HLW-OVP-95-0102

High Level Waste Management Division

High-Level Waste System Plan Revision 6 (U)

December 20, 1995

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

Prepared for the U. S. Department of Energy under contract no. DE-AC09-89SR18035

Westinghouse
Savannah River Company

A. B. Scott, Jr.
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20 DEC 1995

HLW-OVP-95-0102

Mr. A. L. Watkins, Assistant Manager
High Level Waste
U. S. Department of Energy
Savannah River Operations Office
P. O. Box A
Aiken, SC 29802

Dear Mr. Watkins:

HIGH LEVEL WASTE SYSTEM PLAN, REVISION 6 (U)

Attached is the final version of the HLW System Plan, Revision 6. The reason for this revision is to align the Plan with the FY96 Annual Operating Plan, projected funding for FY97 and funding as required to complete the vitrification of all existing and currently planned High Level Waste by the year 2028. There are several improvements incorporated into this Plan as compared to Revision 5. Additional improvements are already in progress for Revision 7. It is anticipated that this Plan will be revised and issued again as Revision 7 after the FY98 Outyear Budget Plan is finalized which is currently projected to occur in the may 1996 timeframe.

Questions or requests for additional information regarding this Plan should be directed to S. S. Cathey at 5-3052 or N. R. Davis at 5-1246 of my staff.

Sincerely,

A. B. Scott, Jr.
Vice President and General Manager
High Level Waste Management Division

NRD:nrd/jbm

Att.

HLW-OVP-95-0102

High-Level Waste Management Division

High-Level Waste System Plan
Revision 6

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HLW System Plan - Revision 6

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Executive Summary

Introduction

This Revision of the High Level Waste (HLW) System Plan describes the HLW Program that will vitrify all HLW contained in the old and new-style tanks by FY2028. The canister production rate is projected to average 200 canisters per year. The funding basis is the FY96 Annual Operating Plan at $466 million and projected FY97 funding of $436 million. The required funding level after FY97 is estimated to be $437 million per year in FY96 constant year dollars except for the time period when Glass Waste Storage Building #2 must be constructed. This assumed funding profile supports all regulatory requirements.

State of the HLW System

The 2F Evaporator attained its space gain goal in FY95 and is operating as planned thus far in FY96.

The 2H Evaporator exceeded its space gain goal in FY95. The evaporator was shut down for feed pump and evaporator vessel replacement. This work is complete and the evaporator was operating well at the time of this Plan.

In-Tank Precipitation (ITP) startup was achieved 9/2/95. Concentration of ITP Batch #1 is complete. The precipitate filters and benzene stripper performed as expected. A rigorous radioactive test program is in progress as planned. Precipitate is projected to be ready to support the 6/1/96 Late Wash startup.

Three quad-volute slurry pumps in Tank 51 have been replaced with new machined impeller pumps. Sludge washing, settling and washwater decanting is complete. A 25 liter sludge sample was obtained for final testing at the Savannah River Technology Center (SRTC).

New Waste Transfer Facility startup was achieved 11/27/95. Testing and hot tie-ins are complete. Water runs were in progress at the time of this Plan.

Design and construction of the Replacement High Level Waste Evaporator (RHLWE) continues. The evaporator vessel has been shipped from the vendor. Radioactive startup is planned to occur 11/30/98.

The refurbishment and upgrade of the F to H-Area Inter Area Line is progressing. This facility is planned to be ready to resume radioactive operations 12/31/95.

Design and construction of Waste Removal facilities on Tanks 8, 25, 28 and 29 is progressing. Construction of the 241-2H Control Room building is complete. The near term project scope is in the process of being redirected to focus on outfitting tanks with waste removal equipment and demonstrating cost effective alternatives to waste removal with slurry pumps.

The Defense Waste Processing Facility completed Waste Qualification Runs having poured 71 canisters. The contractor Operational Readiness Review (ORR) is complete and the Department of Energy (DOE) ORR is in progress. The planned startup date is 12/31/95.

Design and construction of the Late Wash Auxiliary Pump Pit modifications continues toward a planned 6/1/96 radioactive startup.

System Planning Improvement Opportunities

The HLW System Plan is continuously improved in terms of planning tools, administrative controls and scheduling. While there is a strong basis for the Integrated HLW Schedule shown in Appendix E, additional effort is needed in the future to assess the impact of the following actions:

- potential FY96-97 Reduction in Force;
- continued refinements to the various production planning models;
- process optimization to reduce the number of canisters produced;
- incorporation of operating data to refine cycle times for new facilities;
- continued refinement of waste characterization via the Waste Composition Database, particularly in the area of cesium and potassium concentrations in the salt tanks and the actual insoluble solids content of Tank 51 sludge;
- resource loaded schedules at the Department and Division level;
- Tank 39 as a 2H Evaporator salt receiver;
- Tanks 21 and 24 for dilute waste storage and reuse;
- return of empty salt tanks to salt receipt service; particularly Tank 41;
- cooling coil replacement for Tanks 29-31;
- tank closure criteria and Performance Evaluations; and
- Waste Removal programs that require resequencing and Baseline Change Control actions due to past budget reductions and new technologies.

1.0 Introduction to the HLW System Plan

This Plan describes the strategy for the integrated startup and operation of the HLW System based on the efficient allocation of available and projected resources. This Plan is revised each time there is a major perturbation in the planning basis. This revision documents the results of the FY96 Annual Operating Plan (AOP) planning process.

This document includes the bases for the HLW System Plan in Sections #1-6, key issues and assumptions in Section 7, a description of the production plan in Section 8 and supporting tables and figures in the attached Appendices. Appendix A provides a list of acronyms. Appendix G shows simplified process flowsheets. These appendices should be particularly useful to those who are not familiar with this Plan.

Many of the appendices that were included in previous revisions of this Plan are no longer included. This was done to streamline the Plan. This information is still compiled and is available on request.

One of the goals of the planning process is to continuously improve the HLW System Plan to better serve the needs of DOE. Revision 6 of this Plan incorporates several improvements since Revision 5:

- an integrated linear programming computer simulation of the HLW System using Aspen Speedup (R) software is now used in lieu of the previous personal computer based spreadsheets for many areas of this Plan;
- salt batching for ITP now extends to the end of the program versus only for the first 40 batches;
- the Saltstone operation is planned through the end of the program versus the first three vaults;
- planned sludge washing and aluminum dissolution for Sludge Batches #2a, 2b, 3a and 3b has been optimized versus the previous assumption of washing to 10 wt % Na and removing 75 wt % of the aluminum; and most importantly
- the HLW System Plan document has been streamlined by 50% versus the previous revision.

The planning basis for this revision is stronger than the basis for Revision 5. In-Tank Precipitation, Extended Sludge Processing, and the New Waste Transfer Facility have achieved startup. The F/H Inter-Area Line upgrade and the Defense Waste Processing Facility (DWPF) are within one month of startup. The RHLWE and Waste Removal projects have made significant progress. All of these items reduce programmatic uncertainty. Technical uncertainty has also been reduced as most of the technical issues associated with the above startups have been resolved.

The challenge for Revision 7 of this Plan will be to implement cost savings initiatives at the Site and HLW Division levels to enable cost savings and process improvements to be integrated into this Plan. In this way, more funding can be allocated to canister production, removal of waste from tanks, and maintenance of those facilities for which there is a long term mission.

2.0 Mission

The mission for the High Level Waste System is to:

- safely and acceptably store existing DOE high level waste;
- support critical Site production and cleanup missions by providing tank space to receive waste;
- volume reduce and therefore stabilize high level waste by evaporation;
- pretreat high level waste for further processing and disposition;
- immobilize and dispose of low level liquid waste resulting from HLW pre-treatment onsite as Saltstone grout;
- immobilize and store onsite on an interim basis the high level liquid waste as vitrified glass for ultimate disposal in a geologic repository; and
- ensure that risks to the environment and to human health and safety posed by high level waste operations are either eliminated or reduced to prescribed, acceptable levels.

That part of the HLW Mission that supports other Site Missions remains a high priority. The Defense Nuclear Facilities Safety Board (DNFSB) 94-1 document contains nine distinct recommendations, the first of which is:

> "That an integrated program plan be formulated on a high priority basis, to convert within two to three years the materials addressed in the specific recommendations below, to forms or conditions suitable for interim storage."

The Savannah River Site (SRS) plan to address this recommendation is the Integrated Nuclear Management (INMM) Plan which is briefly described in Section 8.2. The HLW resulting from executing the INMM Plan, pending Records of Decision, is shown in Appendix F.3.

3.0 Purpose

The purpose of this HLW System Plan is to document the baseline for the currently planned HLW operations from the receipt of fresh waste through the operation of the DWPF and Saltstone until all HLW has been vitrified. This document is a summary of the key planning bases, assumptions, limitations, strategy and schedules for facility operations as supported by the FY96 AOP. This Plan will also be used as a base document for developing the future FY98 Outyear Budget Plan, for adjusting individual project baselines to match projected funding, and to project the Site's ability to support the Federal Facilities Agreement (FFA) Waste Removal Plan and Schedule.

4.0 High Level Waste System Description

This Plan refers to the HLW System; key facilities of which are listed below. The HLW System includes Tank Farm operations from receipt of fresh waste to the processing and transfer facilities required to deliver feed to and receive recycle from the DWPF, the DWPF operation, and the key supporting operations such as Saltstone and the Consolidated Incinerator Facility as shown below:

High Level Waste
- F-Area Tank Farm
- 2F Evaporator
- H-Area Tank Farm
- 2H Evaporator
- Replacement High Level Waste Evaporator project
- New Waste Transfer Facility project
- Waste Removal projects
- In-Tank Precipitation
- Extended Sludge Processing
- F/H Effluent Treatment Facility
- F/H Inter-Area Line
- Tank Farm Services Upgrade (H-Area) project
- Tank Farm Services Upgrade (F-Area) project
- Tank Farm Storm Water System Upgrade project

Defense Waste
- Defense Waste Processing Facility
- Late Wash
- Replacement Melter projects
- Failed Equipment Storage Vaults projects
- Glass Waste Storage Building #1
- Glass Waste Storage Building #2 project
- Saltstone
- Saltstone Vault projects

Solid Waste
- Consolidated Incinerator Facility project

The inter-relationship of the above facilities and projects is shown in Appendix G, Simplified HLW Flowsheet Diagram. Appendix H shows the same facilities with more detail of the waste tank contents and tank functions.

5.0 Planning Constraints

Operation of the HLW System facilities is subject to a variety of programmatic, regulatory and process constraints as described in Sections 5.1 through 5.3.

5.1 Planning Methodology and Approvals

Some uncertainty is inherent in this Plan. Lack of actual operating experience in the new processes, as well as emergent budget issues, changes to Canyon production plans, evolution of Site Decontamination & Decommissioning initiatives, and other factors preclude execution of a "fixed" plan. Therefore, DOE Headquarters (DOE-HQ), DOE Savannah River (DOE-SR) and Westinghouse Savannah River Company (WSRC) personnel are continuously evaluating the uncertainties in the Plan and incorporating changes to improve planning and scheduling confidence. WSRC refines and updates this Plan after each significant perturbation to the planning basis.

The **HLW Steering Committee** provides the highest level of oversight of the HLW System. This Committee consists of members from DOE-HQ, DOE-SR, and the WSRC HLW Division. The Committee meets periodically to formally review the status and operational plan for the HLW System. The HLW System Plan is approved by DOE-HQ, DOE-SR, and WSRC HLW.

The **HLW Program Board** is a WSRC committee that provides oversight and approval of the HLW System Plan and the schedules contained therein which form the schedule and cost "baseline" for the overall program. Maintenance of the baseline is controlled via a formal change control process.

The **Technical Oversight Steering Team (TOST)** provides the oversight for resolution of technical issues within the HLW System. The TOST is comprised of representatives from HLW Engineering, SRTC and HLW Program Management.

The **HLW System Integration Management Plan (SIMP)** describes the production planning methodology and tools applied at the division and facility levels. The SIMP provides administrative controls regarding the roles and responsibilities of organizations and for the planning, modeling, and evaluation tools that are used.

The **Process Interface Description (PID)** specifically describes the interfaces between HLW facilities and discusses the control of the interfaces. Changes to facility technical baselines are reviewed to determine if they could impact the interfaces described in the PID before the changes are implemented.

Waste Acceptance Criteria are in place for all waste transferred to the Tank Farms for interim storage. Influent waste streams must be compatible with existing equipment and processes, must remain within the safety envelope, and must meet downstream process requirements.

WSRC uses a family of computer simulations to model the HLW System. The **Chemical Process Evaluation System (CPES)** provides a steady state simulation for individual sludge batches or for the entire HLW program. The results of CPES are input to the **Product Composition Control System (PCCS)** which checks glass durability. **ProdMod** is a linear equation model that is used for quick simulations of HLW System response to different operating scenarios.

The **HLW Integrated Flowsheet Model** provides a dynamic simulation of key process parameters to aid in the identification of transient responses during process reactions.

The **Citizens Advisory Board (CAB)** advises the Site on environmental cleanup and waste management issues. The CAB is formally chartered and meets on a regular basis.

Public Meetings are periodically held to increase opportunities for information exchange between SRS officials and members of the public. Meeting locations are varied in order to reach as many communities as possible.

5.2 Regulatory Constraints

There are numerous Regulatory laws, constraints and commitments that impact HLW System planning. The most important are briefly described below.

5.2.1 Federal Facility Agreement

The FFA was executed by DOE, the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC) and became effective August 16, 1993. The FFA provides standards for secondary containment, requirements for responding to leaks and provisions for the removal from service of leaking or unsuitable HLW storage tanks. Tanks that do not meet the standards set by the FFA may be used for the continued storage of their current waste inventories, but these tanks are required to be placed on a schedule for removal from service. The "F/H Area High Level Waste Removal Plan and Schedule," submitted to Regulators on November 10, 1993, shows specific start and end dates for the removal from service of each non-compliant tank, and commits SRS to remove the last non-compliant tank from service no later than FY2028. SCDHEC has yet to approve the F/H Area High Level Waste Removal Plan and Schedule. The current waste removal program schedule shows removal of waste from the non-compliant tanks by FY2021 and all tanks by FY2028.

5.2.2 Site Treatment Plan (STP)

The Proposed Site Treatment Plan for SRS describes the development of treatment capacities and technologies for mixed wastes. The information contained in the plans will allow DOE, Regulatory Agencies, the States and other stakeholders to efficiently plan mixed waste treatment and disposal by considering waste volumes and treatment capacities on a national scale. The STP identifies DWPF as the "preferred treatment option" for treating SRS liquid high level waste. It includes commitments to complete DWPF testing and readiness preparations by second quarter FY96, begin radioactive testing and commence operations within 12 months and provide a schedule for processing backlogged and currently generated mixed waste within 120 days after commencing operations.

5.2.3 National Environmental Policy Act (NEPA) Activities

NEPA requires federal agencies to assess the potential environmental impacts of constructing and operating new facilities or modifying existing facilities. DOE has recently completed three NEPA documents that directly affect the HLW System:

- DWPF Supplemental Environmental Impact Statement
- Waste Management Environmental Impact Statement
- INMM Environmental Impact Statement (EIS)

These three documents, pending the Records of Decision for the INMM EIS, are the basis for the operating scenario described in this Plan.

5.3 Operating Constraints

5.3.1 Waste Removal Sequencing Considerations

The following generalized priorities were used to determine the current sequencing of waste removal from the HLW tanks:

1) Maintain emergency tank space per the Tank Farm Safety Analysis Report (SAR);
2) Control tank chemistry including radionuclide and fissile material inventory;
3) Enable continued operation of the evaporators;
4) Ensure blending of processed waste to meet the ITP, Saltstone and DWPF feed criteria;
5) Remove waste from tanks with a history of leakage;
6) Remove waste from tanks which do not meet secondary containment and leak detection requirements;
7) Provide sludge feed to DWPF and precipitate feed to Late Wash when Late Wash is completed;
8) Maintain an acceptable precipitate balance within ITP;
9) Support the startup and continued operation of the RHLWE;
10) Maintain continuity of radioactive waste feed to the DWPF; and
11) Remove waste from the remaining tanks.

While the principal goal of the HLW System Plan is the removal of waste from the old-style tanks, it is necessary to remove salt waste from some of the Type III Tanks to support the cleanup of the older tanks. Salt removal from new tanks is required to maintain the evaporator systems on-line and to provide space as required to receive the large transfers involved with the waste removal processes and DWPF recycle. Removal of salt from Type III Tanks 41, 25, 29, 38, and 31 must receive priority to support the key volume reduction mission of the 2H, 2F and RHLWE Evaporator systems. It is the complex interdependency of the safety and process requirements of the various HLW facilities that drives the sequencing of waste removal from tanks.

5.3.2 Process Considerations

Waste Removal from Type I, II and IV Tanks: HLW at SRS is stored in carbon steel tanks. The Type I, II and IV Tanks do not have adequate secondary containment and leak detection capabilities (Type IV Tanks have no secondary containment). Several of the HLW tanks have leaked in the past. While no tanks have active leak sites and a formal tank integrity monitoring program exists, risk to the environment will be reduced by removing the waste from these tanks into a borosilicate glass waste form contained in stainless steel canisters. ITP, Extended Sludge Processing (ESP), Late Wash, DWPF and Saltstone are all new operations supporting the mission of vitrifying the waste.

Tank Space Availability: Ensuring the availability of sufficient operating space in specific tanks at specific need dates is a key consideration in the development of an operating strategy. In addition to providing safe storage of waste and a feed stream to DWPF, additional tank space must also be generated to serve as surge capacity. This recovered tank space results from the operation of ITP or by processing of existing dilute HLW supernate through the evaporator systems. This space gain is extremely important for the following reasons:

- to maintain the evaporator systems on-line;
- to provide space to receive the large volume waste transfers which are a by-product of ESP, Waste Removal and DWPF operations; and
- to ensure flexibility to handle unanticipated problems that could require additional tank space.

At this time, the volume of available tank space is quite low thus a significant portion of this Plan is dedicated to planning in this area.

6.0 Planning Bases

6.1 Reference Date

The reference date of this Plan is December 1, 1995. Schedules, budget, milestones, cost estimates, and operational planning were current as of that date.

6.2 Funding

The funding required to support the HLW System Plan through FY01 is shown in Appendix C by individual Activity Data Sheet (ADS) and is based on the following assumptions and requirements:

- FY96 AOP funding in the amount of $466 million;

- projected FY97 Outyear Budget Plan at $454 million minus the DOE Internal Review Board $15 million reduction minus the Rock Hill $3 million reduction leaving a total of $436 million;

- FY98 at the FY97 value of $436 million plus $15 million plus 3% escalation from FY97;

- FY99 - FY01 at the FY98 value plus 3% escalation per year;

- FY02 - 08 similar to FY01 plus the cost of Glass Waste Storage Building #2 plus 3% escalation per year; and

- FY09 and beyond returning to the FY01 value with 3% escalation per year

Two hundred canisters are produced each year starting FY98. The required annual funding is about $437 million in FY96 constant year dollars. This annual amount is exceeded only during the construction of Glass Waste Storage Building (GWSB) #2. After GWSB #2 is complete, the required funding returns to $437 million per year and gradually decreases until all of the waste is vitrified. This funding profile is shown in Appendix C.

6.3 Key Milestones and Integrated Schedule

Key milestones relate to the processes required to safely remove radioactive waste from storage and process it into canisters of glass or into Saltstone. The key milestones shown below are supported by the budget as described in Section 6.2 and are compared to previous revisions of this Plan.

Key Milestone	rev. 3	rev. 4	rev. 5	rev. 6
• Start up In-Tank Precipitation	12/94	3/95	7/95	*9/95*
• Start up New Waste Transfer Facility	11/95	11/95	11/95	*11/95*
• DWPF Radioactive Operations	12/95	12/95	12/95	12/95
• Start up Consolidated Incinerator Facility	2/96	2/96	2/96	5/96
• Start up Late Wash	3/96	6/96	6/96	6/96
• Precipitate ready to feed Late Wash	2/96	8/96	8/96	6/96
• Tank 25 ready for salt removal (2nd ITP)	10/96	6/96	3/97	3/97
• Start up RHLWE	11/97	5/01	4/99	11/98
• Tank 29 ready for salt removal (3rd ITP)	6/96	9/98	7/99	12/99*
• Tank 8 ready for sludge removal (batch#2a)	12/98	2/01	2/01	2/00*
• Tank 38 ready for salt removal (4th ITP)	8/98	5/00	5/04	9/01*
• Tank 11 ready for sludge removal (batch#2b)	6/99	11/02	9/05	9/02*
• Tank 31 ready for salt removal (5th ITP)	5/97	5/01	8/06	9/02*

italics = actual
* indicates current need date, confirmation of schedule pending

7.0 Key Issues and Assumptions

Key issues affecting the HLW system are descibed below. Each issue is tied to an assumption and potential contingency actions.

7.1 Waste Removal FFA Plan and Schedule

Issue: SRS's ability to meet the FFA commitments is uncertain.

Background: The FFA requires waste to be removed from the 24 old-style tanks by FY2028. If additional funding is not available, then our ability to achieve this date will be determined by our ability to implement more cost effective waste removal technologies, increase system attainment, and prove that it is regulatorily feasible to leave small heels in some tanks.

Assumption: A combination of improved waste pre-treatment technologies, waste composition sampling and analyses, process optimization, tank closure studies, and alternative waste removal technologies can be successfully combined to support this very aggressive schedule.

Contingency: Obtain additional funding, develop and implement other cost reductions, adopt new waste processing technologies, or renegotiate the FFA commitments.

7.2 Funding for the HLW System

Issue: Outyear funding may not be sufficient to execute this Plan.

Background: Optimistic outyear funding projections for the HLW System used in past Five Year Plans have eroded. Current funding projections for the HLW System are less than the required funding upon which this Plan is based and do not include any contingency for emergent work, although emergent work items are sure to occur.

Assumption: Additional funding will be made available via cost reduction initiatives that can be combined with additional funding from other sources such that this Plan can be executed as written.

Contingency: WSRC HLW personnel will maintain close communication with DOE-SR regarding budget status, emergent work issues, and availability of funds from cost savings initiatives.

7.3 Age of the HLW Facilities

Issue: The materiel condition of many HLW facilities constructed from the early 1950's to the late 1970's is deteriorating.

Background: The following are examples. The transfer line encasement in F-Area has failed in one place and is leaking in several others. Groundwater intrusion into Tanks 19 and 20 has been observed. Routine repairs to service systems in the F and H-Area Tank Farms have escalated into weeks of unplanned downtime due to the poor condition of the service piping and obsolete instrumentation. In many cases, waste cannot be transferred out of tanks unless temporary services are installed. Aging facilities cause excessive unplanned downtime, addition of unplanned scope to existing projects or the need for new Line Item projects to ensure that the Tank Farm infrastructure will be able to support the HLW Program. It should be noted that the Tank Farm can't be "shut down" as it contains 34 million gallons of highly radioactive, highly mobile liquid waste.

Assumption: The H-Area encasement will not fail, the H-Area Type IV Tanks will not leak or fail, there will be sufficient funding allocated to maintenance of the Tank Farms, and planned Line Item projects in FY96, 99 and 00 will remain on schedule to help refurbish and preserve the Tank Farm infrastructure.

Contingency: Remove sludge from old-style tanks earlier by consolidating it in new-style tanks without feeding it to DWPF; accept a slowdown of the HLW Program and increased life cycle costs to reallocate funding.to the Tank Farm infrastructure; accept increased environmental risks as tank systems age; or obtain additional funding.

7.4 Plans to Avoid Saltbound Condition in Tank Farm Evaporators

Issue: The 2H Evaporator System is nearly saltbound.

background: The 2F Evaporator has seven salt receipt tanks, six of which are full. The 2H Evaporator has two salt receipt tanks with about one quarter of one tank of space remaining. The RHLWE will have one salt receipt tank when it starts up. The 2H Evaporator system is of greatest concern because of the small amount of salt space remaining and because the 2H Evaporator is needed to evaporate the future DWPF recycle stream. It is difficult to measure the actual volume of saltcake in a tank due to the way the salt forms, thus it is difficult to determine how close an evaporator system may be to a saltbound condition.

Assumption: Tank 38, in the 2H Evaporator system, does not contain more than the estimated amount of salt. ITP will execute the ITP Production Plan as shown in Appendix F.1.

Contingency: Demonstrate and implement alternative salt removal techniques to assist in emptying salt tanks. Outfit one salt tank in each evaporator system with slurry pumps to ensure that each evaporator can quickly generate an empty salt tank if needed. Slow down the HLW Program to achieve near term cost reductions or slow down planned Canyon programs until the Tank Farm is in a better position to support it.

7.5 Analytical Laboratory Requirements

Issue: Laboratory turnaround times limit the production capacity of several HLW facilities.

Background: The startup of ITP, ESP, Waste Removal, DWPF and Late Wash will increase the analytical burden on the Site laboratories. The attainment of each facility in the HLW System is dependent upon the timely turnaround of sample results. Analytical results are required to confirm that some processing steps have been satisfactorily completed before proceeding to the next step.

Assumption: Minimum analytical needs can be identified, appropriately scheduled and accommodated by onsite facilities such that HLW System attainment will not be adversely impacted.

Contingency: Alternative analytical methods which can decrease turnaround time are being evaluated as substitutions for previously planned methods. Projected analytical needs are being compared to current Site capabilities to facilitate changes in sample schedules or recommend improvements in Site resources as appropriate.

7.6 ITP Composite Lower Flammability Limit (CLFL)

Issue: CLFL concerns have driven ITP to establish process constraints such that ITP can't support the operation of the HLW System until the constraints are removed.

Background: The ITP SAR requires that the time to reach CLFL be maintained greater than three days in the event that normal tank ventilation is lost. The current ITP safety basis is built upon safety analyses made with lumped parameter models describing benzene generation factors and a tank vapor space that is mixed by diffusion only. Current testing has not yet identified the exact benzene generation mechanism(s).

Assumptions: The ITP Radioactive Operations Commissioning Test Program (ROCTP) currently in progress in Tank 48 will confirm: the adequacy of the "well-mixed vapor space" assumption; the formation mechanism and release rates of benzene; the sustainability of tank inerting systems; and the sustainability of thermal convection currents, which promote constant release rates. Data gathered during the tests will be used to benchmark the Computational Fluid Dynamics models.

Contingency: Initial ITP operating parameters will be limited to control benzene generation rates to levels at which molecular diffusion is known to be adequate to maintain benzene concentrations below CLFL levels.

7.7 Process Rate Uncertainty

Issue: Process batch or cycle times are not certain thus the production capacity of the HLW System is uncertain.

Background: Several first-of-a-kind facilities are in the process of being started up (ESP, ITP, NWTF, DWPF, Late Wash). While there is confidence that each process will work, the interaction of the flowsheets and batch durations have yet to be established.

Assumptions: Facilities will be started up, experience will be gained, and production batch durations can be defined, meshed and altered as necessary to achieve a HLW System production rate of at least 200 canisters per year.

Contingency: Process parameters can be changed as necessary to increase production such as the number of in-process samples taken, sample determinations reduced, turn around times reduced, reaction rates improved, volumetric transfer rates increased, parallel versus serial operations, etc.

8.0 Integrated Production Plan

8.1 General

The overall HLW System attainment is now projected to be 37% with program completion in FY2028. All of the FFA Waste Removal Plan and Schedule commitments are projected to be met. The funding required to achieve this is shown in Appendix C.

Sections 8.2 through 8.10 describe the requirements of each HLW facility to support this Plan.

8.2 HLW System Material Balance

The Tank Farm Material Balance shown in Appendix F.4 is the key tool used to develop this Plan. The balance between influents to the Tank Farm and effluents to DWPF, Saltstone and the Effluent Treatment Facility is critical during the next ten years due to the current low working inventory of tank space in the Tank Farm. The lack of tank space impacts the ability to receive influents from Separations and DWPF and to store salt concentrate from the evaporators. A review of the forecasted influents and effluents and their impact on the HLW System is provided below.

Working Inventory of Tank Space

Influents and effluents are listed only as they impact the Type III Tanks that are used to store and evaporate HLW, herein referred to as the "Working Inventory" of tank space. The old-style tanks are not considered part of the Working Inventory because the Tank Farm Wastewater Operating Permit does not generally allow waste to be added to old-style tanks. ITP Tanks 48-50 and ESP Tanks 40 and 51 are also not part of the near term Working Inventory because there is no plan to use these tanks for anything other than the pre-treatment of HLW. Also, each Tank Farm is required to maintain 1.271 million gallons of space in Type III Tanks as emergency spare. The "Working Inventory" column in Appendix F.4 is the total available tank space in the Working Inventory of Type III Tanks after deducting 2.542 million gallons for emergency spare space. Note that 0.80 million gallons of Tank Farm emergency space is assumed to be maintained in Tank 49. This is discussed further in Section 8.3.

The Tank Farm currently has about 722,000 gallons of Working Inventory. The goal in the past was to get to a 3,000,000 gallon Working Inventory before DWPF starts up. In this Plan, about 1.8 million gallons of tank space is projected at DWPF startup with less than 3.0 million gallons of tank space during the first three years of operation. This is less than in previous revisions of this Plan. Evaluations are in progress to change the service of one tank in H-Area (Tank 39) to improve this condition.

Influents - F-Area Low Heat Waste (LHW) and High Heat Waste (HHW)

The F-Area Canyon resumed normal acid flowsheet operations and plans to operate through 12/02 de-inventorying the various tank contents and flushing the facility. Several campaigns will be conducted: Pu Solutions, Mk 31's, Mk 16/22's, FRR, etc. Influent volumes to the Tank Farm range from 32,000 to 38,000 gallons per month while the F-Area Canyon is operating. All waste volumes after 12/02 are shutdown flows.

Influents - H-Area LHW and HHW

HB-Line completed the Casini Mission. Several smaller campaigns in H-Canyon (Post Cassini, Pu-242, Pu-238, Mk 16/22, and Np-237) will be conducted to de-inventory the facility. A conservative assumption used in Revision 5 of this Plan was that processing of the onsite aluminum clad Spent Nuclear Fuel would occur although there was no an agreement to do this at the time. Processing of this fuel has been deleted from this Plan. A K15 charge was also assumed to be processed; this is no longer included. Start of dissolution of the Mk 16/22 fuel has been moved from 9/97 to 7/98. All of these campaigns will be completed by 12/02. Waste volumes range up to 53,000 gallons per month; 15,000 gallons of which is from the Outside Facilities General Purpose Evaporator.

Influents - DWPF Recycle

DWPF recycle is based on planned production of 70 canisters (17% attainment) in FY96, 150 canisters (28%) in FY97 and 200 canisters per year (37%) thereafter. The recycle volume will range from 1.17 to 2.52 million gallons per year. The recycle algorithm is explained in Section 8.9.1. This algorithm does not assume that options to further reduce the recycle volume are implemented.

Influents - Tank Washwater

The waste tank interiors of all tanks that are to be removed from service are water washed as part of the waste removal program. The annulus of each tank with a leakage history is also water washed. The volume of the tank interior wash is planned to be 140,000 gallons which is a level of about 40 inches in most tanks. The annulus wash is assumed to be two 25,000 gallon washes which is a level of about 24 inches in the annulus for each wash.

Influents - ESP

The ESP washwater values are based on CPES modeling for each of the remaining sludge batches. All of the washwater is assumed to be evaporated although the last few washes of each batch could be stored and re-used as salt dissolution water. The washwater for each batch is generated during the 30 month period immediately before the batch is fed to the DWPF. No differentiation is made between the water used to slurry and transport the sludge to the ESP tanks, aluminum dissolution waste, and sludge washwater. The 11/95 ESP decant of 500,000 gallons is shown as it determines the 12/95 2H Evaporator space gain.

Influents - Other

Influents from the 100-Areas were listed in previous revisions of this Plan but are now planned to be zero. There are no plans to support the Reactor Basin water quality programs using HLW tanks. Also, the ETF evaporator bottoms that are transferred to Tank 50 do not impact the Tank Farm inventory as Tank 50 is not used to store and evaporate HLW. The Receiving Basin for Offsite Fuel (RBOF) impact on the Working Inventory is projected to be zero because all of this waste will be stored in Tank 23 and it is assumed that it will be used to dissolve salt when Tank 23 becomes full.

Effluents - 2F Evaporator

The 2F Evaporator space gain is based on the forecasted Canyon waste generation and evaporation of the remaining backlog of F-Area HHW. Space gain is based on the projected volume of the waste streams allocated to the 2F Evaporator as described in Section 8.5.3. In general, these streams are F-Area and H-Area HHW, F-Area LHW, 1/2 of the DWPF recycle until the RHLWE starts up 11/98, sludge washwater from pre-washing F-Area sludge in F-Area prior to transfer to the ESP tanks, and tank washwater for the F-Area tanks. This evaporator is assumed to go down for one 6 month outage in FY99 for a vessel replacement.

Effluents - 2H Evaporator

The 2H Evaporator space gain is based on the projected volume of waste streams allocated to the 2H Evaporator as described in Section 8.5.2. In general, these streams are H-Area LHW, ESP washwater and 1/2 of DWPF recycle per year. The 500,000 gallon decant from ESP in 11/95 is assumed to be evaporated in 12/95 thus the large space gain shown. This space gain will more likely occur over a two to three month period. This evaporator is planned to have two salt receipt tanks (Tanks 38 and 41). The evaporator vessel has been replaced with a new vessel outfitted with a hastelloy tube bundle and warming coil. This unit is expected to last until the end of the HLW Program.

Effluents - RHLWE

The RHLWE is planned to start up 11/30/98. Space gain is based on the projected volume of waste streams allocated to the RHLWE as described in Section 8.5.4. In general, these streams are 1/2 of the DWPF recycle, ESP washwater generated from H-Area sludge pre-treatment, and tank washwater generated from H-Area waste tank retirement.

Effluents - In-Tank Precipitation

ITP space gain occurs when concentrated supernate is fed directly to ITP or when a salt tank is emptied and returned to salt receipt service. The space gained with each batch of dissolved salt removed from a salt tank is not shown because the plan is to empty the tank completely. A 1.271 million gallon space gain is generally shown at the completion of salt removal from each tank. ITP space gain is based on executing the ITP Production Plan shown in Appendices F.1 and F.2.

Effluents - Other

The "Other" column lists waste transfers into and out of the Type III Tank Working Inventory as well as redeployment of waste tanks. A gain or loss in this column may also indicate changing the projected use of a tank such as Tank 49 serving as the ITP precipitate feed tank and as Tank Farm emergency spare tank space.

Salt Space

As each evaporator gains space, saltcake and a caustic-rich concentrated supernate are formed in the salt receipt tank. When the saltcake level reaches 1.0 million gallons, the tank is considered to be full. The remaining space typically contains concentrated supernate. At this time, another salt receipt tank is required or the evaporator will become saltbound and shut down.

Pages 2 and 4 of Appendix F.4 show the salt formation in each of the three evaporator systems. The 2H Evaporator has two salt receipt tanks: 38 and 41. Tank 38 is currently filling as indicated by the ascending salt inventory values. During this time, Tank 41 is being emptied via ITP as indicated by the descending salt inventory values. Tank 41 will contain about 124,000 gallons of salt when it must be returned to salt service.

The 2F Evaporator and RHLWE salt inventory is also shown. The RHLWE tanks fill more quickly than 2F or 2H as this is a higher capacity evaporator.

8.3 In-Tank Precipitation

ITP Flowsheet

An evaluation of the "ITP Just in Time - Option 2" flowsheet was completed. The recommendation was to combine the best attributes with the existing flowsheet. The only significant change in the flowsheet will be the volume of precipitate maintained in Tank 49. This level will fluctuate from a low of 112,000 gallons (the minimum level at which the Tank 49 slurry pumps can be operated at full speed) to a high of about 300,000 gallons. The objective of the 300,000 gallon limit is to maintain the absorbed dose to the precipitate to less than 200 mega-rads. As operational experience is gained, this limit could be adjusted as more is learned about the fate of organic compounds in DWPF and in the recycle. Tank 49 precipitate volume is shown in Appendix F.2.

Production Capacity

The current ITP flowsheet cycle time is not indicative of the expected long term cycle time due to the ROCTP test program. Once ROCTP is completed, ITP will assume a more normal cycle time. Because it is not possible to accurately predict the cycle time due to the lack of operating experience, the required cycle times are shown in Appendix F.2. The shortest required batch duration is 30 days and the shortest wash duration is 40 days which is generally considered to be attainable over the long run. If this proves to be the case, then a "typical" cycle of three batches followed by one wash would require about 130 days. This can be compared to the original (circa 1984) design basis cycle time of 123 days.

Each cycle will produce, on average, about 140,000 gallons of 10 wt % precipitate. ITP is therefore capable of producing about 319,000 gallons of precipitate per year. This rate can support 66% DWPF attainment during Sludge Batch #1a & 1b. The ITP facility is therefore not expected to be a limiting factor in the long term. Funding constraints will limit ITP production, and HLW System production, as described below.

Production Plan

The ITP Production Plan is shown in Appendix F.1. The first two ITP batches work off the precipitate and washwater heels in Tanks 48 and 49 that remain from the 1983 ITP Demonstration. This waste is blended with concentrated supernate from Tanks 25 and 26. Batch size will increase from about 400,000 gallons for ITP batch #1 to the flowsheet average of about 800,000 gallons for ITP batch #2 so that ITP can ensure adequate mixing in Tank 48.

The F-Area concentrated supernate from Tanks 25 and 26 serves two purposes: 1) to increase the precipitate volume to provide enough precipitate to feed Late Wash in two ITP batches instead of three as was assumed in Revision 5 of this Plan, and 2) to provide space in the 2F Evaporator system. Precipitate is ready for feed to Late Wash 6/1/96. After ITP Batches #1 & 2, ITP feed will be staged in Tank 40 to allow insoluble solids to settle and to accumulate the next one to two batches of feed.

The Cs-137 activity of the precipitate in Cycle #1 is limited to 12.5 Ci/gal. It is assumed that this limit can be increased for subsequent cycles to the design basis of 39 Ci/gal. The activity in Cycle #2 is projected to be about 19 Ci/gal.

ITP Cycle #1 will produce about 167,000 gallons of 10 wt % precipitate in Tank 48. This material will be pumped to Tank 49 down to the Tank 48 pump heel of 21,000 gallons. The Tank 48 slurry pumps will have to be slowed down and eventually shut down during this transfer. The 146,000 gallons of precipitate in Tank 49 will provide 34,000 gallons of precipitate that can be fed forward to Late Wash as the minimum precipitate level in Tank 49 is 112,000 gallons. Below this level, the Tank 49 slurry pumps cannot be operated at full speed thus there is no assurance that the precipitate is well mixed. The "recipe" for Sludge Batch #1a demands 894 gallons of 10 wt % precipitate per canister, thus the 34,000 gallons available will produce about 38 canisters.

Cycle #2 must start 30 days after Cycle #1 is complete in order to have enough precipitate in FY97 to support the planned production of 150 canisters. It should be noted that funding for the ITP Cycle #2 raw materials is not currently included in the FY96 AOP. SRS will work throughout ITP Cycle #1 to identify a funding source such that ITP Cycle #2 can start in FY96.

The first 9 cycles of the ITP Production Plan are comprised of 36 batches with planned outages after each cycle. Each batch is configured to have a volume of about 800,000 gallons, have a Na concentration of about 5.0 M, and produce about 40,000 gallons of 10 wt % precipitate that is less than 39 Ci/gal. Each cycle is planned to yield about 140,000 gallons of 10 wt % washed precipitate. This is about a 9 month supply when DWPF is producing 200 canisters per year.

Absorbed Precipitate Dose

Currently, the precipitate level in Tank 49 is administratively limited to 565,000 gallons assuming the design maximum radionuclide concentration of 39 Ci/gal. This liquid level in Tank 49 is based upon the rate of flammable gas generation in an unventilated tank and the assumption that up to three days may be required to re-establish tank ventilation after a seismic event.

The design basis for DWPF was based upon processing precipitate with an absorbed dose of 200 megarads or less. Additional dose results in the increased formation of Biphenyl, m-Terphenyl, p-Terphenyl and carbazole. These compounds result in precipitate that is difficult to filter in Late Wash, high-boiling organics that foul the DWPF offgas system, and the recycle of these products to the Tank Farm evaporators. While it is not known exactly how much dose is "too much", it is generally considered that less dose is better than more dose. This Plan will result in an absorbed precipitate dose of less than 200 mega-rads.

8.4 Extended Sludge Processing

Scope

Sludge Batch #1 was to have consisted of the sludge currently in Tanks 42 and 51. Because the pumps in Tank 42 were not adequately mixing the entire tank contents and three of the Tank 51 pumps had excessive seal water leakage, a decision was made to focus on completing pump repairs in Tank 51, finishing washing that sludge and starting up DWPF on Tank 51 sludge only. Tank 42 sludge will eventually be slurried and blended with Tank 51 to complete Sludge Batch #1. The Tank 51 sludge is referred to as Sludge Batch #1a. The blended Tank 51 and 42 sludge is Sludge Batch #1b. CPES modeling has shown Tank 42 sludge, Tank 51 sludge, and the combined sludge to be similar. Acceptable glass is expected to be produced from either combination.

Slurry Pump Problems

Three of the four quad-volute slurry pumps installed in Tank 51 were leaking more than 2 gpm per pump. The cause of this excessive leakage was not known at that time. Subsequent run-in and inspection of replacement pumps at TNX revealed wear on the impeller and pump casing caused by excessive shaft deflection. This deflection was destroying the bottom mechanical seal. The cause of the deflection was determined to be hydraulic imbalance of the sand cast impeller. Machined impellers were designed, fabricated and successfully tested that reduced shaft deflection to acceptable levels. The three quad-volute slurry pumps in Tank 51 with the worst leak rate have been replaced with new pumps with the machined impellers. The leak rate from these pumps ranges from 0.2-0.5 gpm which is acceptable. The fourth pump leaks about 2 gpm. A spare is ready to install when needed.

The Tank 42 standard slurry pumps have been started and briefly operated. Initial data shows that seal leakage is within specifications. Two of the pumps on Tank 42 are not drawing amperage indicative of the work expected, i.e., pumping sludge at 2,000 gpm. It is theorized that the pumps are submerged in sludge and are mixing only a small captive volume, raising the temperature of the captive sludge and thus causing cavitation. A test has been proposed which would raise these two pumps into the liquid, operate them to check amperage, and then lower them in ten inch increments to resuspend the sludge. The other two pumps are operating well. It is not known if the arrangement of the four pumps can fully suspend all of the sludge in Tank 42 assuming that all four pumps are operating at capacity. Based on past dip samples of the sludge that was suspended, it is believed that the sludge is fully washed.

Production Capacity

The planning bases for the ESP facility are that 700,000 gallons of sludge can be processed in two ESP tanks using the co-washing flowsheet. Aluminum dissolution, sludge washing, and sludge consolidation into one tank is assumed to require 30 months to complete. Recent data from Tank 51 confirms this assumption. Each of the planned batches of sludge will produce about 500 to 1,000 canisters of glass.

Production Plan

Tank 51 sludge washing is complete. The final wash volume was 700,000 gallons of inhibited water. The first 500,000 gallons was decanted to Tank 43 with the remaining 200,000 gallons decanted to Tank 42. Inhibited water will be added to Tank 51 after the final decant to adjust the wt % solids. Sludge Batch #1a will then be ready to feed. This will be complete in time to support the 12/31/95 DWPF startup. Water runs from Tank 51 to DWPF were in progress at the time of this Plan.

An alternative processing plan will be developed for Tank 42 in FY97. Experience from Tank 51 and testing via the Advanced Design Pump program will be used to develop this plan. The goal for Tank 42 is to have the tank fully operable at least one year before the sludge in Tank 51 runs out. This is projected to occur at the end of FY00, thus Tank 42 should be ready in FY99. At that time, the Tank 42 sludge can be slurried and transferred into Tank 51 as Tank 42 sludge washing is already complete. This becomes Sludge Batch #1b.

Schedule

Sludge will be fed to DWPF to support production of 60 canisters of sludge glass plus 10 canisters of sludge and precipitate glass in FY96 (additional canisters will be produced if time permits). Production will increase to 150 canisters in FY97 and 200 canisters in FY98 where it will remain thereafter. Per this plan, the sludge in Tank 51 will last through FY00. The Tank 42 sludge must therefore be transferred into Tank 51 by FY00.

8.5 Evaporators

The 2H and 2F Evaporators will volume reduce the various waste streams coming into the Tank Farms in the near term. The operation of these two evaporators is crucial to the success of HLW and Site Missions. The Tank Farm currently has about 722,000 gallons of working inventory available in Type III Tanks, excluding the ITP/ESP tanks and emergency spare requirements. The evaporators must reduce the volume of the remaining backlog of waste (nearly complete) and keep current with waste generated by Canyon operations and ESP. There is no near term plan to evaporate the 5 million gallon backlog of unevaporated HHW in H-Area as the salt and concentrate from this waste would consume the remaining salt receipt space if evaporated. This waste will gradually be fed to ITP as supernate.

The goal for the evaporators is to have the Tank Farm in a position where the Tank Farm can be deemed "ready to support DWPF startup" by 12/31/95. This state of readiness can generally be described as:

- ITP started up and running well;
- salt removal projects proceeding on schedule;
- tank space available in each evaporator system to handle the DWPF recycle stream;
- interarea transfer capability between F and H-Areas; and
- adequate tank space to support non-routine Tank Farm and DWPF operations with a high degree of confidence.

A key planning assumption is the volume of the Working Inventory of tank space that is needed at the time of DWPF startup. The DWPF recycle stream is regarded in this Plan as a stream that cannot be "turned off" if there are evaporator problems. This is due to the negative effects of thermally cycling the DWPF melter. This drives the Tank Farm to recover a significant amount of tank space that will permit DWPF to continue operating if the Tank Farm has some serious upset condition, such as an evaporator pot failure or a technical problem that shuts down both evaporators for an extended period of time.

At the time DWPF starts up, about 1.8 million gallons of tank space is projected. This is less than in previous revisions of this Plan, primarily due to delays in ITP startup and handling of ESP washwater (evaporation and storage in Tank 42 versus storage in Type IV tanks). Evaluations are in progress to change the service of one tank in H-Area (Tank 39) such that it could be used for salt receipt service. The reason that Tank 39 can now be considered for this service is that H-Canyon is not projected to process fresh irradiated fuel thus there are no "fresh" HHW receipts in the forecast. This would result in an increase in available space of up to 1.17 million gallons. This evaluation should be complete before the next HLW System Plan is issued.

After DWPF starts up, the space gain from the 2F and 2H Evaporators and from ITP will be sufficient during the next five years to offset waste generation until the RHLWE starts up. It is important to achieve as close to the 3,000,000 gallons of available tank space as soon as possible in anticipation of the higher waste receipts thereafter.

Evaporator space gain is defined as the difference between evaporator feed and evaporator concentrate corrected for flush water and chemical additions necessary to operate the evaporator system. Space gain is predicted based on evaporation of each waste stream given the chemical constituents thereof. This is further described in Sections 8.5.1 through 8.5.4. Note that the best the evaporators can do is to volume reduce the influent streams. This results in a gradual decrease in Working Inventory as saltcake and caustic liquor builds up. The only planned method to actually increase the Working Inventory of tank space is to run ITP.

8.5.1 1H Evaporator

The 1H Evaporator vessel has a leaking tube bundle. Because this evaporator is planned to remain down, the condition in the Tank Farm Wastewater Operating Permit to remove the 1H Evaporator from active service by 1/1/98 has essentially been met. The 2H and 2F Evaporators are projected to be able to support the HLW Mission until the RHLWE starts up.

The 1H system will be chemically decontaminated in FY96. The evaporator cell, the interior of the evaporator vessel, the CTS cell, the CTS tank interior and the CTS loop line will all be cleaned. The cleaning method will be alternate caustic/acid flushes similar to the method recently used for the 2H Evaporator vessel replacement.

8.5.2 2H Evaporator

The primary role of the 2H Evaporator will be to evaporate the 221-H Canyon LHW stream, the ESP Tank 51 sludge washwater and 50% of the future DWPF recycle stream. The forecast for H-Area fresh LHW is about 1-3,000 gallons per month in FY96. After H-Canyon starts up in 9/97, this rate increases to about 51,000 gallons per month and remains there through FY02. All H-Area LHW is received directly into the 2H Evaporator system and evaporated.

The 2H Evaporator feed pump and evaporator vessel have both been recently replaced and the evaporator was restarted. The new vessel has a Hastelloy tube bundle and warming coil that is expected to last for 30 years.

In the near term, it is crucial that the 2H Evaporator system work off the ESP Tank 51 decant as soon as possible and to remain operating to keep up with DWPF recycle. 2H Evaporator operation is based on a planned utility of 60% with a space gain as shown in Appendix F.4.

Space gain for this evaporator is driven by the volume and salt content of H-LHW, DWPF recycle and ESP Tank 51 washwater streams. The Appendix F.4 Tank Farm Material Balance uses an algorithm to forecast space gain. All H-LHW is planned to be evaporated in the 2H Evaporator. It is assumed that the volume reduction for H-LHW will be 71% based on historical and laboratory test data. In addition, 50% of DWPF recycle will be evaporated in the 2H Evaporator. It is assumed that the volume reduction for this stream will be 96% based on the latest CPES Material Balance. It is also planned that the 500,000 gallon 11/95 decant from Tank 51 will be evaporated in the 2H Evaporator. Each decant will generate more space gain and less salt than its predecessor. The algorithm in gallons per month is therefore:

2H Space Gain = (H-LHW)*(0.71) +
(0.50)*(DWPF Recycle)*(0.96) +
(ESP 11/95 decant)*(0.95)

Based on the algorithm, the space gain for the 2H Evaporator increases to a high of about 1,600,000 gallons per year. The ability of this evaporator to attain this space gain with dilute feed is well documented in previous and recent experience.

Appendix F.4 indicates that Tank 38 will fill with salt 3/99 which is before Tank 41 is emptied via ITP. Tank 41 is placed back into salt receipt service with about 124,000 gallons of saltcake remaining in it. This does not create a problem.

8.5.3 2F Evaporator

The primary role of the 2F Evaporator will be to evaporate F and H-Area HHW, F-Canyon LHW, and 50% of the DWPF recycle until the RHLWE starts up 11/30/98. After the RHLWE starts up, the 2F Evaporator's role will transition again by eliminating the DWPF recycle stream and adding washwater from pre-washing the F-Area sludge in F-Area prior to transferring the sludge to ESP and adding F-Area old-style tank washwater.

2F Evaporator utility is planned to be 60% with a space gain of about 100,000 gallons per month during FY96. This is based on waste transfers from Tank 43 to Tank 26 during the course of FY96. These transfers ensure that the buildup of salt resulting from the evaporation of DWPF recycle is shared between the 2H and 2F Evaporator systems. These transfers extend the life of Tank 38 and therefore the operation of the 2H Evaporator until Tank 41 can be emptied. The first of these transfers is planned in May 1996.

An algorithm is used to forecast space gain for the 2F Evaporator as shown in the Appendix F.4 Tank Farm Material Balance. All fresh F-LHW, F-HHW and H-HHW is planned to be evaporated with a space gain factor of 76%. This is based on historical experience as well as laboratory test data. Space gain for the 50% of the DWPF recycle stream allocated to this evaporator is 96%. Of the tank washwater shown in Appendix H.4, 50% is allocated to the 2F Evaporator as F-Area has half of the waste tanks that will be water washed. The space gain factor for this stream is conservatively estimated at 90%. ESP washwater will be generated in F-Area as sludge will be pre-washed in-situ before transfer to ESP. This waste stream is estimated to be the value in the "ESP" column of Appendix F.4 times 0.36 (36% of all sludge is in F-Area) times a space gain factor of 85%. This algorithm is therefore:

2F Space Gain before RHLWE startup = (F-LHW)*(0.76) +
(F-HHW)*(0.76) +
(H-HHW)*(0.76) +
(0.50)*(DWPF)*(0.96)

2F Space Gain after RHLWE startup = (F-LHW)*(0.76) +
(F-HHW)*(0.76) +
(H-HHW)*(0.76) +
(0.36)*(ESP washwater)*(0.85) +
(0.50)*(tank washwater)*(0.90)

8.5.4 Replacement High Level Waste Evaporator

The RHLWE is currently in the design and construction phase. The planned startup date is 11/30/98. Construction was estimated to be 68% complete at the time of this report.

The RHLWE is planned to operate at 80% utility and at a space gain based on the forecasted availability of feed. This space gain values shown in Appendix F.3 are well within the expected capacity of the RHLWE. The design basis is 7,600,000 gallons per year of overheads assuming feed at 33 gpm at 25-35% dissolved solids.

The plan for the RHLWE is to evaporate 50% of the DWPF recycle stream, plus the ESP washwater generated in H-Area (H-Area has about 64% of all sludge thus 64% of the sludge washwater is allocated to the RHLWE) plus the tank washwater generated in H-Area used to clean tanks that will not be returned to service (H-Area has 28 of the 50 tanks thus 56% of the tank washwater is allocated to the RHLWE). Space gain factors for these streams are the same as decribed in the previous section. The algorithm used to forecast RHLWE space gain in gallons per year is therefore:

RHLWE Space Gain = (0.50)*(DWPF recycle)*(0.96) + (0.64)*(ESP washwater)*(0.85) + (0.50)*(tank washwater)*(0.90)

The RHLWE will start up filling Tank 30 with salt. Tank 30 is full of supernate but contains virtually no saltcake. By the time that the salt in Tank 30 has reached 1,000,000 gallons, Tank 29 will be empty and ready for salt receipt service.

8.6 New Waste Transfer Facility (NWTF)

Resolution of pump vibration issues as well as completion of construction punchlist items, startup testing, hot tie-ins and water runs are complete. This facility declared readiness for radioactive operations 11/27/95. This date supports the 12/31/95 startup of DWPF. Startup of the NWTF enables H-Area to F-Area transfers to resume.

8.7 F/H Interarea Line

The capability to transfer from F-Area to H-Area does not exist at this time. Process controls and F-Area Pump Tank-1 support facilities are being upgraded. Field work, testing and water runs are scheduled to be complete 12/31/95. This date will support the earliest planned transfer from F-Area to H-Area which is salt supernate from Tanks 25 and 26 as part of ITP Cycle #2, Batch #1.

8.8 Waste Removal

For the purposes of this Plan, it has been assumed that the Waste Removal funding is $28 million in FY96, steadily decreases to $14 million in FY2001 and then increases back up to about $30 million per year as required thereafter. It is also assumed that the funding required in the future (after Tank 29) to prepare a tank for salt removal will be reduced by 50% from about $13 million per tank to about $6 million per tank.

8.8.1 Salt Removal

The salt removal sequence has not changed since Revision 5 of this Plan. The planned order of salt removal is Tanks 41, 25, 29, 38, 31 and 28. This should ensure that all three evaporator systems can avoid becoming saltbound.

After Tank 28, it is planned to remove the salt from the old-style salt tanks (Tanks 1, 2, 3, 9, 10 and 14) and feed this salt to ITP. Investigations are currently in progress to determine more precisely the potassium content of all salt tanks and particularly Tanks 1-3. If the potassium concentration in the old-style salt tanks proves to be significantly lower than previously projected, then it is very possible that salt removal from these tanks can be accelerated if funding permits. Solid salt samples may be required to confirm these important planning parameters. Until the samples are obtained and analyzed, the salt removal sequence will remain as described above. Resolution of this issue could result in a significant enhancement to the FFA waste removal schedule.

Tank 41 Salt Removal

Tank 41 will be the first salt tank fed to ITP. There are still outstanding criticality issues specific to Tank 41 due to the relatively high concentration of fissile U and Pu. The concern is that insoluble fissiles can concentrate in low spots in the salt formation inside Tank 41. Previous sampling and analytical studies indicate that the majority of the U is soluble and that initiation of salt dissolution can safely proceed. Completed evaluations indicate that the top 50" of saltcake can be safely dissolved without additional criticality safety controls. The criticality issue will not necessarily be closed before the tank has been emptied. Rather, criticality will be managed via sampling and process knowledge for each layer of salt as wate removal proceeds in a deliberate fashion. The increased time requirement to remove salt in this way is incorporated into the schedule.

As before, there is a strong need to feed Tank 41 to ITP as soon as possible in order to maintain the operation of the 2H Evaporator. The initial salt removal from Tank 41 will be slow due to the lack of working capacity in the tank and the criticality sampling requirements. As salt is removed, larger and larger salt removal batches can occur. As stated in Section 8.3, Tank 40 must be available to stage the dissolved salt from Tank 41 to allow insoluble solids to settle prior to transferring to Tank 48.

Tank 41 is being considered for demonstration of alternate salt removal technologies such as Modified Density Gradient, Single Slurry Pump, and possibly Water Jet/Hydraulic Mining. These alternatives are not discussed in this Plan as they are in the development stage.

Tank 25 Salt Removal

Tank 25 will be the second tank fed to ITP. Tank 25 must be empty and returned to salt service before Tanks 27 and 46 are filled with salt. Tank 25 will be ready for waste removal 3/97 with the first transfer of dissolved salt solution to ITP occurring in early FY98. Slurry pump run-in and installation and completion of post-modofication testing activities comprise the the remaining Tank 25 scope.

Tank 25 will be the first F-Area tank to undergo waste removal. It will require completion of the F-Area common area support infrastructure as a predecessor to startup. These facilities include the motor control center, instrument control room, distributed control system, and bearing water makeup and distribution. Succeeding F-Area tanks will use this infrastructure. Tank 25 will also require the F/H Inter-Area Line upgrade to be complete (see Section 8.7).

Tank 29 Salt Removal

Tank 29 will be the third tank to be fed to ITP. The RHLWE will start up dropping salt concentrate to Tank 30. Tank 30 is projected to be filled by FY04. Tank 29 must therefore have all of the salt removed, the cooling coils replaced (if needed) and the tank returned to salt receipt service by FY04. Tank 29 is currently projected to be empty by FY02. Tank 29 will be the only tank in the RHLWE system to be outfitted with slurry pumps. Only two pumps will be installed in Tank 29 pending results from alternate salt removal demonstrations. A third pump could be installed later if required.

Tank 38 Salt Removal

Tank 38 will be the fourth tank fed to ITP. It must be emptied before Tank 41 is refilled or the 2H Evaporator will become saltbound. Tank 41 is projected to fill again by FY08. Salt removal is now scheduled to begin in Tank 38 in FY03 and complete FY04. Tank 38 will be the first tank to employ an alternative salt removal technology after they have been successfully demonstrated in other tanks and the Waste Removal technical baseline changed accordingly.

Tank 31 Salt Removal

Tank 31 will be the fifth tank fed to ITP. Salt removal from Tank 31 must be complete before Tank 29 refills with salt in FY09. Salt removal from Tank 31 is scheduled to start in FY04 and be complete in FY06. Tank 37 is being considered in lieu of Tank 31. This is due to the difference in cooling coils and also because Tank 37 is thought to contain less potassium. The Tank 31 coils will have to be replaced if the tank is refilled with salt. Tank 37 has coils similar to the newer Type III Tanks thus it will not require coil replacement.

8.8.2 Sludge Removal

Sludge removal is performed in a manner that yields nine discreet batches (sometimes called "macro-batches" to distinguish them from the smaller batches used in ITP and DWPF) of sludge which will be individually segregated and characterized after pretreatment in ESP. Sludge Batch #1a is currently in process in ESP Tank 51 and is expected to produce 756 canisters. Sludge Batches 1a, 1b, 2a, 2b, 3a, and 3b have been modeled using CPES and PCCS and are projected to make an acceptable glass waste form.

8.9 Defense Waste Processing

8.9.1 Vitrification

DWPF has completed its startup testing program and its WSRC ORR. Westinghouse expects to declare readiness to start Radioactive Operations by

December 31, 1995. Initial radioactive operations will be conducted with sludge only. Precipitate feed will be available for coupled operation starting 6/1/96.

Startup Testing Summary

The DWPF Vitrification Facility has completed a rigorous startup testing program, which began in 1990. The results of these tests have been used to correct equipment deficiencies, optimize process operations and parameters, and provide tangible evidence that the DWPF process will produce an acceptable waste form. Seventy one simulated waste glass canisters were produced as part of DWPF's Waste Qualification Runs. All were tested by SRTC to confirm that the glass, the canister, and the canistered waste form would meet stringent DOE requirements for acceptance at the Federal Repository. Waste form-specific tests included dimensional measurements of the canister before and after filling, verification of the glass fill height, and testing for internal pressurization and the presence of foreign materials. Glass samples were analyzed for chemical composition and subjected to the Product Consistency Test to verify glass durability.

Transition to Radioactive Operations

Radioactive Operations will commence with the introduction of a dilute sludge feed using permanent operating procedures. This will occur per startup test FA-20.01, "Transition to Radioactive Operations" under the guidance of the DWPF Joint Test Group. The test will focus on collecting baseline radiological data to determine if there are any gross shielding problems and to obtain an indication of expected radiation levels. In order to ensure a smooth chemical transition and obtain experience with radioactive material, the first radioactive batch will contain a mixture of simulated waste and actual Tank 51 sludge. Actual radioactive waste will continue to be incrementally introduced into the process so that final operating conditions can be confirmed. Thirty canisters will be produced during this transition period.

Attainment

Attainment is defined as the design capacity multiplied by the design utility of the DWPF plant. The DWPF, as well as the pre-treatment facilities, were designed to support glass production at 228 pounds per hour, 24 hours per day. The design capacity of DWPF is therefore calculated as follows:

$$\frac{228 \text{ lbs glass}}{\text{hr}} \times \frac{\text{can}}{3{,}705 \text{ lbs glass}} \times \frac{24 \text{ hr}}{\text{day}} \times \frac{365.25 \text{ day}}{\text{yr}} = 540 \frac{\text{cans}}{\text{yr}}$$

Therefore, 540 canisters/yr is the design capacity, sometimes referred to as the instantaneous or nameplate capacity, of the DWPF. The DWPF design utility is 75%. Therefore, the maximum long term average attainment is (.75)*(540) = 405 cans/yr. This value is referred to as 75% attainment.

Production Capacity

In the near term, the average attainment of DWPF, and therefore the HLW System, will be limited by either Late Wash or annual funding. Available funding has now been allocated in such a manner that no one facility limits the System attainment rate. Over the long term, the attainment rate is expected to be 37%. This is about the maximum rate that the Late Wash facility is expected to be able to support as currently configured.

Approximately 6,000 canisters will be required to vitrify the existing HLW inventory plus the onsite inventory of "at-risk" fuels. The current planning basis assumes that all waste will be virtified by 2028. Therefore, canister production must average about 200 canisters per year. This System Plan is based on increasing production from 70 canisters in FY96 to 150 canisters in FY97 to 200 canisters in FY98 and then remain at that level throughout the program.

Recycle Handling

As a part of its normal operations, DWPF generates an aqueous recycle waste stream which originates from two sources in the DWPF process: the melter Off Gas Condensate Tank and the Slurry Mix Evaporator Condensate Tank. A fixed amount of recycle waste is generated as long as the melter is heated. Additional recycle volume is generated with increasing attainment. During radioactive operations, the recycle rate is calculated as follows:

$$\text{gpm} = 2.50 + (4.43)(\text{att}) + (0.16)(n)$$

where: att = attainment expressed as a fraction, and
n = the age of DWPF from 1 to a maximum of 4

Thus, the recycle over the long term is 2.5 + (4.43)(0.37) + (0.16)(4) = 4.78 gpm or 2,514,000 gallons per year. It is also important to note that the recycle rate when the plant is down is 2.50 gpm or 1,315,000 gallons per year. The source of this waste is the melter offgas system. Operation of the offgas system is required if the melter is to be maintained at temperature to avoid thermal cycling.

Mercury Disposal

Mercury becomes entrained in the sludge as a result of Separations processing and must be removed from the sludge prior to vitrification. Initial plans for disposition of this mercury stream called for the mercury to be returned to the Separations facilities for re-use in their processes, but evolving Site missions have precluded re-use of the mercury stream. Since mercury is a toxic hazardous waste under the Resource Conservation and Recovery Act (RCRA), it must be disposed in compliance with RCRA regulations. The current Best Demonstrated Available Technology for mercury disposal is amalgamation. However, radioactive contaminants in the DWPF mercury stream may necessitate pre-treatment before amalgamation, or they may preclude amalgamation altogether. Samples of actual mercury recovered after the start of

DWPF Radioactive Operations will be collected and tested to verify what disposal options are technically feasible. Final disposition of the DWPF mercury will be evaluated on a site-wide basis under the Site Treatment Plan. The DWPF mercury will be stored at an on-site, permitted storage facility until disposition plans are finalized.

Replacement Melters

Ongoing vitrification operations will require periodic melter replacement. Deposition of noble metals, which would short-circuit the melter electrodes, is the most likely mode of melter failure. SRTC estimates that the life expectancy for a melter will be two years. Replacement melter projects are planned accordingly.

Melter #1 is already installed and is being used for DWPF startup testing and initial radioactive operations. Melter #2 is on site and construction modifications are approximately 95% complete. The melter vessel and frame for Melter #3 are on site and other major components (riser pour spout assembly, dome heaters, drain valve, refractories, etc.) are in the procurement cycle. Overall lead time for a replacement melter project, from project inception through actual installation in the DWPF, is approximately 5 years.

8.9.2 Late Wash

Startup Schedule

Late Wash Radioactive Operations are currently scheduled to begin July 22, 1996. Efforts are underway to improve that date to June 1, 1996, when ITP projects to send the first batch of precipitate to Late Wash.

Testing Program

The startup testing program for Late Wash will build upon the programs utilized in DWPF. A series of planned equipment tests will be conducted to verify the operability of each system. Field testing will be followed by a WSRC Readiness Self-Assessment (RSA) addressing design, construction, testing, training, procedures, and safety documentation. Other functional areas will have been covered by the DWPF RSA.

Production Capacity

The Late Wash cycle time is planned to be 61 hours. This cycle time is based on cleaning the crossflow filters after every third batch. It is possible that less cleaning will be required, particularly as precipitate absorbed dose is reduced, however, the conservative assumption is used until radioactive operations data is available. The batch size is planned to be 4,000 gallons per batch.

The Late Wash process is close-coupled with DWPF meaning that there is no "wide spot " to accumulate precipitate. The Late Wash process must wait for downstream tanks in DWPF to be emptied before Late Wash can proceed. Also, Late Wash cannot operate while DWPF is down. DWPF downtime is planned to be 25%. The net result of the interplay between the Late Wash and DWPF flowsheet batch times is that Late Wash becomes the rate limiting process in the HLW System. It is believed that the maximum prodcution rate that Late Wash can support is about 200 canisters per year or 37% attainment. This rate will be refined as actual production data is generated.

8.9.3 Saltstone Facility

Production Capacity

The Saltstone operation is based on one shift per day, five days per week. About 6 hours per day are available for grout production at a rate of 110 gpm. The other 2 hours per day are required for startup preparations in the morning and shutdown of the process at the end of the day. The plant utility is assumed to be 50% based on experience to date. Based on the above, Saltstone can process about 19,800 gallons per day or 5,148,000 gallons per year.

Vaults

Saltstone operations require periodic construction of additional vaults, capping of filled vault cells and construction of permanent roofs. The required schedule for these repetitive projects is dependent upon the ITP production plan. Each vault cell can hold 232,000 cubic feet of saltstone grout, or approximately 1.1 million gallons of Tank 50 salt solution. The timing of Vaults #2 & 3 supports the planned near term ITP production plan, as shown in Appendix F.2.

Currently, construction of Vault #1 is complete and the vault is in service. Vault #1 has 6 cells, 2.5 of which are already filled. The Vault #1 operating plan is as follows: as each cell is filled to a height of 24 feet, a 1 foot thick clean concrete isolation cap is installed and the Rolling Weather Protection Cover (RWPC) is moved to the next set of two cells. When all 6 cells are filled and capped, the RWPC will be dismantled and discarded, and a permanent roof installed.

Vault #4 construction is complete and this vault is also in service. One of its twelve cells has already been filled. A contract for the design and installation of a permanent roof in lieu of using the RWPC was let in September, 1995. Installing the permanent roof at this time will enable the cells to be filled to height of 25 feet, more than one cell to be filled at a time if needed, and eliminate the need to dispose of the RWPC as radioactive waste. Vault #4 filling is projected to resume in FY97.

Like Vault #4, Vault #2 has been designed with twelve cells. The Vault #2 design includes a permanent roof. The design is complete and ready to put out for bids, pending availability of funding. The Vault #2 design is the prototype for future Saltstone vaults. Vault #2 filling is projected to start in FY00.

8.10 Consolidated Incinerator Facility

The CIF is currently scheduled to start Radioactive Operations in May, 1996. The CIF operation is required to support the operation of the HLW System at the time when the 150,000 gallon DWPF Organic Waste Storage Tank becomes full. Due to the low HLW System attainment operation, less cesium/potassium tetraphenylborate will be fed to DWPF, and therefore less benzene will be generated when compared to the design basis for the size of this tank. CIF is not expected to be required to support the HLW system until FY99, well after CIF's forecasted startup date. Therefore, CIF is treated in a summary fashion in this document.

8.11 New Facility Planning

Repetitive Projects

The Saltstone Vaults, DWPF Glass Waste Storage Buildings, Replacement Glass Melters, and Failed Equipment Storage Vaults are repetitive projects that have been deferred consistent with a "just in time" philosophy. There is some program risk inherent in this approach particularly with the latter two projects as there is no actual operating data on the DWPF first-of-a-kind melters.

Tank Farm Services Upgrade (H-Area)

The FY96 Tank Farm Services Upgrade project is part of an overall program to upgrade the deteriorating conditions in aging Tank Farm facilities and is required for environmental protection and compliance with DOE Orders. This project is primarily focused on H-Area with some F-Area scope included. This project has four parts: service piping upgrades, new steam supply lines and waste transfer equipment for Tanks 35-37, cooling system upgrades for the H-Area Tank Farm "East Hill," and electrical upgrades for the F-Area Tank Farm. The existing service lines have been developing below grade leaks that are difficult to locate and expensive to repair. The upgrades will correct this situation by installing new above grade piping to enhance accessiblity, minimize future maintenance costs, and improve reliability. The new steam supply lines and waste transfer equipment for Tanks 35-37 will reduce the potential for backflow of waste into steam supply lines, which could lead to waste being released to the environment in the event of a steam leak. The cooling upgrades for the East Hill will ensure that the ESP and ITP facilities will be able to operate efficiently and within specified Operational Safety Requirements. The F-Area Tank Farm electrical upgrades will correct an overload condition, which is currently causing power interruptions and operational downtime..

Tank Farm Storm Water Upgrades

This FY99 project will provide equipment to relieve the current storm water flooding that occurs in the Tanks 9-12 area of the H-Area Tank Farm. In the past, this condition has resulted in storm water standing on top of Tanks 9-12 and actually leaking into the tanks. In a worst case scenario, the head space in a waste tank could be filled with water causing direct communication between the tank contents and the standing water in the Tanks 9-12 area. The same type of occurrence could happen with the HDB-2 complex. As an interim measure, three foot tall dikes have been constructed around the perimeters of Tanks 9-12 to keep the water out.

Tank Farm Support Services Upgrades (F and H-Area)

This FY00 project will replace the aging, below grade support services in the F-Area Tank Farm and the H-Area East Hill Tank Farm with new above grade lines. These services include steam, cooling water, domestic water, plant and instrument air, and breathing air. The need for this project is evidenced by the extended steam outages experienced by the 2F Evaporator in FY94 and FY95. What should have been routine three or four day outages became one and two month outages. Once excavated, long line segments have been found to be in poor condition rather than isolated leaks or point failures. These conditions are indicative of the age of the services, the newest of which were constructed in 1978-80.

9.0 HLW System Plan Base Case Requirements

Revision 4 of this Plan is often referred to as the "Base Case". The vitrification of all existing and planned HLW was projected in Revision 4 to be complete in FY2021. Achievement of the Base Case is not possible with the assumed funding profile used to develop this Plan, however, the funding required to achieve the Base Case can be determined by using the HLW Cost Model.

The HLW Cost Model is based on fixed and variable costs. Fixed costs are those costs required to keep a facility in a "hot standby" mode. This can be described as fully manned with a trained workforce such that production could resume virtually immediately. Variable costs are those costs that actually vary with production. These are power, water, raw materials, repetitive projects such as outfitting tanks with waste removal equipment, replacement glass melters, Failed Equipment Storage Vaults, Saltstone Vaults, some Capital Equipment, etc. Variable costs go to zero if production is zero.

The average HLW System production rate in the Base Case was 245 canisters per year (43% attainment) as compared to this Plan (200 canisters per year or 37% attainment). There are no increases in fixed costs to increase production to 245 canisters per year based upon what is known about each facility in the HLW System. It is possible that, as each facility is operated, information will be accumulated that indicates that a step change in fixed cost is required to increase production, however, nothing of this sort is evident at this time.

The additional funding required to increase production to 245 canisters per year is therefore all variable. The affected facilities and/or projects are Vitrification

(22-AA), Saltstone (23-AA), ITP/ESP (34-AA) and Waste Removal (314-LI). The HLW Cost Model indicates that an additional $15.89 million per year (FY96 dollars) would be required to complete vitrification in FY2021. The average cost is therefore $453 million versus $437 million per year as shown in this Plan. If vitrification could be completed in FY2021, then a Life Cycle cost savings in FY96 dollars of $3.06 billion could be realized.

Appendix A - Acronyms

ADS	Activity Data Sheet
AOP	Annual Operating Plan
CAB	Citizen's Advisory Board
CIF	Consolidated Incinerator Facility
Ci/gal	Curies per Gallon
CLFL	Composite Lower Flammability Limit
CPES	Chemical Process Evaluation System
DNFSB	Defense Nuclear Facility Safety Board
DOE	Department of Energy
DWPF	Defense Waste Processing Facility
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESP	Extended Sludge Processing
ETF	Effluent Treatment Facility
FFA	Federal Facility Agreement
FY	Fiscal Year
ITP	In-Tank Precipitation
GWSB	Glass Waste Storage Building
HHW	High Heat Waste
HLW	High Level Waste
HQ	Headquarters - usually as a suffix to DOE
INMM	Integrated Nuclear Material Management
ITP	In-Tank Precipitation
LHW	Low Heat WasteLI
NEPA	National Environmental Policy Act
NWTF	New Waste Transfer Facility
ORR	Operational Readiness Review
PCCS	Product Composition Control System
PID	Process Interface Description
RBOF	Receiving Basin for Offsite Fuels
RCRA	Resource Conservation and Recovery Act
RHLWE	Replacement High Level Waste Evaporator
ROCTP	Radioactive Operations Commissioning Test Program
SAR	Safety Analysis Report
SCDHEC	South Carolina Department of Health and Environmental Control
SIMP	System Integration Management Plan
SR	Savannah River - usually a suffix to DOE
SRS	Savannah River Site
SRTC	Savannah River Technology Center
STP	Site Treatment Plan
STPB	Sodium Tetraphenylborate
Tk	Tank
TOST	Technical Oversite Steering Team
WSRC	Westinghouse Savannah River Company

Appendix B - HLW Priorities

1. Maintain operating facilities in a safe condition:
    - 1a. Health & safety of workers & public
    - 1b. Stewardship of current waste inventories
    - 1c. Improvement programs critical to 1a and 1b
    - 1d. Maintenance of facilities to ensure 1a and 1b

2. Support critical Site Missions

3. Comply with Federal and State Regulatory Commitments

4. High Level Waste System to support 12/31/95 DWPF sludge startup:
    - 4a. DWPF Vitrification startup
    - 4b. ESP Batch#1a processing
    - 4c. New Waste Transfer Facility startup

5. High Level Waste System to support 6/1/96 sludge & precipitate initial operation:
    - 5a. Late Wash Project
    - 5b. Late Wash Filter Demonstration Unit
    - 5c. ITP Cycle #1

6. Maintain Continuity of Operations at a minimum rate of 200 canisters per year for the next 5 years:
    - 6a. F to H-Area Inter-Area Line
    - 6b. Tank 40 agitation
    - 6c. ITP Cycles #2-5
    - 6d. Tank 25 salt removal
    - 6e. Tank 29 salt removal
    - 6f. Sludge Batch #1b
    - 6g. Tank 8 sludge removal

7. Remove waste from old-style tanks at the earliest date consistent with priorities #1-6

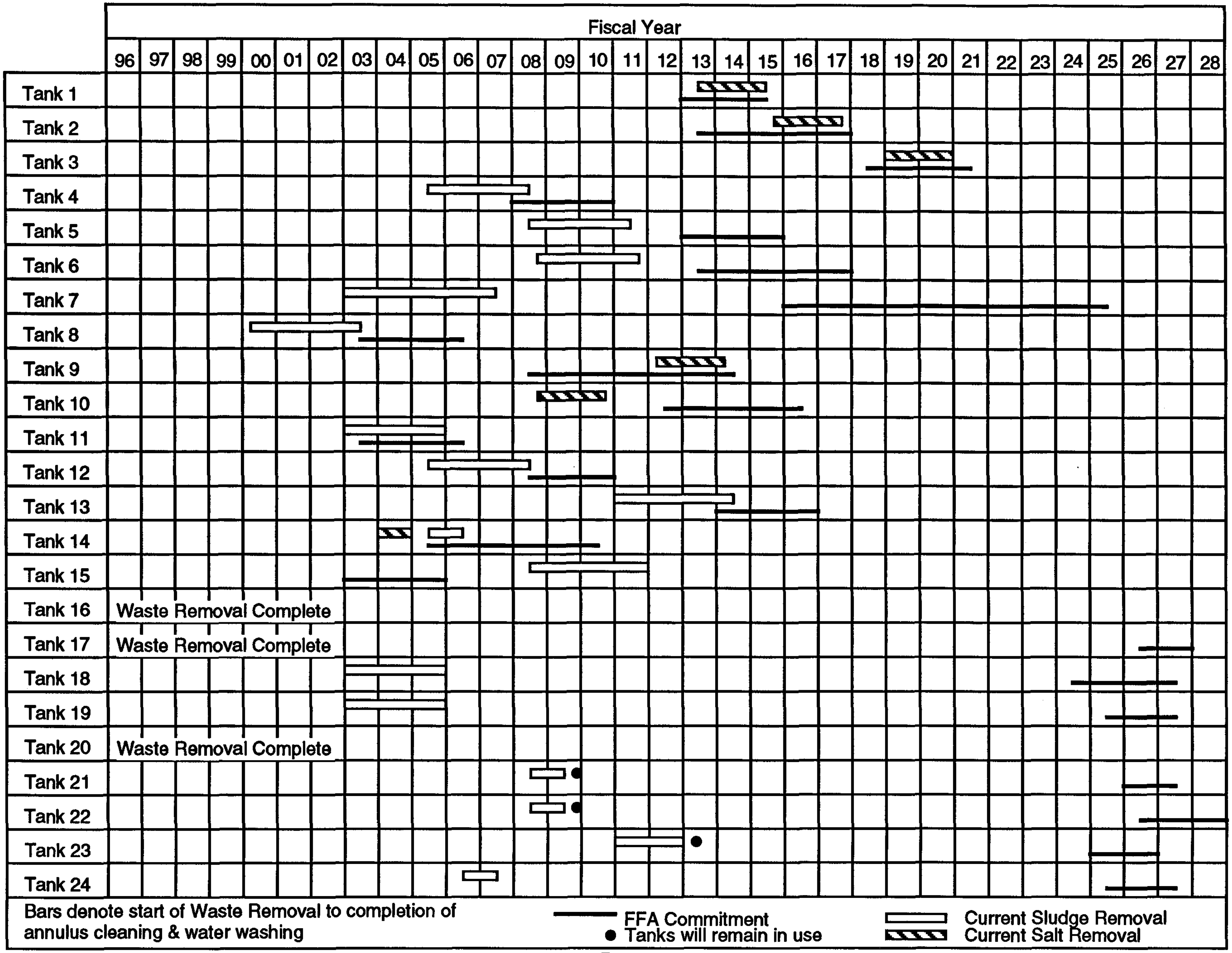
8. Provide minimum essential infrastructure as required to support waste removal from tanks on a "just in time" basis

9. Invest a portion of available funding in technology initiatives that have a strong potential to reduce cost:
    - 9a. Modified Density Gradient Salt Removal
    - 9b. One Pump Salt Removal
    - 9c. Other salt Removal Techniques (Water Jet)

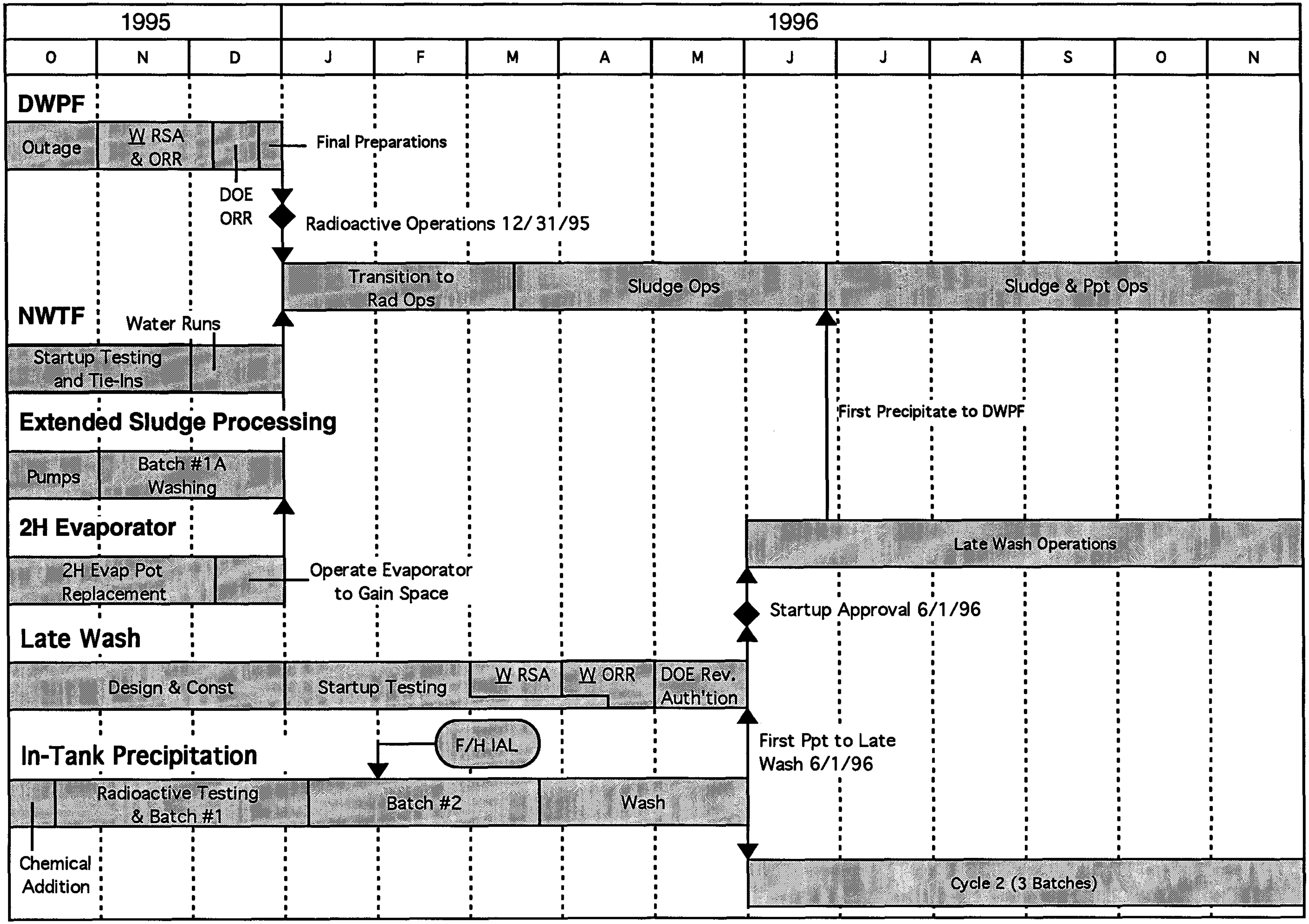
10. Invest a portion of available funding in the development of tank or Tank Farm closure activities:
    - 10a. Preliminary Performance Evaluation/Performance Assessment
    - 10b. Sampling old-style tanks
    - 10c. Tank Heel Removal Demonstration

		AOP	Projected	Required Funding ($ x 1,000,000)			
ADS #	ADS Title	FY96	FY97	FY98	FY99	FY00	FY01
21-AA	DWPF Program Management	23,069	21,481	21,942	22,413	22,895	23,582
22-AA	Vitrification	148,850	133,936	144,125	154,984	156,003	156,045
23-AA	Saltstone Z-Area	10,058	10,485	11,137	12,914	26,763	18,290
24-GP	DWPF General Plant Projects	1,000	2,060	3,214	3,326	3,443	3,546
25-LI	DWPF New Facility Planning	0	0	2,466	2,517	0	8,114
26-LI	DWPF (Line Item)	0	0	0	0	0	
31-AA	HLW Program Management	47,185	44,878	47,498	48,600	49,728	53,538
32-AA	H-Tank Farm	62,824	62,192	67,287	68,802	67,995	70,875
33-AA	F-Tank Farm	41,037	40,018	42,304	43,372	44,468	45,802
34-AA	ITP/ESP	60,025	55,995	59,076	65,306	65,853	65,510
35-AA	Effluent Treatment Facility	17,767	17,700	18,152	18,616	19,093	19,665
37-GP	HLW General Plant Projects	1,540	2,616	2,694	2,775	2,859	2,944
38-LI	HLW New Facility Planning	871	504	4,456	7,649	14,969	25,156
39-LI	New Waste Transfer Facility	3,753	0	0	0	0	0
310-LI	RHLWE	16,187	17,493	11,422	1,028	0	0
311-LI	DB & Pump Pit Containment	11	0	0	0	0	0
314-LI	Waste Removal	28,350	20,767	20,457	18,544	14,841	13,854
315-LI	Tank Farm Services Upgrade (H-Area)	3,873	5,679	7,700	6,913	3,220	0
	Total SRS High Level Waste	466,400	435,804	463,930	477,759	492,130	506,921
	Total in FY96 Constant $	466,400	423,111	437,299	437,217	437,251	437,275

Appendix D - FFA Waste Removal Schedule



Appendix E - HLW Integrated Schedule



Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
c1/b1	9/2/95	128	1/8/96	48	252	heel	•precipitate heel from ITP demo
				38	130	cs	
					46	stpb	
					496		
c1/b2	1/8/96	74	3/22/96	25	140	cs	
				26	95	cs	
				49	150	heel	•washwater heel from ITP demo
					300	iw	
					62	stpb	
					814		
wash	3/22/96	70	5/31/96				
transfer	5/31/96	1	6/1/96				•167 kgal ppt produced, 146 kgal to Tk 49
outage	6/1/96	30	7/1/96				
c2/b1	7/1/96	30	7/31/96	26	100	cs	
				38	75	cs	
				40	130	us	
				41	47	cs/ds	•start Tk 41 saltcake removal
					330	ww	
					68	stpb	
					771		
c2/b2	7/31/96	30	8/30/96	32	170	us	
				38	100	cs	
				40	110	us	
				41	63	ds	
					230	ww	

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
					22	stpb	
					818		
c2/b3	8/30/96	30	9/29/96	32	125	us	
				38	125	cs	
				41	84	ds	
					150	ww	
					100	iw	
					25	stpb	
					761		
wash	9/29/96	40	11/8/96				
transfer	11/8/96	1	11/9/96				•164 kgal ppt produced, 143 kgal to Tk 49
outage	11/9/96	30	12/9/96				
c3/b1	12/9/96	60	2/7/97	32	110	us	
				38	110	cs	
				41	262	ds	
					270	ww	
					34	stpb	
					807		
c3/b2	2/7/97	60	4/8/97	29	75	cs	
				32	200	us	
				41	199	ds	
					220	ww	
					21	stpb	
					785		

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
c3/b3	4/8/97	60	6/7/97	29	60	cs	
				32	150	us	
				41	267	ds	
					220	ww	
					17	stpb	
					812		
c3/b4	6/7/97	60	8/6/97	27	100	cs	
				41	365	ds	
					65	ww	
					130	iw	
					28	stpb	
					808		
wash	8/6/97	60	10/5/97				
transfer	10/5/97	1	10/6/97				•156 kgal ppt produced, 135 kgal to Tk 49
outage	10/6/97	30	11/5/97				
c4/b1	11/5/97	45	12/20/97	27	100	cs	
				41	365	ds	
					220	ww	
					43	stpb	
					749		
c4/b2	12/20/97	45	2/3/98	29	75	cs	
				41	400	cs	
					250	ww	
					15	stpb	
					823		

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
c4/b3	2/3/98	45	3/20/98	29	35	cs	
				32	50	us	
				41	400	ds	
					200	ww	
					10	stpb	
					797		
c4/b4	3/20/98	45	5/4/98	27	75	cs	
				41	400	ds	
					98	ww	
					75	iw	
					22	stpb	
					783		
c4/b5	5/4/98	45	6/18/98	27	75	cs	
				41	400	ds	
					150	iw	
					22	stpb	
					765		
wash	6/18/98	45	8/2/98				
transfer	8/2/98	1	8/3/98				•169 kgal ppt produced, 148 kgal to Tk 49
outage	8/3/98	20	8/23/98				
c5/b1	8/23/98	40	10/2/98	25	35	cs	
				25	125	ds	•start Tk 25 saltcake removal
				41	400	ds	
					175	ww	

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
					21	stpb	
					777		
c5/b2	10/2/98	40	11/11/98	25	100	ds	
				27	50	cs	
				41	400	ds	
					200	ww	
					18	stpb	
					817		
c5/b3	11/11/98	40	12/21/98	25	100	ds	
				27	50	cs	
				41	400	ds	•Tk 41 salt removal complete
					200	ww	
					18	stpb	
					841		
c5/b4	12/21/98	40	1/30/99	25	400	ds	
				30	50	us	
					200	ww	
					15	stpb	
					761		
c5/b5	1/30/99	40	3/11/99	25	400	ds	
				30	50	us	
					82	ww	
					75	iw	
					15	stpb	
					740		
c5/b6	3/11/99	40	4/20/99	25	400	ds	

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
				30	100	us	
					125	iw	
					15	stpb	
					730		
wash	4/20/99	40	5/30/99				
transfer	5/30/99	1	5/31/99				•162 kgal ppt produced, 141 kgal to Tk 49
outage	5/31/99	30	6/30/99				
c6/b1	6/30/99	40	8/9/99	25	400	ds	
				30	50	us	
				38	40	cs	
					250	ww	
					15	stpb	
					792		
c6/b2	8/9/99	40	9/18/99	25	350	ds	
				30	100	us	
					250	ww	
					16	stpb	
					782		
c6/b3	9/18/99	40	10/28/99	25	350	ds	
				30	100	ds	
					250	ww	
					17	stpb	
					803		
c6/b4	10/28/99	40	12/7/99	25	300	ds	

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
				27	50	cs	
				30	50	us	
					46	ww	
					150	iw	
					15	stpb	
					728		
c6/b5	12/7/99	40	1/16/00	25	300	ds	
				30	100	us	
					150	iw	
					16	stpb	
					708		
wash	1/16/00	40	2/25/00				
transfer	2/25/00	1	2/26/00				•165 kgal ppt produced, 144 kgal to Tk 49
outage	2/26/00	60	4/26/00				
c7/b1	4/26/00	50	6/15/00	25	400	ds	
				30	100	us	
					200	ww	
					27	stpb	
					748		
c7/b2	6/15/00	50	8/4/00	25	280	ds	•Tk 25 empty
				27	50	cs	
				30	100	us	
					300	ww	
					28	stpb	
					817		

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
c7/b3	8/4/00	50	9/23/00	27	50	cs	
				30	250	us	
					250	ww	
					75	iw	
					36	stpb	
					755		
c7/b4	9/23/00	50	11/12/00	27	50	cs	
				29	100	ds	•start Tk 29 saltcake removal
				30	140	us	
					200	iw	
					27	stpb	
					660		
wash	11/12/00	50	1/1/01				
transfer	1/1/01	1	1/2/01				•181 kgal ppt produced, 160 kgal to Tk 49
outage	1/2/01	60	3/3/01				
c8/b1	3/3/01	50	4/22/01	27	50	cs	
				29	420	ds	
					200	ww	
					40	stpb	
					731		
c8/b2	4/22/01	50	6/11/01	27	50	cs	
				29	420	ds	
					225	ww	
					26	stpb	

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
					800		
c8/b3	6/11/01	50	7/31/01	27	50	cs	
				29	350	ds	
					225	ww	
					24	stpb	
					764		
c8/b4	7/31/01	50	9/19/01	27	50	cs	
				29	250	ds	
					140	ww	
					20	stpb	
					639		
wash	9/19/01	40	10/29/01				
transfer	10/29/01	1	10/30/01				•171 kgal ppt produced, 150 kgal to Tk 49
outage	10/30/01	60	12/29/01				
c9/b1	12/29/01	50	2/17/02	28	75	cs	
				29	400	ds	
					250	ww	
					30	iw	
					46	stpb	
					639		
c9/b2	2/17/02	50	4/8/02	29	450	ds	
					180	ww	
					15	stpb	
					733		

Appendix F.1 - ITP Production Plan

Cycle/ Batch	Start	Duration	Finish	Feed Tank	Feed to ITP (kgal)	Feed Type	Notes:
c9/b3	4/8/02	50	5/28/02	26	50	cs	
				29	350	ds	
					250	ww	
					28	stpb	
					784		
c9/b4	5/28/02	50	7/17/02	26	60	cs	
				29	325	ds	•Tk 29 saltcake level down to 234 kgal
					126	ww	
					115	iw	
					30	stpb	
					803		
wash	7/17/02	40	8/26/02				
transfer	8/26/02	1	8/27/02				•180 kgal ppt produced, 159 kgal to Tk 49

Notes:
- Cycle #1 batch times prolonged by ROCTP testing
- DWPF precipitate demand at 200 canisters per year is about 188 kgal/year
- Batch durations varied as required to maintain precipitate production to about 188 kgal/year
- Abbreviations:

ww = washwater	iw = inhibited water
ds = dissolved salt	cs = concentrated supernate
stpb = sodium tetraphenylborate	c = cycle
us = unconcentrated supernate	b = batch

Appendix F.2 - ITP Precipitate and Filtrate Production

ITP Batch	Start Date	Duration (days)	ITP Ppt (kgal)	Ppt Fed to LW (kgal)	Tk 49 Volume (kgal)	ITP Filtrate (kgal)	ETF Conc (kgal)	Total to Tk 50 (kgal)	SS Grout Produced (kgal)	Cells Filled (each)	V#1 Cells Filled (each)	V#4 Cells Filled (each)	V#2 Cells Filled (each)
c1/b1	9/2/95	128	0	0	0	383	105	488	791	0.45	2.95	1.00	
c1/b2	1/8/96	74	0	0	0	592	61	653	1,058	0.61	3.56		
wash	3/22/96	70	0	0	0	0	58	58	93	0.05	3.61		
x-fer	5/31/96	1	146	0	146	0	1	1	1	0.00	3.62		
outage	6/1/96	30	0	5	141	0	25	25	40	0.02	3.64		
c2/b1	7/1/96	30	0	0	141	580	25	605	980	0.56	4.20		
c2/b2	7/31/96	30	0	5	136	643	25	668	1,082	0.62	4.82		
c2/b3	8/30/96	30	0	0	136	550	25	575	931	0.53	5.36		
wash	9/29/96	40	0	15	121	0	33	33	53	0.03	5.39		
x-fer	11/8/96	1	143	0	264	0	1	1	1	0.00	5.39		
outage	11/9/96	30	0	11	253	0	25	25	40	0.02	5.41		
c3/b1	12/9/96	60	0	22	231	703	49	752	1,219	0.70	6.00	1.16	
c3/b2	2/7/97	60	0	22	209	666	49	715	1,159	0.67		1.83	
c3/b3	4/8/97	60	0	22	187	675	49	724	1,173	0.67		2.50	
c3/b4	6/7/97	60	0	22	165	620	49	669	1,084	0.62		3.12	
wash	8/6/97	60	0	29	135	0	49	49	80	0.05		3.17	
x-fer	10/5/97	1	135	0	270	0	1	1	1	0.00		3.17	
outage	10/6/97	30	0	15	255	0	25	25	40	0.02		3.19	
c4/b1	11/5/97	45	0	22	233	623	37	660	1,069	0.61		3.80	
c4/b2	12/20/97	45	0	22	211	706	37	743	1,204	0.69		4.50	
c4/b3	2/3/98	45	0	22	189	674	37	711	1,152	0.66		5.16	
c4/b4	3/20/98	45	0	22	167	618	37	655	1,061	0.61		5.77	
c4/b5	5/4/98	45	0	22	145	570	37	607	983	0.56		6.33	
wash	6/18/98	45	0	22	123	0	37	37	60	0.03		6.37	
x-fer	8/2/98	1	148	0	270	0	1	1	1	0.00		6.37	
outage	8/3/98	20	0	10	261	0	16	16	27	0.02		6.38	
c5/b1	8/23/98	40	0	20	241	708	33	741	1,200	0.69		7.07	
c5/b2	10/2/98	40	0	20	221	726	33	759	1,229	0.71		7.78	
c5/b3	11/11/98	40	0	20	202	726	33	759	1,229	0.71		8.48	
c5/b4	12/21/98	40	0	20	182	628	33	661	1,071	0.61		9.10	

Appendix F.2 - ITP Precipitate and Filtrate Production

ITP Batch	Start Date	Duration (days)	ITP Ppt (kgal)	Ppt Fed to LW (kgal)	Tk 49 Volume (kgal)	ITP Filtrate (kgal)	ETF Conc (kgal)	Total to Tk 50 (kgal)	SS Grout Produced (kgal)	Cells Filled (each)	V#1 Cells Filled (each)	V#4 Cells Filled (each)	V#2 Cells Filled (each)
c5/b5	1/30/99	40	0	20	163	585	33	618	1,001	0.57		9.67	
c5/b6	3/11/99	40	0	20	143	553	33	586	949	0.54		10.22	
wash	4/20/99	40	0	20	123	0	33	33	53	0.03		10.25	
x-fer	5/30/99	1	141	0	264	0	1	1	1	0.00		10.25	
outage	5/31/99	30	0	15	249	0	25	25	40	0.02		10.27	
c6/b1	6/30/99	40	0	20	230	696	33	729	1,181	0.68		10.95	
c6/b2	8/9/99	40	0	20	210	678	33	711	1,152	0.66		11.61	
c6/b3	9/18/99	40	0	20	190	679	33	712	1,153	0.66		12.00	0.27
c6/b4	10/28/99	40	0	20	171	562	33	595	964	0.55			0.82
c6/b5	12/7/99	40	0	20	151	527	33	560	907	0.52			1.34
wash	1/16/00	40	0	20	132	0	33	33	53	0.03			1.37
x-fer	2/25/00	1	144	0	275	0	1	1	1	0.00			1.38
outage	2/26/00	60	0	29	246	0	49	49	80	0.05			1.42
c7/b1	4/26/00	50	0	25	221	662	41	703	1,139	0.65			2.08
c7/b2	6/15/00	50	0	25	197	691	41	732	1,186	0.68			2.76
c7/b3	8/4/00	50	0	25	172	580	41	621	1,006	0.58			3.33
c7/b4	9/23/00	50	0	25	148	452	41	493	799	0.46			3.79
wash	11/12/00	50	0	25	123	0	41	41	67	0.04			3.83
x-fer	1/1/01	1	160	0	283	0	1	1	1	0.00			3.83
outage	1/2/01	60	0	29	253	0	49	49	80	0.05			3.88
c8/b1	3/3/01	50	0	25	229	613	41	654	1,060	0.61			4.49
c8/b2	4/22/01	50	0	25	204	658	41	699	1,133	0.65			5.14
c8/b3	6/11/01	50	0	25	180	592	41	633	1,026	0.59			5.72
c8/b4	7/31/01	50	0	25	155	442	41	483	783	0.45			6.17
wash	9/19/01	40	0	20	136	0	33	33	53	0.03			6.20
x-fer	10/29/01	1	150	0	285	0	1	1	1	0.00			6.21
outage	10/30/01	60	0	29	256	0	49	49	80	0.05			6.25
c9/b1	12/29/01	50	0	25	231	658	41	699	1,133	0.65			6.90
c9/b2	2/17/02	50	0	25	207	612	41	653	1,058	0.61			7.51
c9/b3	4/8/02	50	0	25	182	610	41	651	1,055	0.61			8.11

Appendix F.2 - ITP Precipitate and Filtrate Production

ITP Batch	Start Date	Duration (days)	ITP Ppt (kgal)	Ppt Fed to LW (kgal)	Tk 49 Volume (kgal)	ITP Filtrate (kgal)	ETF Conc (kgal)	Total to Tk 50 (kgal)	SS Grout Produced (kgal)	Cells Filled (each)	V#1 Cells Filled (each)	V#4 Cells Filled (each)	V#2 Cells Filled (each)
c9/b4	5/28/02	50	0	25	158	583	41	624	1,011	0.58			8.70
wash	7/17/02	40	0	20	138	0	33	33	53	0.03			8.73
x-fer	8/26/02	1	159	0	297	0	1	1	1	0.00			8.73

Notes:
- ITP actual startup 9/2/95
- ITP Cycle #1 batch times determined by ROCTP testing requirements
- ITP batch times after Cycle #1 based on required timing to support canister production
- ITP ppt and filtrate rates based on ITP Production Plan 12/4/95 (Taylor, Davis)
- Sludge Batch #1a & 1b sludge modeling requires 894 gal 10 wt % precipitate per canister produced
- Sludge Batch #1a produces 756 canisters
- Canister Ascension based on FY1996 @ 70, FY1997 @ 150, FY1998-2028 @ 200 canisters/year
- ETF feed to Tank 50 assumed 300 kgal/year
- 1.0 gallons of salt solution in Tank 50 = 1.62 gallons of Saltstone grout

Appendix F.3 - Sludge Batches and Sequencing

Batch	Tank	Volume (Kgal)	Available Volume (kgal)	Notes
1A	51		383	Includes feed from Tanks 15, 17, 18, 21 and 22.
	51 heel		-88	
			295	
1B	42		267	Includes feed from Tanks 15, 17, 18, 21 and 22.
	42 heel		-75	
			192	
2A	8	164	164	
	40		173	
	40 heel		-88	
			249	
2B	7p	150	150	
	11	140	70	Al dissolution 2:1
	18	42	42	Residual heel from 1985-86 sludge removal campaign
	19	20	20	Residual heel from 1985-86 salt removal campaign
			282	
3A	4	127	127	
	7r	62	62	
	12	215	108	Al dissolution 2:1
	14	27	13	Al dissolution 2:1
			310	

Appendix F.3 - Sludge Batches and Sequencing

Batch	Tank	Volume (Kgal)	Available Volume (kgal)	Notes
3B	5	25	25	
	6	25	25	
	15	312	156	Al dissolution (actual)
	21		14	Volume reduction due to washing and compaction
	22		60	Volume reduction due to washing and compaction
			280	
4	13	223	167	Al dissolution 4:3
	47	248	248	Sludge remaining after salt removal
	23	43	43	
			415	
5	26	263	263	2F evap shut down during sludge removal; will incl. future sludge
	35	52	26	Al dissolution 2:1
	32	157	79	Al dissolution 2:1, RHLWE down during sludge removal
	51 heel		88	
			456	
6	33	42	42	
	34	45	45	
	39	93	47	Al dissolution 2:1
	43	192	192	2H evap shut down during sludge removal; will incl. future sludge
	42 heel		75	
	40 heel		88	
			489	

Notes:

- For tanks with less than 7 Kgal of sludge waste heel remaining (Tanks 1, 2, 3, 9, 10, and 24) it is assumed that the heels do not need to be removed.
- p = partial, r = remaining

Appendix F.4 - Tank Farm Material Balance

End of	Influents							Effluents					Working	
Mo/Year	F-LHW	F-HHW	H-LHW	H-HHW	DWPF	Tank WW	ESP	2H Evap	2F Evap	RHLWE	ITP	Other	Inventory	Notes
Nov-95							500,000						722,000	Working Inventory as of 12/1/95
Dec-95	30,310	7,370	5,400	0	0	0	200,000	478,834	26,753	0	0	800,000	1,784,507	See note at bottom
Jan-96	30,310	7,370	5,400	0	142,000	0	0	71,994	94,913	0	95,000	0	1,861,334	Tk 26 -95 kgal to ITP
Feb-96	29,910	7,370	5,400	0	142,000	0	0	71,994	94,629	0	0	0	1,843,276	
Mar-96	29,910	7,370	5,400	0	142,000	0	0	71,994	94,629	0	0	0	1,825,219	
Apr-96	29,910	7,370	5,400	0	142,000	0	0	71,994	94,629	0	0	0	1,807,162	
May-96	29,910	7,370	5,400	0	142,000	0	0	71,994	94,629	0	175,000	0	1,964,105	Tk 26-100 kgal, Tk 38-75 kgal to ITP
Jun-96	29,910	7,370	2,000	0	142,000	0	0	69,580	94,629	0	0	0	1,947,034	
Jul-96	28,410	7,370	3,350	0	142,000	0	0	70,539	93,564	0	270,000	0	2,200,006	Tk 32-170 kgal, Tk 38 100 kgal to ITP
Aug-96	28,410	7,370	2,000	0	142,000	0	0	69,580	93,564	0	250,000	0	2,433,370	Tk 32-125 kgal, Tk 38-125 kgal to ITP
Sep-96	11,500	7,370	2,700	0	142,000	0	0	70,077	81,558	0	0	0	2,421,434	
Oct-96	15,450	500	2,700	0	178,000	0	0	87,357	96,765	0	0	0	2,408,906	
Nov-96	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,391,181	
Dec-96	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	220,000	0	2,593,455	Tk 32-110 kgal, Tk 38-110 kgal to ITP
Jan-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,575,730	
Feb-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	200,000	0	2,758,005	Tk 32-200 kgal to ITP
Mar-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,740,279	
Apr-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	150,000	0	2,872,554	Tk 32-150 kgal to ITP
May-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,854,829	
Jun-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	100,000	0	2,937,104	Tk 27-100 kgal to ITP
Jul-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,919,378	
Aug-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,901,653	
Sep-97	15,450	19,120	2,000	0	178,000	0	0	86,860	109,985	0	0	0	2,883,928	
Oct-97	15,450	19,120	2,000	0	203,000	0	0	98,860	121,985	0	0	0	2,865,202	
Nov-97	15,450	19,120	2,000	0	203,000	0	0	98,860	121,985	0	100,000	0	2,946,477	Tk 27-100 kgal to ITP
Dec-97	15,450	19,120	2,000	0	203,000	0	0	98,860	121,985	0	0	0	2,927,752	
Jan-98	15,450	19,120	2,000	0	203,000	0	200,000	288,860	121,985	0	0	0	2,899,026	Seal water decant from Tk 51-200 kgal
Feb-98	15,450	19,120	2,000	0	203,000	0	0	98,860	121,985	0	50,000	0	2,930,301	Tk 32-50 kgal to ITP
Mar-98	15,450	19,120	5,500	1,500	203,000	0	0	101,345	123,050	0	75,000	0	2,985,126	Tk 27-75 kgal to ITP
Apr-98	13,950	19,120	5,500	1,500	203,000	0	0	101,345	121,985	0	0	0	2,965,386	
May-98	13,950	19,120	11,000	3,000	203,000	0	0	105,250	123,050	0	75,000	0	3,018,615	Tk 27-75 kgal to ITP
Jun-98	13,950	19,120	2,000	0	203,000	0	0	98,860	120,920	0	0	0	3,000,325	
Jul-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	140,090	0	0	0	2,968,173	
Aug-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	140,090	0	0	0	2,936,020	
Sep-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	140,090	0	0	0	2,903,868	start Tk 25 salt removal
Oct-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	140,090	0	50,000	0	2,921,716	Tk 27-50 kgal to ITP
Nov-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	140,090	0	50,000	0	2,939,563	Tk 27-50 kgal to ITP, Tk 41 empty
Dec-98	13,950	19,120	22,800	27,000	203,000	0	0	113,628	42,650	0	50,000	0	2,859,971	Tk 30-50 kgal to ITP
Jan-99	13,950	19,120	22,800	27,000	203,000	0	0	113,628	42,650	97,440	50,000	0	2,877,819	Tk 30-50 kgal to ITP
Feb-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	42,650	97,440	0	0	2,841,897	
Mar-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	42,650	97,440	1,371,000	0	4,176,974	Tk 30-100 kgal to ITP, Tk 41 RTSS
Apr-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	0	0	4,098,402	
May-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	0	0	4,019,830	
Jun-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	90,000	0	4,031,258	Tk 30-50 kgal, Tk 38-40 kgal to ITP
Jul-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	0	0	3,952,686	
Aug-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	100,000	0	3,974,114	Tk 30-100 kgal to ITP
Sep-99	13,950	19,120	35,800	27,000	203,000	0	0	122,858	0	97,440	100,000	0	3,995,542	Tk 30-100 kgal to ITP

Appendix F.4 - Tank Farm Material Balance

	2H Evaporator		2F Evaporator							RHLWE				
End of Mo/Yr	Tk 38 Salt Inv. (gal)	Tk 41 Salt Inv. (gal)	Tk 25 Salt Inv. (gal)	Tk 27 Salt Inv. (gal)	Tk 28 Salt Inv. (gal)	Tk 44 salt Inv. (gal)	Tk 45 salt Inv. (gal)	Tk 46 Salt Inv. (gal)	Tk 47 salt Inv. (gal)	Tk 30 Salt Inv. (gal)	Tk 29 Salt Inv. (gal)	Tk 31 salt Inv. (gal)	Tk 36 salt Inv. (gal)	Tk 37 Salt Inv. (kgal)
Nov-95	780,000		1,000,000	449,000	1,000,000	1,000,000	1,000,000	78,000	1,000,000	5,000	1,000,000	1,000,000	1,000,000	1,000,000
Dec-95	791,566							87,043						
Jan-96	795,972							98,926						
Feb-96	800,378							110,714						
Mar-96	804,784							122,501						
Apr-96	809,190							134,288						
May-96	813,596	1,226,000						146,075						
Jun-96	817,016							157,862						
Jul-96	820,828	1,210,000						169,290						
Aug-96	824,248	1,189,000						180,717						
Sep-96	827,871							188,086						
Oct-96	832,214							195,474						
Nov-96	836,354							207,330						
Dec-96	840,494	1,123,000						219,187						
Jan-97	844,634							231,044						
Feb-97	848,774	1,073,000						242,901						
Mar-97	852,914							254,758						
Apr-97	857,054	1,006,000						266,614						
May-97	861,194							278,471						
Jun-97	865,334	915,000						290,328						
Jul-97	869,474							302,185						
Aug-97	873,614							314,042						
Sep-97	877,754							325,898						
Oct-97	882,394							338,255						
Nov-97	887,034	824,000						350,612						
Dec-97	891,674	724,000						362,969						
Jan-98	906,314							375,326						
Feb-98	910,954	624,000						387,682						
Mar-98	916,609	524,000						400,399						
Apr-98	922,264							412,756						
May-98	929,514	424,000						425,473						
Jun-98	934,154							437,470						
Jul-98	944,826							455,946						
Aug-98	955,498	324,000						474,423						
Sep-98	966,170							492,900						
Oct-98	976,842	224,000	975,000					511,377						
Nov-98	987,514	124,000	950,000					529,854						
Dec-98	998,186		850,000					544,270						
Jan-99	1,008,858		750,000					558,687						
Feb-99	1,023,300							573,104						
Mar-99	1,037,742		650,000					587,521						
Apr-99		138,442						601,938						
May-99		152,884						616,354						
Jun-99		167,326	550,000					630,771						
Jul-99		181,768						645,188						
Aug-99		196,210	462,000					659,605						
Sep-99		210,652	374,000					674,022		5,000				

Appendix F.4 - Tank Farm Material Balance

End of Mo/Year	Influents							Effluents					Working	
	F-LHW	F-HHW	H-LHW	H-HHW	DWPF	Tank WW	ESP	2H Evap	2F Evap	RHLWE	ITP	Other	Inventory	Notes
Oct-99	18,710	38,610	35,800	27,000	203,000	0	0	122,858	64,083	97,440	100,000	0	4,056,803	Tk 27-50 kgal; Tk 30-50 kgal to ITP
Nov-99	18,710	38,610	35,800	27,000	203,000	0	0	122,858	64,083	97,440	100,000	0	4,118,065	Tk 30-100 kgal to ITP
Dec-99	18,710	38,610	35,800	27,000	203,000	0	0	122,858	64,083	97,440	0	0	4,079,326	
Jan-00	18,710	38,610	35,800	27,000	203,000	0	0	122,858	64,083	97,440	0	0	4,040,587	
Feb-00	18,710	38,610	35,800	27,000	203,000	0	0	122,858	64,083	97,440	0	0	4,001,848	
Mar-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440	0	0	3,979,391	
Apr-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440	100,000	0	4,056,935	Tk 30-100 kgal to ITP
May-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440	1,421,000	0	5,455,478	Tk 25 empty, Tk 27-50, Tk 30-100 kgal to ITP
Jun-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440	0	0	5,433,021	
Jul-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440		0	5,410,564	
Aug-00	18,710	38,610	2,000	0	203,000	0	275,000	98,860	122,763	344,940	300,000	0	5,739,807	Tk 27-50 kgal, Tk 30 250 kgal to ITP
Sep-00	18,710	38,610	2,000	0	203,000	0	0	98,860	43,563	97,440	190,000	0	5,907,351	Tk 27-50 kgal, Tk 30 140 kgal to ITP
2001	238,320	516,480	116,400	0	2,515,000	0	1,100,000	1,289,844	890,448	1,770,400	200,000	0	5,571,843	Tk 27-200 kgal to ITP
2002	198,880	346,320	393,600	0	2,515,000	0	1,100,000	1,486,656	731,152	1,770,400	110,000	0	5,116,251	Tk 26-110 kgal to ITP
2003	30,000	360	116,400	0	2,515,000	140,000	275,000	1,289,844	165,274	1,411,000	1,271,000	0	6,176,608	Tk 29 empty
2004	30,000	360	24,000	0	2,515,000	0	980,000	1,224,240	305,314	1,708,960	1,271,000	0	7,136,762	Tk 38 empty
2005	30,000	360	24,000	0	2,515,000	0	1,468,000	1,224,240	445,858	1,958,816	0	0	6,728,315	
2006	30,000	360	24,000	0	2,515,000	190,000	1,222,000	1,224,240	460,510	1,918,364	1,271,000	0	7,621,069	Tk 31 empty
2007	30,000	360	24,000	0	2,515,000	0	1,592,000	1,224,240	481,570	2,022,304	0	0	7,187,823	
2008	30,000	360	24,000	0	2,515,000	660,000	1,468,000	1,224,240	742,858	2,255,816	1,271,000	0	7,984,376	Tk 28 empty
2009	30,000	360	24,000	0	2,515,000	0	1,387,000	1,224,240	422,530	1,917,344	0	0	7,592,130	
2010	30,000	360	24,000	0	2,515,000	190,000	1,320,000	1,224,240	488,734	1,968,540	1,271,000	0	8,465,283	Tk 36 empty
2011	30,000	360	24,000	0	2,515,000	470,000	1,203,000	1,224,240	581,038	2,034,636	0	0	8,062,837	
2012	30,000	360	24,000	0	2,515,000	190,000	820,000	1,224,240	344,734	1,712,540	1,271,000	0	9,035,991	Tk 37 empty
2013	30,000	360	24,000	0	2,515,000	0	1,400,000	1,224,240	426,274	1,924,000	0	0	8,641,144	
2014	30,000	360	24,000	0	2,515,000	330,000	1,280,000	1,224,240	540,214	2,011,060	1,271,000	0	9,508,298	Tk 47 empty
2015	30,000	360	24,000	0	2,515,000	190,000	0	1,224,240	108,574	1,292,700	0	0	9,374,451	
2016	30,000	360	24,000	0	2,515,000	0	930,000	1,224,240	290,914	1,683,360	1,271,000	0	10,344,605	
2017	30,000	360	24,000	0	2,515,000	0	1,400,000	1,224,240	426,274	1,924,000	0	0	9,949,759	
2018	30,000	360	24,000	0	2,515,000	140,000	1,170,000	1,224,240	423,034	1,869,240	1,271,000	0	10,857,912	
2019	30,000	360	24,000	0	2,515,000	0	640,000	1,224,240	207,394	1,534,880	0	0	10,615,066	
2020	30,000	360	24,000	0	2,515,000	140,000	1,280,000	1,224,240	454,714	1,925,560	1,271,000	0	11,501,219	Tk 30 empty
2021	30,000	360	24,000	0	2,515,000	0	1,280,000	1,224,240	391,714	1,862,560	0	0	11,130,373	
2022	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	1,271,000	0	12,286,527	Tk 27 empty
2023	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	0	0	12,171,680	
2024	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	1,271,000	0	13,327,834	Tk 41 empty (2nd fill)
2025	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	0	0	13,212,987	
2026	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	1,271,000	0	14,369,141	Tk 29 empty
2027	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	0	0	14,254,295	
2028	30,000	360	24,000	0	2,515,000	0	0	1,224,240	23,074	1,207,200	1,271,000	0	15,410,448	Tk 38 empty (2nd fill)

Appendix F.4 - Tank Farm Material Balance

	2H Evaporator		2F Evaporator							RHLWE				
End of Mo/Yr	Tk 38 Salt Inv. (gal)	Tk 41 Salt Inv. (gal)	Tk 25 Salt Inv. (gal)	Tk 27 Salt Inv. (gal)	Tk 28 Salt Inv. (gal)	Tk 44 salt Inv. (gal)	Tk 45 salt Inv. (gal)	Tk 46 Salt Inv. (gal)	Tk 47 salt Inv. (gal)	Tk 30 Salt Inv. (gal)	Tk 29 Salt Inv. (gal)	Tk 31 salt Inv. (gal)	Tk 36 salt Inv. (gal)	Tk 37 Salt Inv. (kgal)
Oct-99		225,094	299,000					694,258		9,060				
Nov-99		239,536						714,495		13,120				
Dec-99		253,978	224,000					734,732		17,180				
Jan-00		268,420						754,969		21,240				
Feb-00		282,862						775,206		25,300				
Mar-00		287,502						788,962		29,360				
Apr-00		292,142	124,000					802,719		33,420				
May-00		296,782						816,476		37,480				
Jun-00		301,422	54,000					830,233		41,540				
Jul-00		306,062	Tk 25 empty					843,990		45,600				
Aug-00		310,702						857,746		76,060				
Sep-00		315,342		449,000				871,503		80,120				
2001		399,398		689,552						236,020	615,000			
2002		563,842		879,800						391,920	234,000			
2003		647,898		907,976						475,620	0			
2004	Tk 38 empty	705,158	54,000	968,182						620,000	Tk 29 empty			
2005		762,418	140,558							811,228				
2006		819,678	222,029							988,340	0	Tk 31 empty		
2007		876,938	315,283								203,132			
2008	0	934,198	430,312		Tk 28 empty						427,360			
2009	57,260		512,497								610,812			
2010	114,520		599,259								797,332		Tk 36 empty	
2011	171,780		691,782								986,620	0		
2012	229,040		751,545									138,520		Tk 37 empty
2013	286,300		834,431									323,220		
2014	343,560		925,073									512,900		
2015	400,820		940,555									572,700		
2016	458,080		998,062		0	Tk 44 empty						712,280		
2017	515,340				82,886							896,980	0	
2018	572,600				159,392		Tk 45 empty						169,620	
2019	629,860				201,238								281,360	
2020	687,120				283,684					Tk 30 empty			461,540	
2021	744,380				360,090								634,720	
2022	801,640			Tk 27 empty	367,377								685,020	
2023	858,900				374,663								735,320	
2024	916,160	Tk 41 empty			381,950								785,620	
2025	973,420				389,236								835,920	
2026	1,030,680	0			396,522						Tk 29 empty		886,220	
2027		57,260			403,809								936,520	
2028		114,520			411,095								986,820	

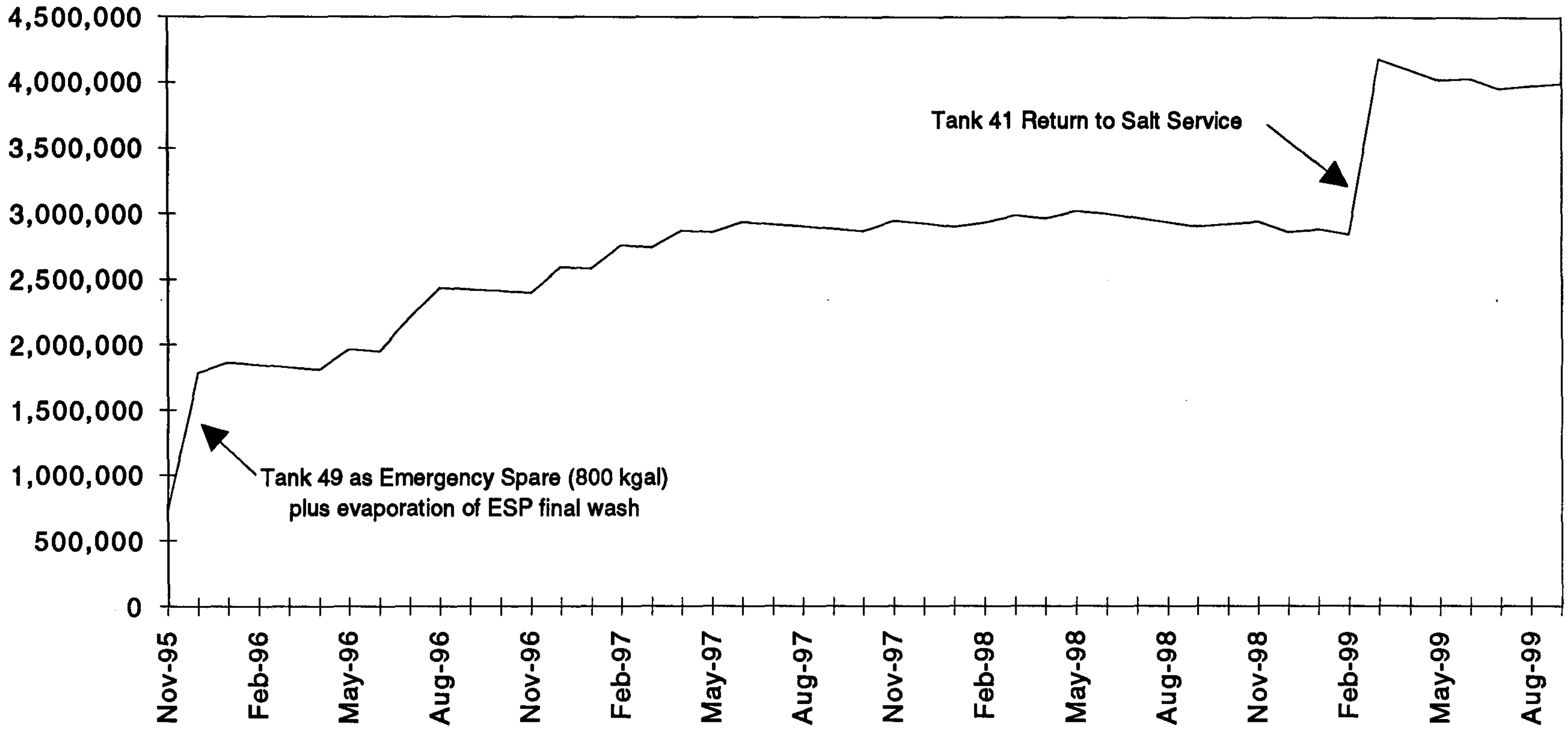
Appendix F.4 - Tank Farm Material Balance

End of Mo/Year	Influents							Effluents				Other	Working Inventory	Notes
	F-LHW	F-HHW	H-LHW	H-HHW	DWPF	Tank WW	ESP	2H Evap	2F Evap	RHLWE	ITP			

Notes:

- F-LHW & HHW: per NMP-EFA-95-0028, dated 3/2/95
- H-LHW & HHW: per NMP-EFA-95-00??, dated 3/??/95
- Reactor Basin sludge transported to the Tank Farm is planned to be zero. The historical average is 35,200 gal/yr.
- DWPF recycle is a function of the planned attainment and age of DWPF per WSRC-TR-93-0677, Rev. 0.
- Tank washwater based on removal from service dates in Appendix F, 140 kgal for tank interior, 50 kgal for annulus if contaminated.
- ESP washwater per memo, A. S. Choi to N. R. Davis, 5/25/94, for each batch. Washwater is assumed to be generated evenly for 30 months prior to feeding each batch to DWPF.
- 1H Evaporator is assumed to remain down indefinately.
- 2H Evaporator space gain per Section 8.6.2 of this Plan.
- 2F Evaporator per Section 8.6.3 of this Plan.
- RHLWE is assumed to start up 11/30/98, space gain per Section 8.6.4 of this Plan.
- ITP precipitate will be produced just in time without building inventory in Tank 49.
- The "Other" column shows transfers of dilute waste out of Type III Tanks for use as waste removal water and the changing use of Tank 42 as emergency spare.
- The 800 kgal in the "Other" column asumes that 800 kgal in Tank 49 is reserved for Emergency Spare space.
- The "Working Inventory" column shows the useable storage space in Type III Tanks 25-39 and 41-47.
- Does not count the 1.271 Mgal of emergency spare space per Tank Farm, ITP Tanks 48-50 or ESP Tanks 40 & 51.

Appendix F.5 - Tank Farm Material Balance Graph



Appendix F.6 - Glass Waste Storage Building Fill Rate

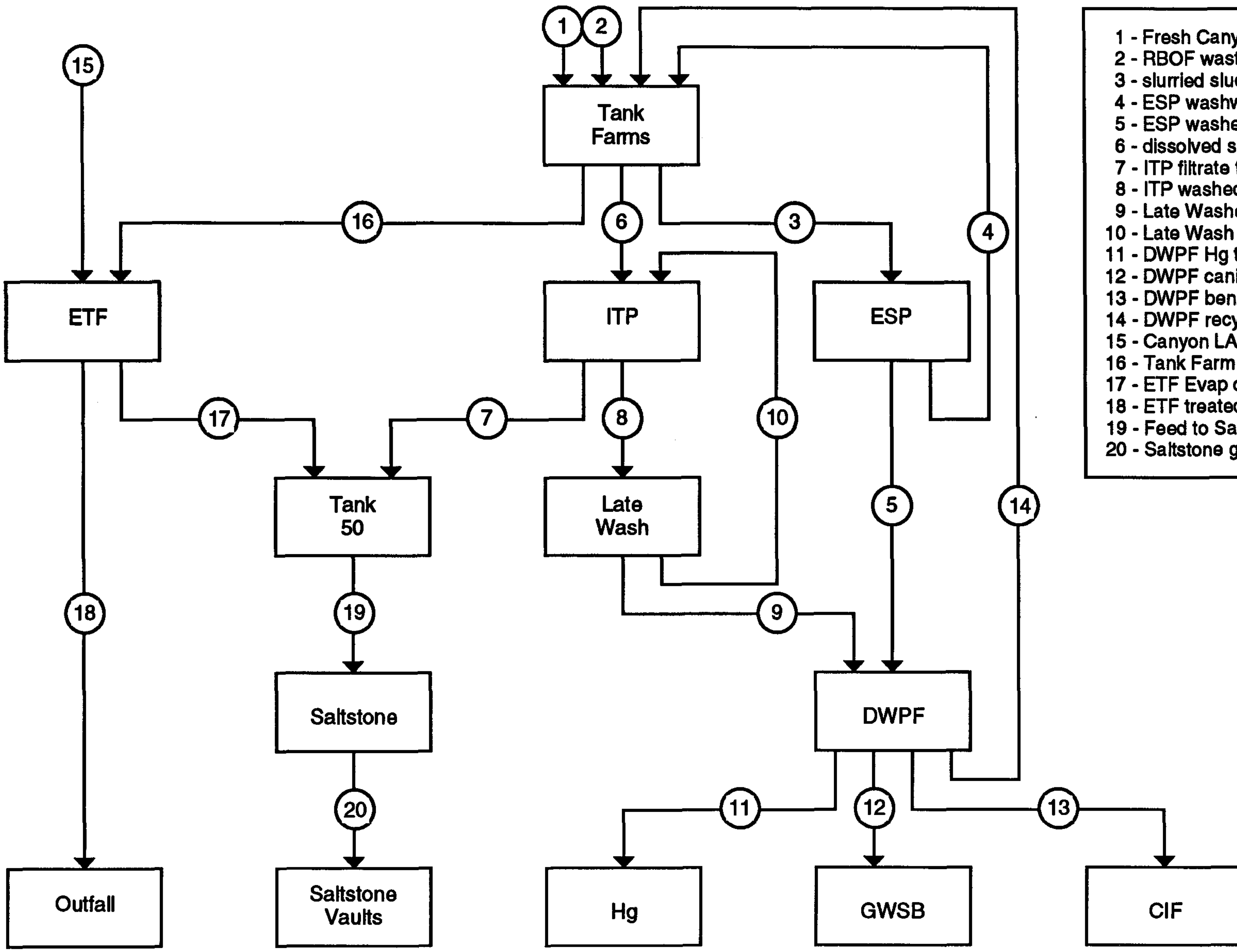
End of Yr	Sludge Batch	Percent Attnmt	No. Cans Produced	Total Cans In GWSB #1	Total Cans In GWSB #2	Total Cans In GWSB #3	Notes
1996	1A	13	70	70			• Start production 1/1/96
1997	1A	22	150	220			
1998	1A	30	200	420			
1999	1A	37	200	620			
2000	1A, 1B	37	200	820			
2001	1B	37	200	1,020			
2002	1B	37	200	1,220			
2003	1B, 2A	37	200	1,420			
2004	2A	37	200	1,620			
2005	2A, 2B	37	200	1,820			
2006	2B	37	200	2,020			
2007	2B	37	200	2,159	61		• Start filling GWSB #2, modules 1 and 2.
2008	2B, 3A	37	200		261		
2009	3A	37	200		461		
2010	3A	37	200		661		
2011	3A, 3B	37	200		861		
2012	3B	37	200		1,061		
2013	3B, 4	37	200		1,261		
2014	4	37	200		1,461		
2015	4	37	200		1,661		
2016	4	37	200		1,861		
2017	4,5	37	200		2,061		
2018	5	37	200		2,261		
2019	5	37	200		2,286	175	• Start filling GWSB #2, module 3.
2020	5	37	200			375	
2021	5,6	37	200			575	
2022	6	37	200			775	
2023	6	37	200			975	
2024	6	37	200			1,175	
2025	6	37	200			1,375	
2026	6	37	124			1,499	
					Total Cans Produced:	**5,944**	

Appendix F.6 - Glass Waste Storage Building Fill Rate

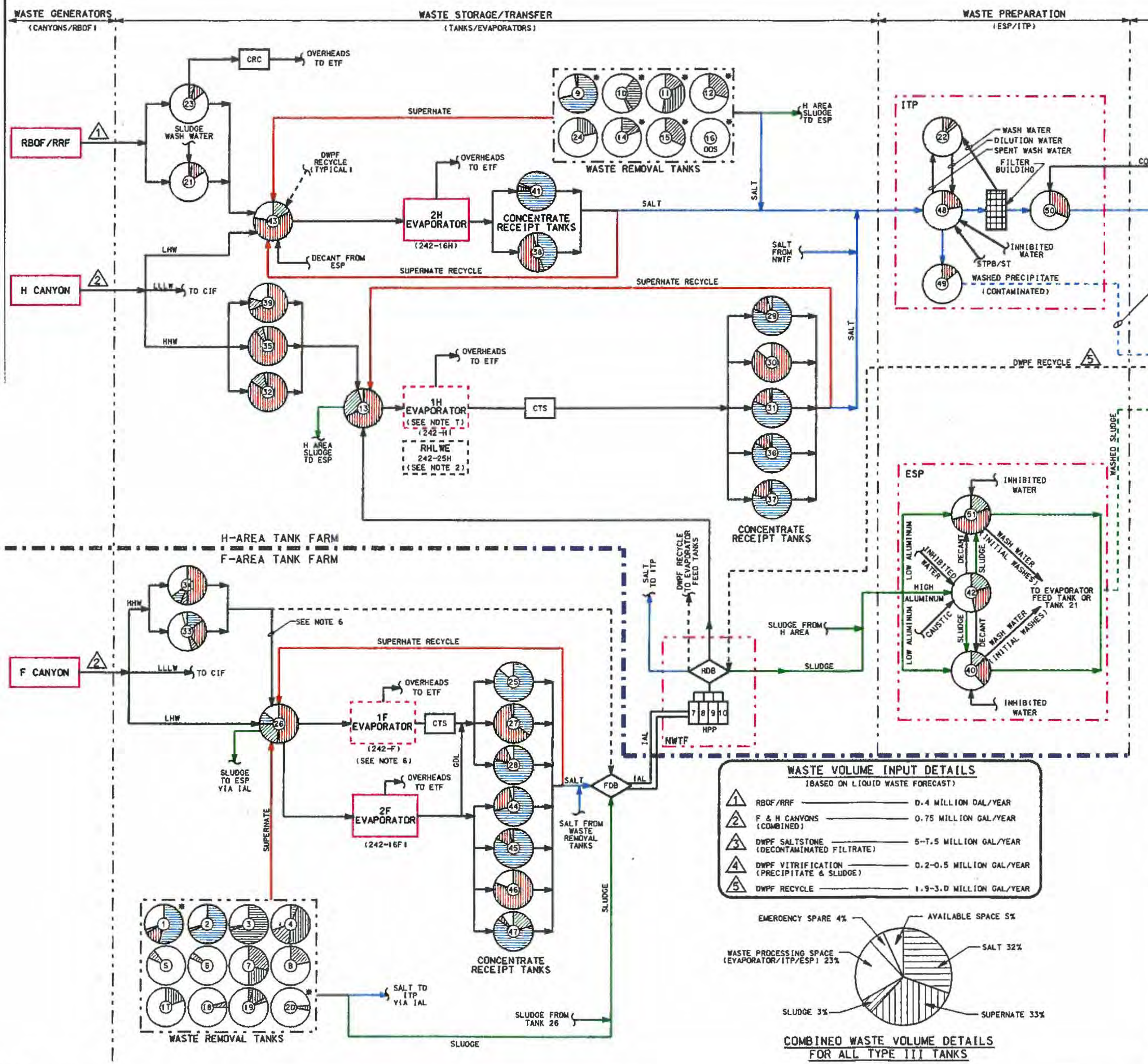
Assumptions:

- GWSB #1 holds 2,286 canisters, less 122 unusable positions, less 5 non-radioactive test cans, leaves working capacity = 2,159 cans. (Note: 570 positions are currently unusable. Per letter HLW-OVP-95-0088, dated 11/08/95, 448 of those positions can be safely repaired after the start of DWPF Rad Ops.)
- GWSB #2, if needed, will be built in modules: first two modules will have combined capacity of 2,286 canisters.
- A third module, if needed, will be added later to store balance of forecasted canisters.
- Each GWSB fills to capacity.
- Assumes no other canisters are stored from other facilities (i.e., West Valley)
- Transfer of canisters to Federal Repository is not shown. If the Federal Repository opens in FY2015 as currently planned, then the need for GWSB#2, module 3 could be negated.

Appendix G - Simplified HLW System Flowsheet



1 - Fresh Canyon HLW
2 - RBOF waste
3 - slurried sludge to ESP
4 - ESP washwater
5 - ESP washed sludge to DWPF
6 - dissolved salt to ITP
7 - ITP filtrate to Tank 50
8 - ITP washed Ppt to Late Wash
9 - Late Washed Ppt to DWPF
10 - Late Wash washwater to ITP Tk 22
11 - DWPF Hg to storage
12 - DWPF canisters to GWSB
13 - DWPF benzene to OWST/CIF
14 - DWPF recycle to Tank Farms
15 - Canyon LAW to ETF
16 - Tank Farm LAW to ETF
17 - ETF Evap concentrate to Tk 50
18 - ETF treated water to outfall
19 - Feed to Saltstone
20 - Saltstone grout to Vaults



WASTE VOLUME INPUT DETAILS

(BASED ON LIQUID WASTE FORECAST)

1	RBOF/RRF	0.4 MILLION GAL/YEAR
2	F & H CANYONS (COMBINED)	0.75 MILLION GAL/YEAR
3	DWPF SALTSTONE (DECONTAMINATED FILTRATE)	5-7.5 MILLION GAL/YEAR
4	DWPF VITRIFICATION (PRECIPITATE & SLUDGE)	0.2-0.5 MILLION GAL/YEAR
5	DWPF RECYCLE	1.9-3.0 MILLION GAL/YEAR

EMERGENCY SPARE 4%
AVAILABLE SPACE 5%
SALT 32%
WASTE PROCESSING SPACE (EVAPORATOR/ITP/ESP) 23%
SLUDGE 3%
SUPERNATE 33%

COMBINED WASTE VOLUME DETAILS FOR ALL TYPE III TANKS

NOTE

Use this flow diagram for INFORMATION only.

LEGEND

CIF	CONSOLIDATED INCINERATION FACILITY
CRC	CESIUM REMOVAL COLUMNS
CTS	CONCENTRATE TRANSFER SYSTEM
DWPF	DEFENSE WASTE PROCESSING FACILITY
ESP	EXTENDED SLUDGE PROCESSING
FDB	F AREA DIVERSION BOX
GDL	GRAVITY DRAIN LINE
HDB	H AREA DIVERSION BOX
HHW	HIGH HEAT WASTE
HPP	PUMP PIT (H AREA)
IAL	INTER-AREA LINE
ITP	IN TANK PRECIPITATION
LHW	LOW HEAT WASTE
LLLW	LIQUID LOW LEVEL WASTE
NWTF	NEW WASTE TRANSFER FACILITY
OOS	OUT OF SERVICE
RBOF	RECEIVING BASIN FOR OFFSITE FUEL
RHLWE	REPLACEMENT HIGH LEVEL WASTE EVAPORATOR
RRF	RESIN REGENERATION FACILITY
ST	SODIUM TITANATE
STPB	SODIUM TETRA PHENYL BORATE

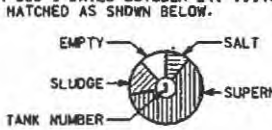
TANK FARMS

TYPE OF TANK	TANK NO.S	AREA
TYPE I TANK (750,000 GALLONS)	1-8	F AREA
	9-12	H AREA
TYPE II TANK (1,030,000 GALLONS)	13-16	H AREA
TYPE III TANK (1,300,000 GALLONS)	25-28	F AREA
	29-32	H AREA
	33-34	F AREA
	35-43	H AREA
	44-47	F AREA
	48-51	H AREA
TYPE IV TANK (1,300,000 GALLONS)	17-20	F AREA
	21-24	H AREA

* TANKS WITH CRACKS

GENERAL NOTES

1. DOTTED LINE SHOWS FACILITY OR PROCESSES CURRENTLY NOT IN OPERATION.
2. WHEN REPLACEMENT HIGH LEVEL WASTE EVAPORATOR WILL BE PLACED IN SERVICE, TANK 32 WILL BECOME THE FEED TANK AND 1H EVAPORATOR AND TANK 13 WILL BE TAKEN OUT OF SERVICE. FURTHER, TANKS 35 AND 36 WILL SWITCH FUNCTIONS.
3. IT IS WASTE MANAGEMENT'S OBJECTIVE TO EMPTY ALL TYPE I, II, & IV TANKS AND REMOVE THEM OUT OF SERVICE AS EARLY AS POSSIBLE.
4. THERE ARE MANY DIVERSION BOXES NOT SHOWN HERE WHICH HELP TO ROUTE WASTE TO VARIOUS TANKS TO COPE WITH THE LEVEL AND TYPE OF WASTE IN THE TANKS.
5. WASTE CONTENTS ARE SHOWN BY COLORED SEGMENTS PROPORTIONAL FOR EACH TANK ACCORDING TO ITS INDIVIDUAL OPERATING LIMIT, EXCEPT FOR WASTE REMOVAL TANKS (TANKS 1-12, 14-20, AND 24) WHICH ARE SHOWN ACCORDING TO THEIR MAXIMUM FILL LIMITS. THE DATA IS BASED ON HIGH LEVEL WASTE ENGINEERING RECORD WSRC-RP-94-383-9 DATED OCTOBER 24, 1994. THE CONTENTS ARE COLOR MATCHED AS SHOWN BELOW.



6. F-AREA IS PROCESSING HIGH HEAT WASTE USING 2F EVAPORATOR; THE 1F EVAPORATOR IS INACTIVE.
7. 1H AND 1F EVAPORATORS ARE CURRENTLY OUT OF SERVICE.

LIQUID WASTE PROCESSING FLOW DIAGRAM

DATE: DECEMBER 10, 1994

PREPARED BY: ASOKA PILLAI

DRAWN BY: KAREN A. BARLEY

Distribution:

DOE-HQ
R. Erickson, HQ
M. McMillan, HQ
K. Picha, HQ

DOE-SR
C. E. Anderson, 704-S
S. M. Blanco, 703-H
M. S. Glenn, 703-A
H. B. Gnann, 704-S
M. R. Jump, 704-S
W. D. Leslie, 704-60H
J. W. McCullough, 704-S
W. D. Pearson, 704-S
R. J. Schepens, 704-S
M. G. Schwenker, 704-S
W. F. Spader, 704-S
P. R. Washer, 730-B
A. L. Watkins, 704-S

HLWM Staff
A. B. Scott, 719-4A
C. L. Peckinpaugh, 719-4A
H. D. Harmon, 719-4A
A. M. Cwalina, 719-4A

HLW Prog. Mgmt.
J. N. Brooke, 719-4A
S. S. Cathey, 719-4A
K. B. Way, 719-4A
M. N. Wells, 719-4A
F. E. Wise, 719-4A

DWPF
D. B. Amerine, 704-S
M. N. Brosee, 704-S
W. T. Davis, 704-99S
W. H. Pettigrew, 704-S
D. G. Thompson, 704-S
J. W. Wilson, 210-S
A. L. Whittenburg, 210-Z
R. L. Yancey, 704-S

HLW Cont. Mgmt.
G. L. Archer, 742-13G
D. W. Beckenhauer, 703-7C
L. G. Frelin, 703-H
M. T. Keefer, 241-153H
A. J. Norkus, 742-13G
T. E. Pate, 742-13G
K. Rashidi, 742-13G
L. J. Simmons, 703-H

HLW Controller
P. S. Kennedy, 704-1S
G. M. Kizer, 719-4A
M. N. Nelson, 773-41A
T. D. Ross, 742-9G
L. W. Wiker, 719-11A

HLW Proj. Mgmt.
D. W. Armstrong, 707-C
C. J. Boasso, 707-60H
W. B. Boore, 703-8C
D. R. Buchanan, 704-6C
H. M. Handfinger, 704-56H
R. R. Hopkins, 742-3G
G. M. Johnson, 703-5C
D. M. Matos, 719-4A
F. D. O'Brien, 719-4A
R. A. Stokes, 704-6C (4)
R. W. Wilson, 742-2G
J. C. Woeber, 719-4A

HLWM Engg.
D. T. Bignell, 719-4A
R. C. Blaine, 704-20S
R. W. Brandon, 719-4A
R. M. Campbell, 719-4A
J. T. Carter, 704-25S
R. K. Cauthen, 704-15S
D. P. Chew, 719-4A
W. D. Clark, 241-120H
B. G. Croley, 241-120H
P. D. d'Entremont, 703-H
E. N. Dixon, 704-20S
H. H. Elder, 704-S
M. A. Hunter, 742-6G
B. L. Lewis, 703-8C
T. J. Lex, 719-4A
J. E. Marra, 703-H(5)
S. L. Marra, 704-35S
M. S. Miller, 704-S
T. M. Monahon, 703-H
M. J. Montini, 704-S
J. P. Morin, 719-4A
J. F. Ortaldo, 704-S
P. M. Patel, 704-27S
S. F. Piccolo, 704-S
P. L. Rutland, 241-152H
R. L. Salizzoni, 707-H(5)
R. M. Satterfield, 719-4A
J. F. Sproull, 704-S
C. B. Stevens, 742-6G
G. D. Thaxton, 241-120H
G. A. Taylor, 703-H
W. Van Pelt, 241-152H
A. W. Wiggins, 241-84H

HLW Ops
G. Davis, 241-100F
M. J. Green, 703-8C
J. E. Herbert, 703-9C
M. D. Johnson, 704-56H
L. G. Lawson, 241-84H
M. J. Mahoney, 703-8C
C. A. Polson, 707-H
G. T. Wright, 703-H

HLW QA
R. L. Malloy, 719-4A
M. K. Carlson, 704-S

HLW Training & Proc.
M. A. Kirkpatrick, 705-1C
W. A. Morrison, 703-5C
E. C. Temple, 705-C
D. W. Zimmerman, 704-49S

EDD
T. H. Gould, 773-41A

EPD Division
C. R. Hayes, 742-5A

NMPD
M. F. Sujka, 703-A
R. L. Geddes, 704-F
T. C. Robinson, 221-F

SRTC
L. M. Papouchado, 773-A
E. W. Holtzscheiter, 773-A
W. L. Tamosaitis, 773-A
A. S. Choi, 704-1T
S. D. Fink, 773-A
R. A. Jacobs, 704-T
M. J. Plodinec, 773-A
A. A. Ramsey, 704-1T

SWER
C. B. Jones, 730-B
L. L. Bailey, 730-B
W. S. Carnes, 704-61S
S. E. Crook, 704-45S
B. A. Daugherty, 705-3C
R. T. Duke, 705-3C
S. A. Lorah, 704-45S
C. W. McVay, 704-45S
K. S. Wierzbicki, 730-B

WHC
P. Brackenbury
L. Ermold
K. Gasper

WVNS
R. Lawrence
D. Meess

Records
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