently available permitted MLLW storage space. This substantial volume essentially represents new storage space that will be required, since it not only exceeds the capability of currently permitted storage space, but also storage space pending SCDHEC approval, and further, may potentially require additional storage capacity. There is virtually no storage space available in the MLLW storage facilities in comparison to these large volumes of wastes to be stored. Storage pads 20 through 22 will become available for MLLW storage after the Part B application is approved by SCDHEC, however, approximately half of their storage area is committed to MLLW to be relocated from TRU pad 9 (and a small amount on other TRU pads) plus stabilized CIF waste after the assigned area on the M-Area storage pad is full. Their storage capacity will be 1,446,130 gallons (5,474 m^3) as specified in the Part B Permit application under review by SCDHEC.

As a short range stop-gap measure, a small amount of this waste volume can be placed on unoccupied areas of the TRU pads on a temporary basis since there is currently excess permitted capacity available for mixed TRU waste storage. The amount of space available on the TRU pads is limited, however, and will be available for only a few years until retrieval and planned waste relocations discussed in 7.2.2 occur and when these wastes are received at the SWDF. If any of these wastes are placed on the TRU pads they should only be those that consist of the smaller volumes and containers, acknowledging that they will have to be moved within a relatively short period of time to other facilities. This limited storage space will not be of any substantial storage help and beyond that short range span of time additional MLLW storage area will be needed. Steps will need to be taken early on to provide the additional storage space.

Compensating factors will include the movement of some water to vault disposal and consumption of some wastes in the CIF, however, the time frames when these actions occur relative to storage space becoming available and the volumes that will be removed from storage areas are difficult to predict at this time. Relief in a storage capability for these reasons is not expected to provide nearly enough storage capability for the substantial volumes noted above and provision of additional storage space should be actively pursued.

The low-level waste 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.

Table 3 – MLLW Future Generation and Excess Capacity (1993 – 1997)

Waste Type	Excess Capacity in Cubic Meters (From Table 2)	Five-Year Future Generation in Cubic Meters	Capacity After Five Years in Cubic Meters
<u>Mixed Low-Level Waste Container Storage</u>			
Aggregate of existing facilities	1,342.2	159.2 - a	1183
Pad 315-4M	2,271*	1413-b	858
<u>Mixed Low-Level Waste Tank Storage</u>			
Process Waste Interim Treatment Storage Facility	6,764.9	490.1	c
DWPF Organic Waste Storage Tank	567.8	380	d
SRL Mixed Waste Storage Tanks	49.1	750	d
Burial Ground Solvent Tanks and Liquid Waste Solvent Tanks	640.1	0	e

*Not from Table 2; this is the pad capacity in the May 1994 Part A permit application, see 7.2.1.

a. Five-year forecast for newly generated wastes
b. Five-year forecast for M-Area Vendor and CIF treatment residuals. Volumes represent the treated wasteforms (i.e., vitrified M-Area sludge and stabilized CIF ash and blowdown).
c. 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.
d. The inventory in the DWPF OWST and SRL MWST will change with time as treatment processes begin 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 volumes do not exceed capacity.

e. Refer to Section 7.1.1.3 for a discussion concerning how the permitted capacity for the solvent storage tanks will be transferred from the burial ground solvent tanks to the proposed liquid waste solvent tanks.

7.2.2 Mixed TRU Waste

The evaluation and study to identify the quantity of waste currently stored in mixed TRU waste facilities in comparison to available interim status capacity has recently been completed. The results show that the amount of stored mixed TRU waste is significantly less than the interim status capacity, although the storage area on pads 1 through 17 is largely occupied. Presently, some of the storage pads have a mix of various types and sizes of storage containers and are full or nearly full, while others have remaining storage area.

Currently, the stored wastes are not arranged in arrays with aisle spacing. The SCDHEC permitting process for pads 14 through 17 requires that aisle spacing be incorporated in the waste container stored arrays for inspection and emergency access (i.e., fire fighting, spill cleanup, etc.), and that aisle spacing be fully incorporated on these four pads by December 31, 1998.

An evaluation was made to determine the impact of aisle spacing on the amount of storage area required for mixed TRU waste. It was determined that approximately 17 3/4 storage pads are required. This pad requirement accounts for retrieval of drums from pads 2-5, conservatively assuming that all are repacked into 83 gallon (0.3 m^3) overpack drums. The 17 3/4 pads also included MLLW on pad 9 and some additional MLLW distributed over pads 6 through 13 equating to approximately 1 pad, plus some drummed non-mixed TRU waste. The MLLW will be relocated to MLLW storage facilities with the small amount of non-mixed TRU drums remaining temporarily on the TRU pads. This reduces the storage requirements to 16 3/4 pads to accommodate current mixed TRU waste storage needs after the MLLW is relocated.

The recently completed evaluation of future mixed TRU waste generation indicated that an annual generation rate of approximately 15,100 gallons (57.2 m^3) per year can be expected. The five-year (1993-1997) cumulative total is 75,500 gallons (285.8 m^3). This mixed TRU waste is projected to be all drummed waste with the majority in excess of 0.5 Ci per drum, which requires placement in culverts. Since the exact split of culvert and non-culvert drums cannot be predicted, it is assumed that culvert storage will be required, resulting in a requirement of approximately 1.2 TRU pads. This brings the total mixed TRU waste storage requirement to 18 pads as compared to the 17 existing permitted TRU pads.

Investigation of additional storage sites showed that existing storage pads 18 and 19, adjacent to pads 14 through 17 at the Solid Waste Disposal Facility (SWDF), are identical to pads 14 through 17, but are not permitted for storage of mixed waste. Presently, pads 18 and 19 contain non-mixed TRU waste, which will be relocated to another non-RCRA storage site, making these pads available. In May 1994, SRS submitted a revision to the RCRA Part A Permit Application to include pads 18 and 19 in the interim status capacity of TRU Pads 6 through 17. Also a portion of the interim status capacity of pads 6 through 17 was allocated to Pad 315-4M for storage of M-Area and CIF stabilized low-level mixed wastes. Thus, permitting of pads 18 and 19 and reserving them for storage of mixed TRU waste will increase available storage space to 19 TRU pads which will satisfy current needs and future generation. The one excess TRU pad will be needed as a temporary staging area during waste container movements and for support of retrieval operations.

Retrieval of drums on pads 2 through 5 is scheduled to begin in 1997, and completion of aisle spacing drums on pads 14 through 17 is required by December 1998. Since completion of these actions is not immediate and because they are of a progressive nature, sufficient time exists to plan the activities and bring these activities to an orderly completion. A *Container Management Plan* is in the formative stages, and initially provides for a reorganization of waste containers on the TRU storage pads in the SWDF to meet near term needs. The *Container Management Plan* is a "living document" and will be revised as necessary to meet differing needs and requirements and as waste storage activities progress.

In Section 7.1.2.2, it was noted that the current excess mixed TRU waste permitted capacity was 2,204,020 gallons (8,342 m^3). Allocation of 600,000 gallons to the 315-4M pad yields a net excess capacity for TRU pads 1 through 19 of approximately 1,604,000 (6,071 m^3). The 75,500 gallons (285.8 m^3) of future generation of mixed TRU waste noted above reduces this amount of excess capacity to 1,078,500 gallons (4,082 m^3). This remaining excess capacity is adequate to accommodate unanticipated changes in forecasted future mixed TRU waste generation storage capacity requirements.

7.2.3 High-Level Waste (HLW)

Fifty of the 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 an ongoing basis. Six of the 27 tanks are dedicated for the processing of the waste for the In-Tank Precipitation and Extended Sludge Processing Facility. Of the remaining tanks, only 4133 m^3 of the dedicated storage capacity remains for future waste receipts.

The future HLW projection for 1993 through 1997 is 13,570.4m^3. This projection exceeds the excess storage capacity of 4133 m^3 listed in Section 7.1.3.2, "HLW Storage Inventory." HLW will continue to be evaporated and will eventually be processed through the In-Tank Precipitation and Extended Sludge Process facilities once these processes are brought on-line. 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 1993 through 1997.

Final waste treatment and storage of the HLW will be provided by the Defense Waste Processing Facility (DWPF) and Saltstone Manufacturing Facility. With the startup of the vitrification plant, large-scale waste removal activities for the F-Area and H-Area Tank Farms will proceed.

Section 7.3 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. These wastes will be stored in RCRA permitted storage areas.

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CHAPTER 8 DISPOSAL

Section 8.1 Introduction

This section discusses the overall process developed by the U.S. Department of Energy (DOE) for evaluating issues related to the disposal of residues from the treatment of mixed low-level wastes (MLLW) subject to the Federal Facilities Compliance Act (FFCAct). The Savannah River Site (SRS) is among the sites being analyzed further under this process for potential development as a disposal site for residues from the treatment of MLLW subject to the Act.

The Federal Facility Compliance Act (FFCAct) requires only that DOE develop a plan for the treatment of mixed wastes. The Act does not impose any similar requirement for the disposal of mixed wastes. DOE recognizes, however, the need to address this final phase of mixed waste management. The following process reflects DOE's current strategy for evaluating the potential options for disposal and, consistent with the purpose of Volume II, Backgr*ound Volu*me, is provided for informational purposes only.

It is important to note that the ultimate identification of sites that may host mixed waste disposal activities will follow state and federal regulations for siting and permitting and will include public involvement in the decision-making and preparation of the appropriate environmental impact analyses in accordance with the National Environmental Policy Act (NEPA). Moreover, any recommendations concerning removal of sites from further evaluation under this process do not affect environmental restoration decisions by DOE under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) concerning remediation activities.

Mixed waste subject to the Act includes high-level waste (HLW) and mixed transuranic waste (mixed TRU). However, established processes are already being implemented for studying, designing, constructing, and ultimately operating disposal facilities for these wastes (e.g., HLW repository, Waste Isolation Pilot Project). Currently, however, there are no active permitted disposal facilities operated by DOE for residues from the treatment of MLLW.

Previously, the DOE planning baseline included the development of MLLW disposal facilities at the six DOE sites currently disposing of low-level waste (Hanford Site, Savannah River Site, Oak Ridge, Idaho, Nevada, and Los Alamos). Plans for the development of these facilities are currently on hold pending the results of this process and the Environmental Management Programmatic Environmental Impact Statement (EM PEIS) currently being prepared by DOE. Once the process of acquiring permits for these sites is initiated, along with associated design and radiological performance assessment efforts, some sites may be found to not be desirable for disposal activities. Additionally, some sites which have not been considered for disposal activities before may be suitable for the disposal of some MLLW residues.

Pursuant to discussions between DOE and the states, DOE developed a process for evaluating the potential options for disposal of the residues from treatment of mixed waste subject to the Act. The sites subject to this evaluation are the 49 sites reported to Congress by DOE in the Mixed Waste Inventory Report (MWIR), April 1993, as currently storing or expected to generate mixed waste.

This chapter outlines the process developed by DOE, in consultation with the states, for evaluating potential options for the disposal of residues from the treatment of MLLW. Importantly, because MLLW disposal sites are not currently being developed by DOE, preferred alternatives or final destinations for disposal of treatment residues may not be known at the time final Proposed Site Treatment Plans are submitted to the states and the Environmental Protection Agency (EPA) in February 1995. The results of this process are intended to be considered during the discussions about development of the Act Site Treatment Plans, both between DOE and states and among states themselves.

Section 8.2 Disposal Site Evaluation Process to Date

Although the Act 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 with potential disposal of the residues from the treatment of DOE MLLW at the sites subject to the Act. The focus of this process has been to identify, from among the sites currently storing or expected to generate mixed waste, sites that are suitable for further evaluation regarding their disposal capability. Sites determined to have marginal or no potential for disposal activities will be removed or postponed from further evaluation under this process. Remaining sites will be evaluated more extensively. Ultimately, a number of sites are expected to be technically acceptable for disposal activities.

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 Mixed Waste Inventory Report, 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:

- The Idaho National Engineering Laboratory and Argonne National Laboratory (West) are located within several miles of each other on a single federally owned reservation in Idaho Falls, Idaho, and were considered a single site for further analysis.

- The Sandia National Laboratory, Livermore and Lawrence Livermore National Laboratory are located on adjoining properties in Livermore, California, and were considered a single site for further analysis.

- The Inhalation Toxicology Research Institute and Sandia National Laboratory, Albuquerque, New Mexico, are located on the same federally owned reservation within several miles of each other and were considered a single site for further analysis.

- 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, in Oak Ridge, Tennessee, and were considered a single site for further analysis.

Initial Site Screening

The remaining 44 sites were screened against three exclusionary criteria. These criteria were developed by reviewing federal and state laws regarding the siting of waste treatment, storage, and disposal facilities to determine whether any criteria existed which could be considered exclusionary minimum requirements for hosting disposal activities and which could be applied uniformly across sites. It was agreed at a joint DOE/states meeting in Tucson, Arizona, on March 3-4, 1994, that in order to be further evaluated for potential disposal activities, 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
- must have sufficient area to accommodate a 100-meter buffer zone

Two of the criteria (100-year flood plain and active fault) are derived from regulatory requirements under the Resource Conservation and Recovery Act, which restricts the location of waste treatment, storage, and disposal facilities. The third criterion (sufficient area for 100-meter buffer) is derived from guidance from the U.S. Environmental Protection Agency, U.S. Nuclear Regulatory Commission, and U.S. Department of Energy concerning the area required to properly operate such facilities.

Application of the three exclusionary criteria identified 18 sites which did not meet the criteria (see Figure 8-1). The results were presented at a March 30-31, 1994, joint DOE/States meeting in Dallas, Texas. At the meeting, it was agreed to remove the 18 sites from further evaluation and that DOE would collect additional site-specific information on the remaining 26 sites to identify the strengths and weaknesses of the remaining sites for the purpose of disposal activities (see Figure 8-2). It was also agreed that DOE and any affected States may propose additional sites for elimination from further evaluation after review of the site-specific information and further discussions.

Evaluation of 26 Sites

DOE and the states met on July 26-27, 1994, in Denver, Colorado, to discuss the site specific information on the 26 sites and to consider proposals for elimination of sites from further evaluation. The focus of these discussions was to identify sites suitable for further evaluation regarding their disposal capability. It was agreed that sites determined to have marginal or no potential for disposal activities would be removed or postponed from further evaluation under this process. As a result of the meeting, DOE and the states agreed that the following sites would be eliminated from further evaluation due to their limited potential for disposal activities:

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 that due to its geographic proximity, the Knolls Atomic Power Laboratory at Niskayuna, New York, would be merged with the Knolls Atomic Power Laboratory at Kesselring, New York, for further analysis. DOE and the states also agreed that the following sites, while not eliminated from further evaluation, would be given a lower priority for further evaluation:

Site	State
Weldon Spring Remedial Action Project	Missouri
Brookhaven National Laboratory	New York
Mound Plant	Ohio
Bettis Atomic Power Laboratory	Pennsylvania

Sites assigned a lower priority for further evaluation had issues that required further consideration including whether the technical abilities of the site were adequately known, the volume of mixed waste which may be generated by the site, and whether other arrangements for disposal of the sites' mixed waste were adequate. DOE and the states agreed to further evaluate these sites in terms of their ability to dispose of their own mixed waste on-site only if no other options for disposal of their wastes could be identified through the disposal evaluation process. In no case would these sites be considered as a disposal option for wastes from other sites and could be eliminated from further analysis if sufficient information suggests that their potential for disposal activities is too limited.

Section 8.3 Next Steps in Disposal Site Evaluation Process

For the sites not eliminated from further evaluation or assigned a lower priority for evaluation, a more technically detailed performance evaluation will be conducted to increase the understanding of the strengths and weaknesses of a site's potential for disposal activities and to better identify what types of disposal activities could or could not occur at a site. A configuration analysis (risk, cost, transportation) will also be prepared, and a final set of sites will be identified as disposal options which will be technically capable of disposing of some waste. DOE officials, in concert with the public and pursuant to the National Environmental Policy Act, will then identify those sites that will be further evaluated for potential development as disposal sites. Permitting and preparation of performance assessments in accordance with radioactive waste management regulations will then be undertaken collaboratively with states and regulators.

Performance Evaluation

The performance evaluation to be conducted for each of the remaining sites will entail the collection of site-specific data related to the natural surroundings, geotechnical setting, groundwater and surface water characteristics, and other factors related to the disposal capabilities of each site. This information will then be used to evaluate the sites and determine what types and quantities of waste may be able to be disposed at a given site. The performance evaluations will be initiated in August 1994, and will be completed by February 1995. The 16 sites being carried forward for this analysis are

Site	**State**
Lawrence Livermore National Laboratory, Site 300	California
Rocky Flats Plant	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
Knolls Atomic Power Laboratory -- Kesselring	New York
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

Configuration Analysis

Through the Draft EM PEIS currently being prepared by DOE, the potential cost, risks, transportation, and other environmental impacts of using each of the remaining 16 sites for some level of disposal activity will be analyzed. This analysis is currently scheduled to be released for public review and comment in late 1994 or early 1995.

Site Limitations Analysis

Following public comment on the Draft EM PEIS and completion of the performance evaluations on the remaining 16 sites, DOE will work with the states and public to develop estimates of the quantities and types of waste that could be disposed at the 16 sites. It is expected that the results of these two analyses may indicate that some of the remaining 16 sites are not suitable for further analysis.

Final EM PEIS

While the final proposed Site Treatment Plans are being prepared, and following their submission by DOE to the states and other regulators, it is expected that individual states and DOE will enter into discussions concerning what wastes will be treated at which sites. It is also expected that as a part of these discussions, some arrangements may be established between DOE sites and states as to how any future disposal activities will be handled. DOE expects that the information supplied throughout this process will be used in those discussions. Likewise, DOE expects that the Final EM PEIS analyses will encompass the range of discussions and arrangements under consideration.

Post-Compliance Order Activities

It is expected that by October 1995, when compliance orders are expected to be issued under the Act, discussions among states and DOE sites concerning disposal of the residues from the treatment of mixed waste may not completed. It is therefore expected that a Record of Decision under the EM PEIS relative to disposal activities may be delayed somewhat to allow discussions to continue further. When a Record of Decision is issued, it will identify preferred sites to be recommended for further development as disposal facilities.

Post-Record of Decision Activities

Following the issuance of a Record of Decision under the EM PEIS on disposal activities, DOE sites will, as appropriate, initiate site-specific Environmental Impact Statements on the proposed disposal facilities, initiate performance assessment processes in accordance with radioactive waste management regulations, and collaboratively with the States and other regulators initiate processes for permitting of disposal facilities.

Figure 8-1
Sites Eliminated in Initial Screening

Site	Exclusionary Criteria		
	100-meter buffer	100-year Flood plain	Active Fault
California			
Lawrence Berkeley Laboratory	•		
Laboratory for Energy-Related Health Research	•		
Mare Island Naval Shipyard (a)		•	
Colorado			
Grand Junction Project Office		•	
Connecticut			
Knolls Atomic Power Laboratory, Windsor	•		
Hawaii			
Pearl Harbor Naval Shipyard (a)		•	
Iowa			
Ames Laboratory	•		
Maine			
Portsmouth Naval Shipyard (a)		•	
Missouri			
Kansas City Plant		•	
University of Missouri	•		
New Jersey			
Middlesex Sampling Plant	•		
Princeton Plasma Physics Laboratory	•		
New York			
Colonie Interim Storage Site	•		
Ohio			
Battelle Columbus Laboratory	•		
RMI Titanium, Inc.	•		
South Carolina			
Charleston Naval Shipyard (a)		•	
Virginia			
Norfolk Naval Shipyard (a)		•	
Washington			
Puget Sound Naval Shipyard (a)		•	

• Site fails criteria
(a) Site potentially in Coastal High-Hazard Area

Figure 8-2
26 Sites Remaining After Initial Screening

California
Energy Technology Engineering Center
General Atomics
General Electric Vallecitor Nuclear Center
Lawrence Livermore National Laboratory, Site 300

Colorado
Rocky Flats Plant

Florida
Pinellas Plant

Idaho
Idaho National Engineering Laboratory

Illinois
Argonne National Laboratory
Site A/Plot M

Kentucky
Paducah Gaseous Diffusion Plant

Missouri
Weldon Spring Remedial Action Project

Nevada
Nevada Test Site

New Mexico
Los Alamos National Laboratory
Sandia National Laboratory

New York
Brookhaven National Laboratory
Knolls Atomic Power Laboratory – Kesselring
Knolls Atomic Power Laboratory – Niskayuna
West Valley Demonstration Project

Ohio
Fernald Environmental Management Project
Mound Plant
Portsmouth Gaseous Diffusion Plant

Pennsylvania
Bettis Atomic Power Laboratory

South Carolina
Savannah River Site

Tennessee
Oak Ridge Reservation

Texas
Pantex Plant

Washington
Hanford Site

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CHAPTER 9 TREATMENT FACILITIES AND TREATMENT TECHNOLOGIES

Section 9.1 Existing Facility Descriptions

This section describes existing SRS facilities considered in options analysis. It should be noted that the contract for M-Area Vendor Treatment Process has been awarded, so it is considered "existing" even though the equipment has not been installed.

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 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 employs six 35000 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 86000 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 38000 gallons per day.

9.1.2 M-Area Vendor Treatment Process

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. Nevertheless, 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.

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 around 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). The ashcrete system could be used to encapsulate other small sized wastes, which could be mixed directly with the ash.

Capacity

The CIF thermal capacity of 18.1 million BTU/hr is based on the design estimate of wastes expected to be 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 reestimated 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 level and high-level 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 (TCLP) so the spent resin also becomes a non-hazardous low-level waste.

Capacity

The RCRA Part A permit modification, under which the probes operate, limits the throughput of the mixed waste storage tank treatment process (both low-level and high-level 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 will receive high-level waste from tank farms in the defense materials production areas. High level defense waste is as radioactive as 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 radioactivity, organic liquid (primarily benzene) and a high radioactive aqueous stream.

2. A vitrification process treats the aqueous stream and high radioactivity sludge to remove mercury, mixes the streams with additives and glass-forming materials, and continuously feeds a high temperature in a 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, the maximum technical capacity for the system is approximately 2 million pounds per year.

9.1.6 *Effluent Treatment Facility*

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.

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. 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. ETF's waste treatment capacity requires the influent to be almost pure water or in small quantities.

9.1.7 *Tritium*

The tritium facility produces tritium gas (a radioactive form of hydrogen). Tritium is not a waste treatment facility *per se*. It does, however, have tritium control and recovery equipment, which could be needed if wastes contaminated with tritium were treated. Any treatment process handling tritiated waste would either have to use the control equipment at the tritium facility or construct it anew.

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 radioactive wastes containing mercury and particularly to wastes containing radioactive mercury isotopes. Mercury compounds are converted into a solid alloy with mercury and the amalgamating material, which is more easily managed and less mobile than solutions containing radioactive mercury. Amalgamation provides a change in mobility from liquid.

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 radioactive components are ionic. It will also concentrate the radioactive ionic species into a small volume, leaving a nonradioactive aqueous phase. The principal mixed waste application of this process is to recover metallic radionuclide from wastewaters or acid leach liquids.

9.2.6 Macroencapsulation

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.

9.2.7 Decontamination of Lead

Lead waste, which is unmixed with plastic, paper, or leather, 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 enhance sludge dewatering may also be used.

9.2.10 *Pretreatment Process*

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.

9.2.11 *Roasting/Retorting*

Sprengle pumps and mercury diffusion pumps contaminated with tritium and mercury are contained in stainless steel boxes. Due to radiation or exposure concerns, some of the boxes are enclosed in a concrete culvert. Processing requires monitoring and opening the culvert and boxes then removing and cutting up the pumps in a glovebox prior to roasting and 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. The oven is sized to handle 8-liter sprengle pumps and mercury diffusion pumps. The estimated chamber size is 36 x 36 x 36 inches resulting in a capacity of 27 ft^3 or 0.76 m^3.

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 and condensed. Liquid organics are decanted at the supernatant interface and go to the CIF. The mercury goes to amalgamation. 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 low-level mixed 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 microwave.

9.2.14 *Vitrification*

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 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 and Characterization Facility (TWCCF)*

The 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

The TRU Waste Certification/Characterization Facility (TWCCF) will process wastes contaminated with alpha-emitting transuranic radionuclides (half-lives greater than 20) 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 low-level mixed 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.

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 the non-alpha vitrification facility. Vitrified and low temperature stabilized wasteforms will be routed through the 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

Chapter 10 provides information on the requests from other DOE sites for the Savannah River Site (SRS) to analyze selected waste streams to determine the feasibility for treatment of these streams at SRS.

In making the determination, a simple, preliminary analysis was performed. Sites desiring SRS to perform an analysis submitted characterization data in a formal request. In most cases, contact was made with the requesting sites to supplement the waste data provided to ensure that SRS had appropriate information. Characterization information for each offsite waste stream was compared to the waste acceptance criteria for the specific SRS treatment facilities. If the waste stream was within the acceptance criteria for an SRS treatment facility, the waste could be accepted. If the waste stream was outside of the treatment facility acceptance criteria, the waste stream was rejected. The comparison of each waste stream to the treatment facility acceptance criteria was completed by the technical representatives for the specific treatment facility. Table 10.1 lists other sites (as of August 1, 1994) that have notified SRS that the site is the preferred treatment option for certain waste streams.

The listing of these waste streams in Table 10.1 is not an indication that these streams are accepted for treatment at SRS. This determination will not be made until the completion of the Final Site Treatment Plan when all stakeholder input is complete. The information is an indication of the feasibility of treating selected, offsite waste and indicates a preliminary determination made by other offsite facilities.

The impacts to SRS operations resulting from potential treatment of these offsite wastes cannot be fully determined at this time. Site impacts will depend on the volume and characterization of waste to be treated as well as prioritization of onsite and offsite waste treatment. Prioritization protocols for treatment of offsite mixed waste to ensure timely treatment of wastes subject to Resource Conservation and Recovery Act (RCRA) land disposal restrictions (LDRs) and wastes not stored in compliance with RCRA regulations will be developed.

If SRS is selected to treat offsite wastes, major changes to the SRS facility baseline documents including regulatory permits will be required prior to the initiation of waste treatment operations. Since these modifications to baseline documents have not been forecasted, an accurate schedule for waste treatment operations cannot be determined at this time.

Based on the forecasted staffing for the SRS mixed waste treatment facilities, additional staff is not anticipated for treatments of offsite mixed waste. If SRS is required to repackage or sort offsite wastes before treatment, then additional staff to support those operations may be required. However, until the scope of the operations to treat offsite waste is further defined, staffing impacts cannot be fully determined.

Table 10.1 – Offsite Waste Streams for which Other DOE Locations Have Listed SRS Facilities as the Preferred Treatment Option

Naval Reactors

Waste Stream No.	DOE Site/ Waste Stream	SRS Treatment Facility	Potential Issues	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
NN-W002	Solid Waste Contaminated With Chromium	CIF	(1) (2) (3) (7)	0.0	2.05
CN-W001	Solids Containing Potassium Chromate	CIF	(1) (2) (3)	0.5	0.0
CN-W004	Organic Debris with Lead and/or Chromium	CIF	(1) (2) (3)	0.03	0.5
BT-W001	Oil Containing Heavy Metals #1	CIF	(1) (2) (3) (5)	0.21	0.21
BT-W002	Spent M-192 Solvent Rags	CIF	(1) (2) (3)	0.21	0.0
BT-W003	Oil Containing Heavy Metals #2	CIF	(1) (2) (3)	0.730	0.21
BT-W007	Solids with Solvents	CIF		0.42	0.0
KK-W008	Organic Sludges/Particulate	CIF	(1) (2) (3) (7)	0.0	0.75
KK-W009	Organic Debris without Metals	CIF	(1) (2) (3) (7)	0.0	0.4
KA-W003	Trichloroethylene	CIF	(1) (2) (3)	0.2	0.1
KA-W006	Freon® 113 on Rags	CIF	(1) (2) (3)	0.4	0.0
KA-W013	Organic Debris with Heavy Metals	CIF	(1) (2) (3) (7)	0.0	0.4
KA-W014	Organic Sludges/Particulate with Heavy Metals	CIF	(1) (2) (3) (7)	0.0	0.4
KW-W006	Organic Sludges/Particulate with Heavy Metals	CIF	(1) (2) (3) (7)	0.0	1.6
BT-W018	TCLP Extract Fluid	CIF	(1) (2) (3) (7)	0.0	0.001
KK-W003	Oils	CIF	(1) (2) (3) (7)	0.0	0.25
KK-W005	Organic Debris with Heavy Metals	CIF	(1) (2) (3) (6)	1.0	0.6
KK-W007	Inorganic Sludges/Particulate	CIF	(1) (2) (3) (4)	0.1	0.93
KK-W011	Cutting Oils and Liquids	CIF	(1) (2) (3) (7)	0.0	0.4
KA-W002	Cutting Oils, Liquids, Lubricants	CIF	(1) (2) (3) (7)	0.0	0.1
KA-W007	Oils Containing Heavy Metals and Solvents	CIF	(1) (2) (3)	0.23	2.0

Waste Stream No.	DOE Site/ Waste Stream	SRS Treatment Facility	Potential Issues	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
KA-W009	Organic Debris with Heavy Metals	CIF	(1) (2) (3)	0.05	2.0
KA-W012	Inorganic Sludge/particulate with Heavy Metals	CIF	(1) (2) (3) (4) (7)	0.0	0.6
KW-W001	Oil with Heavy Metals	CIF	(1) (2) (3) (7)	0.0	0.45
KW-W003	Organic Debris with Heavy Metals	CIF	(1) (2) (3) (7)	0.0	1.5
KW-W004	Inorganic Debris and Equipment	CIF	(1) (2) (3) (4) (7) (8)	0.0	2.25
CN-W007	Flammable Organic Debris	CIF	(1) (2) (3) (7)	0.0	0.03
PN-W015	Solids with Potassium Chromate	CIF	(1) (2) (3) (7)	0.0	0.03

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. EPA recently issued a policy that prohibits the incineration of specific inorganic wastes containing hazardous metals. A portion of the following NR wastes may be excluded from the CIF due to this policy.

5. 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.

6. The CIF cannot treat Radioactive Lead Solids (D008c). Per the November 18, 1994, letter from Naples to Sauls, waste stream 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.

7. Future-generated wastes will have to be characterized at the time of generation to ensure that they meet the CIF WAC.

8. The metal debris content of this waste may require sorting of unacceptable metal objects from the waste stream prior to shipment by NR to SRS. The CIF WAC excludes metal objects with any dimension exceeding two inches.

CHAPTER 11 SUMMARY INFORMATION

Section 11.1 Preferred Option Summary (by Waste Stream)

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
SR-W001	Rad-Contaminated Solvents	Incineration followed by Stabilization – CIF	8.4	5.0
SR-W002	Rad-Contaminated Chlorofluorocarbons	Consolidated with SR-W001	N/A	N/A
SR-W003	Solvent Contaminated Debris (LLW)	Incineration followed by Stabilization – CIF	9.3	2.6
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	Stabilization by Vitrification – M-Area Vendor Treatment Process	850	20
SR-W005	Mark 15 Filtercake	Stabilization by Vitrification – M-Area Vendor Treatment Process	15.4	0
SR-W006	Mixed TTA/Xylene – TRU	Characterization in TWCCF – WIPP Disposal	0.1	0
SR-W007	SRL (SRTC) Low Activity Waste	SRTC Ion Exchange	58.6	375
SR-W008	SRL (SRTC) High Activity Waste	SRTC Ion Exchange	72.2	375
SR-W009	Silver Coated Packing Material	Macroencapsulation in S. S. Container – Containment Bldg.	10.2	3.1
SR-W010	Scintillation Solution	Consolidated with SR-W001	N/A	N/A
SR-W011	Cadmium-Coated HEPA Filters	Stabilization by Vitrification – M-Area Vendor Treatment Process	100.2	0
SR-W012	Incinerable Toxic Characteristic (TC) Material	Incineration followed by Stabilization – CIF	2.8	1609.6
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated	Decontamination by Offsite Vendor	82.2	30
SR-W014	Tritium-Contaminated Mercury	Amalgamation – Offsite DOE-INEL-WEDF	0.3	0.1
SR-W015	Mercury/Tritium Contaminated Equipment	Macroencapsulation in S. S. Container as 90-Day Generator	9.9	253.2
SR-W016	221-F Canyon High Level Liquid Waste	Stabilization by Vitrification – DWPF	53,800	5,464
SR-W017	221-H Canyon High Level Liquid Waste	Stabilization by Vitrification – DWPF	73,240	9,970
SR-W018	Filter Paper Take Up Rolls (FPTUR)	Incineration followed by Stabilization – CIF	260	0

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	**Current** cumulative inventory through 09/30/94 (m^3)	**Future** forecast generation (1995-1999) (m^3)
SR-W019	244-H RBOF High Activity Liquid Waste	Consolidated with SR-W017	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 – ITP	0	32.6
SR-W021	Poisoned Catalyst Material	Waste stream eliminated	N/A	N/A
SR-W022	DWPF Benzene	Incineration followed by Stabilization – CIF	0	1,512
SR-W023	Cadmium Safety/Control Rods	Macroencapsulation in a cask, as a 90-day generator	0.3	3.2
SR-W024	Mercury/Tritium Gold Traps	Meets LDR Treatment Standard	2.3	0.2
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g	Characterization in TWCCF	2,744.8	0
SR-W026	Thirds/TRU Job Control Waste	Characterization in TWCCF – WIPP Disposal	67	241
SR-W027	Solvent/TRU Job Control Waste	Characterization in TWCCF – WIPP Disposal	4,873.2	0
SR-W028	Mark 15 Filter Paper	Incineration followed by Stabilization – CIF	1.0	0
SR-W029	M-Area Sludge Treatability Samples	Stabilization by Vitrification – M-Area Vendor Treatment Process	1.0	0.4
SR-W030	Spent Methanol Solution	Consolidated with SR-W001	N/A	N/A
SR-W031	Uranium/Chromium Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	0.6	0
SR-W032	Mercury Contaminated Heavy Water	D-Area Facility	9.6	0
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g	Characterization in TWCCF	8.0	308
SR-W034	Calcium Metal	Deactivation by Wet Oxidation – DOE Mobile Reactive Metals Unit – Offsite	0.8	0
SR-W035	Mixed Waste Oil – Sitewide	Incineration followed by Stabilization – CIF	2.2	2.0

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
SR-W036	Tritiated Oil with Mercury	Incineration followed by Stabilization – DOE Mobile Packed-Bed Incinerator – Onsite	17.2	2.2
SR-W037	M-Area High Nickel Plating Line Sludge	Stabilization by Vitrification – M-Area Vendor Treatment Process	1,579	0
SR-W038	Plating Line Sump Material	Stabilization by Vitrification – M-Area Vendor Treatment Process	0.4	0
SR-W039	Nickel Plating Line Solution	Stabilization by Vitrification – M-Area Vendor Treatment Process	5.0	0
SR-W040	M-Area Stabilized Sludge	Waste stream eliminated	N/A	N/A
SR-W041	Aqueous Mercury and Lead	Effluent Treatment Facility	.3	0
SR-W042	Paints and Thinners	CIF – Incineration	5.4	7.0
SR-W043	Lab Waste w/Tetraphenyl Borate	Consolidated with SR-W012	N/A	N/A
SR-W044	Tri-Butyl-Phosphate & n-Paraffin – TRU	Consolidated with SR-W045	N/A	N/A
SR-W045	Tri-Butyl-Phosphate & n-Paraffin	Incineration followed by Stabilization – CIF	119.6	54.5
SR-W046	Consolidated Incineration Facility (CIF) Ash	Stabilization – CIF Ashcrete Unit	0	124
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	Stabilization – CIF Ashcrete Unit	0	800
SR-W048	Soils from Spill Remediation	Stabilization by Vitrification – M-Area Vendor Treatment Process	16.8	0
SR-W049	Tank E-3-1 Clean Out Material	Stabilization – Offsite DOE-INEL-WEDF	1.2	0
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	Treatment by SRTC as a 90-Day Generator	0.1	0.4
SR-W051	Spent Filter Cartridges and Carbon Filter Media	Incineration followed by Stabilization – CIF	0.8	3.0
SR-W052	Cadmium Contaminated Glovebox Section	Waste stream eliminated	N/A	N/A
SR-W053	Rocky Flats Incinerator Ash	Return to Rocky Flats	0.1	0
SR-W054	Enriched Uranium Contaminated with Lead	Consolidated with SR-W037	N/A	N/A
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	Incineration followed by Stabilization – CIF	951	0

Waste Stream No.	Waste Stream Name	Preferred Option (PO)	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators	None – pursuing research program	260	0
SR-W057	D-Tested Neutron Generators	Waste stream eliminated	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
SR-W059	Tetrabutyl Titanate (TBT)	Consolidated with SR-W001	N/A	N/A
SR-W060	Tritiated Water with Mercury	Macroencapsulation in S. S. Container – Onsite	0.2	0
SR-W061	DWPF Mercury	Amalgamation – Offsite DOE-INEL WEDF	0	0.9
SR-W062	Toxic Characteristic (TC) Contaminated Debris	Macroencapsulation with Polymer by a Vendor – Onsite	6.2	5
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	Meets Treatment Standard	0	42
SR-W064	IDW Soils/Sludges/Slurries	Awaiting ROD, etc.		
SR-W065	IDW Monitoring Well Purge/Development Water	Awaiting ROD, etc.		
SR-W066	IDW Steel and Metal Debris	Awaiting ROD, etc.		
SR-W067	IDW Personnel Protective Equipment (PPE) Waste	Awaiting ROD, etc.		
SR-W068	Elemental (Liquid) Mercury	Amalgamation – Offsite DOE-INEL WEDF	0.1	0.2
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	Macroencapsulation with Polymer by a Vendor – Onsite	73.5	15
SR-W070	Mixed Waste from Laboratory Samples	Incineration followed by Stabilization – CIF	0	2.2
SR-W071	Wastewater from TRU Drum Dewatering	Incineration followed by Stabilization – CIF	11.8	4.2
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
SR-W073	Plastic/Lead/Cadmium Raschig Rings	Incineration followed by Stabilization – CIF	1.8	0

Section 11.2 Preferred Option Summary (by Facility)

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
Consolidated Incineration Facility (CIF)			
Treatment Standard – Incineration			
SR-W001	Rad-Contaminated Solvents	8.4	5.0
SR-W003	Solvent Contaminated Debris (LLW)	9.3	2.6
SR-W012	Incinerable Toxic Characteristic (TC) Material	2.8	1,609.6
SR-W022	DWPF Benzene	0	1,512.0
SR-W035	Mixed Waste Oil – Sitewide	2.2	2.0
SR-W055	Job Control Waste Containing Solvent Contaminated Wipes	951	0
Treatment Standard – Other Than Incineration			
SR-W018	Filter Paper Take Up Rolls (FPTUR)	260	0
SR-W028	Mark 15 Filter Paper	1.0	0.4
SR-W042	Paints and Thinners	5.4	7.0
SR-W045	Tri-Butyl-Phosphate & n-Paraffin	119.6	54.5
SR-W051	Spent Filter Cartridges and Carbon Filter Media	0.8	3.0
SR-W070	Mixed Waste from Laboratory Samples	0	2.2
SR-W071	Wastewater from TRU Drum Dewatering	11.8	4.2
SR-W073	Plastic/Lead/Cadmium Raschig Rings	1.8	0
Ashcrete Stabilization			
SR-W046	Consolidated Incineration Facility (CIF) Ash	0	124
SR-W047	Consolidated Incineration Facility (CIF) Blowdown	0	800
Effluent Treatment Facility Wastewater Treatment			
SR-W041	Aqueous Mercury and Lead	0.3	0
SRTC Low Activity Waste Storage Tanks – Ion Exchange			
SR-W007	SRL (SRTC) Low Activity Waste	58.6	375
SRTC High Activity Waste Storage Tanks – Ion Exchange			
SR-W008	SRL (SRTC) High Activity Waste	72.2	375
High-Level Waste ITP Facility			
SR-W020	In-Tank Precipitation (ITP) and Late Wash (LW) Filters	0	32.6
D-Area Heavy Water Operations Facility			
SR-W032	Mercury Contaminated Heavy Water	9.6	0

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
Meet Treatment Standards			
SR-W024	Mercury/Tritium Gold Traps	2.3	0.2
SR-W040	M-Area Stabilized Sludge	N/A	N/A
SR-W063	Macroencapsulated Toxic Characteristic (TC) Waste	0	42
Macroencapsulation as a 90-Day Generator			
SR-W015	Mercury/Tritium Contaminated Equipment	9.9	253.2
SR-W023	Cadmium Safety/Control Rods	0.3	3.2
SR-W072	Supernate or Sludge Contaminated Debris from High-Level (HLW) Operations	0	1,065
M-Area Vendor Treatment Process			
Design Basis Waste Streams			
SR-W004	M-Area Plating Line Sludge from Supernate Treatment	850	20
SR-W005	Mark 15 Filtercake	15.4	0
SR-W029	M-Area Sludge Treatability Samples	1.0	0.4
SR-W037	M-Area High Nickel Plating Line Sludge	1,579	0
SR-W038	Plating Line Sump Material	0.4	0
SR-W039	Nickel Plating Line Solution	5.0	0
Newly Identified Streams			
SR-W031	Uranium/Chromium Solution	0.6	0
SR-W048	Soils from Spill Remediation	16.8	0
M-Area Liquid Effluent Treatment Facility followed by M-Area Vendor Treatment Process			
SR-W011	Cadmium-Coated HEPA Filters	100.2	0
SRS Canyon Facility – Macroencapsulation in S. S. Container			
SR-W009	Silver Coated Packing Material	10.2	3.1
SRS (Facility TBD) – Macroencapsulation			
SR-W060	Tritiated Water with Mercury	0.2	0
SR-W062	Toxic Characteristic (TC) Contaminated Debris	6.2	5
SR-W069	Low-Level Waste (LLW) Lead – to be Macroencapsulated	73.5	15

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
DOE Mobile Treatment Facilities			
SR-W034	Calcium Metal	0.8	0
SR-W036	Tritiated Oil with Mercury	17.2	2.2
Offsite Vendor Facility – Decontamination			
SR-W013	Low-Level Waste (LLW) Lead – to be Decontaminated	82.2	30
Offsite DOE Facility – INEL/WEDF Amalgamation			
SR-W014	Tritium-Contaminated Mercury	0.3	0.1
SR-W061	DWPF Mercury	0	0.9
SR-W068	Elemental (Liquid) Mercury	0.1	0.2
Offsite DOE Facility – INEL/WEDF Stabilization			
SR-W049	Tank E-3-1 Clean Out Material	1.2	0
Waste Streams to be Further Characterized			
SR-W025	Solvent/TRU Job Control Waste <100 nCi/g**	2,744.8	0
SR-W033	Thirds/TRU Job Control Waste <100 nCi/g **	8.0	308
Waste Streams Undergoing Development of Treatment Technology			
SR-W056	Job Control Waste with Enriched Uranium and Solvent Applicators	260	0
TRU Waste Streams			
SR-W006	Mixed TTA/Xylene – TRU	0.1	0
SR-W026	Thirds/TRU Job Control Waste	67	241
SR-W027	Solvent/TRU Job Control Waste	4,873.2	0
Offsite DOE— Rocky Flats Environmental Technology Site			
SR-W053	Rocky Flats Incinerator Ash	0.1	0
Defense Waste Processing Facility			
SR-W016	221-F Canyon High-Level Liquid Waste	53,800	5,464
SR-W017	221-H Canyon High-Level Liquid Waste	73,240	9,970

Waste Stream No.	Waste Stream Name	Current cumulative inventory through 09/30/94 (m^3)	Future forecast generation (1995-1999) (m^3)
Pretreatment as a 90-day Generator at SRTC followed by Vitrification			
SR-W050	Mixed Waste to Support High-Level Waste (HLW) Processing Demonstrations	0.1	0.4
SR-W058	Mixed Sludge Waste with Mercury from DWPF Treatability Studies	0.1	0
Waste Streams Consolidated			
SR-W002	Rad-Contaminated Chlorofluorocarbons	N/A	N/A
SR-W010	Scintillation Solution	N/A	N/A
SR-W019	244-H RBOF High Activity Liquid Waste	N/A	N/A
SR-W030	Spent Methanol Solution	N/A	N/A
SR-W043	Lab Waste w/Tetraphenyl Borate	N/A	N/A
SR-W044	Tri-Butyl-Phosphate & n-Paraffin – TRU	N/A	N/A
SR-W054	Enriched Uranium Contaminated with Lead	N/A	N/A
SR-W059	Tetrabutyl Titanate (TBT)	N/A	N/A
Waste Streams Recharacterized			
SR-W021	Poisoned Catalyst Material	N/A	N/A
SR-W052	Cadmium Contaminated Glovebox Section	N/A	N/A
SR-W057	D-Tested Neutron Generators	N/A	N/A

** Mixed low-level waste conservatively managed as TRU (transuranic waste).

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
BLEAD	Thermal Recovery of Lead
BOD	Biological 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
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
Co	Cobalt
CO_2	Carbon Dioxide
COBRA	Computerized Radioactive Waste Burial Record Analysis
Cont. Bldg.	Containment Building
Cr	Chromium
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-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
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
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
NRC	Nuclear Regulatory Commission
NTPO	National Transuranic Program Office

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
ppt	Parts Per Trillion
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
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

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