High Level Waste Management Division

HLW System Plan Revision 1 (U)

Westinghouse Savannah River Company
Aiken, South Carolina

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HLW System Plan - Revision 1 (U)

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1.0 Mission Statement

The mission for the High Level Waste System is to:

- prevent and/or minimize the amount of high level, low level, hazardous and mixed waste generated,
- safely and acceptably handle, treat, store, transport and dispose of existing and future Department of Energy (DOE) waste; and
- ensure that risks to the environment and to human health and safety posed by inactive and surplus facilities and sites are either eliminated or reduced to prescribed, acceptable levels.

This will be done using the most technically effective and cost efficient means reasonably achievable while providing appropriate opportunities for public involvement.

2.0 Purpose

The purpose of this High Level Waste (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 Defense Waste Processing Facility (DWPF) and Saltstone. This document is a summary of the key planning bases, assumptions, limitations, strategy and schedules for facility operations as supported by the Fiscal Year (FY) 93 Annual Operating Plan (AOP), the projected FY94 AOP and FY95 Five Year Plan (FYP) to meet regulatory and DOE milestones. The recent development of the FY95 FYP necessitated the need for this revision to the previous Plan (revision 0). There are a small number of key dates or durations used in this Plan that are not the jointly agreed upon dates between WSRC and DOE because a joint agreement did not exist at the time of htis Plan. For those cases, the most reasonably achievable date as determined by the HLW System Integration Manager was used. This is per the charter established for this Plan by the HLW Steering Committee.

3.0 Executive Summary

A HLW System flowsheet is attached to this Plan to enable the reader to better understand the text of the Plan. Also, the last appendix, Appendix O, lists all of the acronyms for ready reference.

3.1 Reference Date

The reference date of this Plan is June 7, 1993. All FY93 data (manpower, funding, milestones, schedules, etc.) shown in the Plan is based upon the FY93 AOP. All FY94 data is based upon the recent FY94 OMB Passback assuming a successful Budget Amendment and full funding of the WSRC ConOps initiative. Funding allocations to the various Activity Data Sheets (ADS's) are shown in Appendix M. All data shown for FY95 through FY99 is based on the most recent output of System W (System W is the Site financial software system that receives and compiles all AOP or FYP ADS's and supporting information) as of May 11, 1993 plus the Conduct of Operations (ConOps) Initiative changes in support of the FY95 FYP development. At the time of this Plan, WSRC and DOE-SR had not closed on the scope and funding source for the ConOps Initiative. It is anticipated that this issue will be resolved during the FY94 AOP development process and that rev 2 to this Plan will be issued immediately after the FY94 AOP is complete.

3.2 Key Milestones

The key milestones relate to the processes required to safely remove radioactive waste from storage and process it into canisters of glass or into Saltstone. For HLW operations, these milestones relate to Waste Removal, In-Tank Precipitation (ITP), Extended Sludge Processing (ESP), Evaporation and the associated transfer operations. For the DWPF, the key milestones relate to successful cold chemical testing, initiation of radioactive feed and successful operation of the Late Wash process. For Solid Waste, the key milestones relate to the Consolidated Incinerator Facility (CIF) and those facilities in direct support of the CIF, namely, the Hazardous Waste/Mixed Waste Disposal Facility and M-Area Waste Disposal.

The key milestones shown below, as well as the complete list of milestones shown in Appendix I, were taken directly from the FY95 FYP ADS's that were the output from System W as of May 11, 1993 and corrected for the ConOps initiative (see section 7.1 Funding).

	rev. 1	rev. 0
• Start ESP Process Verification Test	7/1/93	4/20/93
• Restart 1H Evaporator	9/1/93	
• Restart 2H Evaporator	10/1/93	
• Restart 2F Evaporator	11/1/93	
• Start up In-Tank Precipitation	3/5/94	4/20/93
• Start up New Waste Transfer Facility	5/24/94*	12/9/93
• Late Wash Bypass Complete	6/10/94	6/10/94
• DWPF Radioactive Operations	11/1/94	5/30/94
• Start up Consolidated Incinerator Facility	6/1/96	n/a
• Start up Late Wash APP Modifications	10/30/95	10/30/95
• Start up Replacement High Level Waste Evaporator	11/17/97	8/31/96
• Sludge batch#2 ready to feed	6/1/99	10/1/98
• Sludge batch#3 ready to feed	5/1/02	9/1/01

* schedule still under review at the time of this Plan.

3.3 Operational Plan Summary

ESP batch#1 washing will resume under the guidance of the ITP/ESP Startup Test Group per the Process Verification Test on or before 7/1/93 and could potentially complete washing sludge batch#1 as part of that test program. After washing is complete, the sludge will be consolidated in Tank 51 and fully characterized before DWPF sludge-only startup.

ITP is planned to start up 3/5/94. Tank 41 will be the first tank fed to ITP. The entire tank contents will be processed. Tank 41 will be emptied before the second tank (Tank 29) will be ready for salt removal. During this period, concentrated supernate from Tanks 32, 38 and 43 are planned to be fed directly to ITP. The volume of concentrated supernate fed from each tank will be monitored very carefully as each of the alternate feeds tanks contains from four to ten times the long term average flowsheet concentration of potassium. The increased potassium concentration generates significantly more precipitate than the typical ITP feed thus consuming the available precipitate storage capacity in Tank 49. This is described elsewhere in this report and shown graphically in Appendix J-4.

The first precipitate washing step will be conducted after the completion of Tank 41 salt removal and direct feed because that will be the earliest date that there will be enough precipitate to wash. The second tank to be fed to ITP will be Tank 29. This tank will also be emptied completely so that the cooling coils can be replaced. Tank 27 concentrated supernate will be fed after Tank 29 feed. This will ensure that the 2F Evaporator has adequate, although only marginally, salt receipt space.

DWPF will resume cold chemical runs as soon as the melter is dried and conduct of operations improvements are made. This is planned to occur in the July-August 1993 timeframe. The Cold Chemical Runs (CCR) recycle will be trucked to Effluent Treatment Facility (ETF) if it cannot go to Horse Creek Valley (an industrial wastewater treatment plant). Following CCR's, DWPF will commence mercury runs. The recycle from this will be handled in one of three ways: 1) trucked to ETF, 2) trucked to the Tank Farm or New waste Transfer facility (NWTF), or 3) pumped to the Tank Farm using the Low Point Pump Pit (LPPP), Late Wash Bypass Line and NWTF. DWPF will then start up on sludge-only feed in 11/94 and operate on sludge-only until 4/95. Late Wash will be tied in during a planned six month maintenance/tie-in outage. The maintenance activities to be completed during this outage have not been defined at this time; however, experience suggests that there will be a significant number of emergent repairs or modifications that will need to be made after the first 6 months of operation. DWPF will restart concurrent with the startup of Late Wash on sludge and precipitate feed on 10/30/95.

Sludge batch#2 will be ready to feed 6/99 and will last until sludge batch#3 is ready 5/02. The attainment of DWPF during the period of batch#1 and #2 feed will be 26 and 37%, respectively. Funding for the Waste Removal Program has been requested in the FY95 FYP to increase the System attainment during batch #3 and #4 to about 60%.

3.4 Key Issues and Assumptions

Several of the most significant issues are listed below. Each of these issues is tied to an assumption. These issues and assumptions as well as numerous others are listed in Appendix H where all issues/assumptions are further tied to potential contingency actions.

ITP Geotechnical

The ongoing geotechnical program at ITP is revealing some potential problems with soil stability. Several areas of poor quality soil have been found near the ITP facilities. The issue is that there is a possibility that remedial actions to improve soil stability will be required. The assumption is that the problems found in ITP will be systemic to the entire Tank Farm or major portions of the Tank Farm and that remediation (if required) will be completed after ITP startup.

Evaporator Restart

The three existing Tank Farm evaporators were voluntarily shut down pending implementation of a Conduct of Operations improvement initiative. Each evaporator has a recovery program and schedule. At the time of this Plan, the recovery programs were not adequately staffed and the schedule performance was in jeopardy. Once each evaporator restarts, it is expected to perform per a space gain plan that has been developed based on historical data, current experience and engineering judgement. The issue is that the restart dates and the performance after restart could vary significantly from the planned dates and rates and there is very little contingency. The assumption in this Plan is that the evaporators will be restarted as scheduled and that they will operate at or near the planned rate of space gain.

Successful Renegotiation of Regulatory Commitments

There are several Solid Waste and High Level Waste programs that compete for EM funding. Many have strong regulatory commitments and future expectations. There is not adequate funding for many of the programs. Other programs are adequately funded but are limited by technical concerns. The issue is that the Regulators may not agree to large scale changes to existing commitments and expectations, thus driving SRS to reallocate funding based on Regulatory input. The assumption is that SRS can successfully renegotiate the regulatory commitments as proposed by SRS and that current expectations can be revised.

Duration of Operational Readiness Reviews

Each facility startup or restart program separately negotiates the schedule for the DOE ORR and Startup Authorization. There are some apparent discrepencies such as a 20 day critical path duration for the DWPF DOE ORR and a 40 day duration for the ITP DOE ORR which is a much smaller and less complicated facility. WSRC also considers the existing durations for ORR's and Startup Authorizations to be somewhat optimistic and counter to recent experience. DOE SR has been formally requested by WSRC for further guidance. The issue is that the actual startup dates could vary significantly from the planned dates. The assumption is that existing durations will be used until additional guidance is received.

Funding for the HLW System

The schedule for key facility startups and the HLW System attainment is based on the FY93 AOP, the FY94 OMB Passback with Budget Amendment and the FY95 FYP as submitted to DOE-HQ in 5/93. There is already a decrement case in FY94 of $33 million. Also, the success of the proposed FY94 Budget Amendment is uncertain. If the Amendment is not successful, then about $42 million of operating funds will be shifted into capital funded projects, primarily in the Solid Waste area. Reduced DP funding causes the shift of a larger burden of the Site overhead to shift to EM. This is difficult to predict yet it could result in a $10 to $50 million impact to the EM program. The issue is that, for the reasons stated above, the actual funding allocated to the various HLW facilities from FY94 to FY99 could vary significantly from the funding used as the basis for this Plan. The assumption is that the actual funding will be as described in the FY95 FYP.

Reduction in Force

A Reduction in Force (RIF) will occur at SRS prior to the start of FY94. Non-exempt personnel will be outplaced based on seniority. The least senior operators and mechanics will be "bumped" out of their jobs by more senior personnel. In many cases, the bumped personnel will have been trained and qualified to work in a particular facility. The loss of qualified personnel will impact the startup dates of key facilities such as ITP and DWPF. WMER has proposed, as part of the ConOps initiative, that a "pipeline" be established. The ConOps initiative also includes improved training that is more rigorous than previous training. It is expected that the training failure rates will increase. The pipeline would be filled with additional operators, mechanics and supervisors to ensure that vacancies would be filled with qualified personnel as quickly as possible thus minimizing the impact to key facility startups. The issue is that the magnitude of the RIF is subject to change, the number of bumped personnel by facility is not known, and the funding source for the pipeline is yet to be determined. The assumption is that the pipeline will be appropriately funded and that the impact to key facilities will be manageable. In all likelihood, the impact of the RIF will not be known until the next revision to this Plan, however, the projected cost of the pipeline is included in this Plan.

3.5 HLW System Plan Management

Due to the lack of actual operating experience in the new processes and due to the combination of other interacting factors such as EM budget, DP budget, shifts in Site Overhead, changes to Canyon and Reactor production plans, etc., there is a significant degree of uncertainty inherent in this Plan and Integrated Schedule.

WSRC is continuously evaluating the uncertainties in the Plan and prioritizing improvements that can be made to improve the confidence in the planning and scheduling program. It is the intent of WSRC to refine and update the current Plan and Integrated Schedule after each significant perturbation to the planning basis. This update includes improved process experience, strategy as possible to increase the overall waste removal rate, appropriate revision to the sequence of waste removal from specific tanks, leveling of manpower as practical, and currently forecasted funding levels.

The HLW System Plan is approved by the senior level HLW System Program Board, chaired by the Vice President & General Manager of the WMER Division. The Board is comprised of the Level 2 managers of the key line program and support divisions. A primary responsibility of the Board is the oversight and approval of the HLW System Plan and the Integrated Schedule which form the schedule and cost "baseline" for the overall program. Maintenance of this "baseline", especially with regard to technology developments, and alignment with the AOP and FYP is controlled through a formal change control process. Board approval is required before line programs take action which could have a significant impact on the Integrated Schedule. The Board is also responsible for ensuring that corrective actions to meet program objectives are accomplished through the responsible line management.

The Plan assumes success in related funding activities including the FY94 Budget Amendment. It also assumes that planned manpower and infrastructure needs will be met including the required level of support services (e.g., laboratory analyses including necessary new facilities, steam, electrical, water, etc.).

4.0 High Level Waste System Description

This Plan refers to the HLW System as described in Appendix A. This includes all of the HLW 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 various Solid Waste facilities as shown below.

High Level Waste

F-Tank Farm
2F Evaporator
H-Tank Farm
1H Evaporator
2H Evaporator
Replacement High Level Waste Evaporator
New Waste Transfer Facility
Waste Removal Program
Diversion Box & Pump Pit Containment
In-Tank Precipitation
Extended Sludge Processing

Defense Waste

Defense Waste Processing Facility
Late Wash
Saltstone & Saltstone Vaults

Solid Waste

Consolidated Incinerator Facility
Hazardous Waste/Mixed Waste Disposal Facility
M-Area Waste Disposal

5.0 Principles and Guidelines

The principal driver for the HLW System Plan is to facilitate the removal of high level waste from the older style Type I, II and IV Tanks while maintaining adequate and safe storage of the remaining HLW until it can be immobilized in glass. The secondary drivers are addressed by the following guidelines:

5.1 Safety Documentation

High Level Waste, Solid Waste and Defense Waste facilities, processes and projects that are part of the HLW System are listed in Appendix B. The highest level safety document for each facility, process or project is listed along with current status and comments.

5.2 Regulatory Permits

High Level Waste, Solid Waste and Defense Waste facilities, processes and projects that are part of the HLW System are listed in Appendix B. The applicable environmental documents (i.e. FFA, FFCA, Wastewater Permit, etc.) for each facility, process or project is listed along with current status and comments. A discussion of the major regulatory requirements and issues follows.

- Wastewater Operating Permit: The operation and maintenance of the Tank Farms are regulated under the South Carolina Pollution Control Act and the Federal Clean Water Act and permitted as an Industrial Wastewater Treatment Facility under the recently issued Permit To Operate; #17,424-IW F/H Area High Level Waste Tank Farms. Operation of the Tank Farms must be in compliance with the permit including all special conditions and significant changes to the Tank Farms, such as piping or equipment modifications, may require a permit modification. Now that the Wastewater Permit to Operate has been issued, the existing RCRA Part A permit application is being amended to delete the Tank Farms.

- RCRA: The Resource Conservation and Recovery Act (RCRA) regulations currently apply to only the generation of hazardous waste from the Tank Farms. The operation and maintenance of the Tank Farms is exempted from RCRA regulation because the Tank Farms have received a Wastewater Permit to Operate.

- LDR-FFCA: The Federal Facility Compliance Agreement (FFCA) provides commitments relative to the operation of the DWPF, the use of Type I, II and IV Tanks and the operation of the Consolidated Incineration Facility (CIF). The FFCA stipulates that no newly generated Land Disposal Restriction (LDR) waste can be placed in Tanks 13, 21, 22, and 23. Newly generated LDR waste is defined as waste generated after March 13, 1991. WSRC's position is that recycle streams associated with the processing of Tank Farm high level waste are not considered new LDR waste. Therefore, wastes from ITP, ESP, Late Wash, DWPF or any stream management step associated

Tank Farm operation (i.e., evaporation) does not constitute newly generated waste. The FFA will supersede this provision upon its effective date.

- FFA: The Federal Facility Agreement (FFA) has been signed by DOE, EPA and SCDHEC. The FFA, therefore, has been executed but the EPA has not yet provided an effective date. The FFA provides standards for secondary containment, requirements for responding to leaks and provisions for the removal of leaking or unsuitable tanks from service. Tanks that do not meet the standards set by the FFA may be used for the continued storage of their current waste inventories. However, these tanks are required to be placed on a schedule for removal from service This schedule is required to be submitted to SCDHEC 90 days after the effective date of the agreement.

5.3 Site Long Range Planning

Appropriate references have been made to the FY93 AOP and the FY95 FYP. The waste generation rates used in the Plan are based upon P&PD 93-0, ASD-NMP-93-0009, rev 2, as issued April 22, 1993. For the purpose of this Plan, fresh waste receipts from the Canyons include processing of driver fuel through K-14 along with the missions to deinventory the Canyon facilities. The Plan contains no provision for generation of fresh waste from additional processing although the processing of a K-15 charge would have an insignificant impact to the waste removal program.

There are other streams that may be sent to the Tank Farm which are being proposed or evaluated such as unevaporated 211-F waste water after the Canyons are shut down and the contents of various vessels in the Canyons that are not included in the Plans described above. These streams are listed as issues in Appendix H.

Significant shifts of Site overhead and responsibility for Site infrastructure are estimated and incorporated in the FY95 FYP and therefore in this Plan. Further shifts beyond the FY95 FYP planning period are anticipated but not incorporated into this Plan. Future revisions of this Plan will incorporate Site overhead and infrastructure planning as it is developed.

5.4 Roadmaps

The Roadmaps issues identification process is specifically designed to identify issues effecting operations over a long term planning horizon (up to 30 years). This complements the Five Year Planning process which takes a more detailed view of funding requirements, regulatory drivers, scope, and milestones over an intermediate planning horizon of 7 years. Roadmaps also complement the Annual Operating Plan which has a one year planning horizon and the Budget Plan which has a two year planning horizon. The integration of all of the above plans is one of the primary functions of the WM&ER Program Management department. Issues identified in the Roadmaps planning process are incorporated into cost account plans which are then fed into the AOP and FYP development process. Roadmaps are one of many sources of input into the development process. Roadmaps are one of many sources of input into the budget development process. The High Level Waste System Integration Manager, who is also the author of this Plan, participates in the Roadmaps development process and in the WSRC Roadmap review process. The FY95 FYP Roadmaps were cross-checked against the Issues/Assumptions in this Plan to ensure that Roadmaps are included as appropriate.

5.5 DOE Orders/Guidance/AOP/FYP

All facilities and operations required for removal, preparation, processing, and final disposal of high level liquid waste have been reviewed or are in the review process for compliance with all applicable state and federal laws, regulations and DOE Orders. Areas of non-compliance will be identified. The plan and schedule to bring all facilities and operations into compliance has not been finalized at this time. Where laws, regulations or DOE Orders do not exist to provide requirements and guidance, generally accepted industry standards, such as Institute of Nuclear Power Operations guidelines, ANSI/ANS standards, and National Fire Protection Association NFPA are utilized.

Specific guidance from DOE relative to this Plan is provided by a number of documents such as the Program Execution Guidance (PEG), the Annual Operating Plan, the Five Year Plan, the High Level Waste Steering Committee, and specific individual guidance letters as deemed necessary by DOE-SR. The specific funding guidelines and planning baselines for the HLW System Plan rev. 1 can be found in the FY93 Annual Operating Plan and the FY95 Five Year Plan. Changes to the baseline are controlled by a formal Change Control process.

5.6 Process Considerations

- Safety Analysis: Operations will be maintained within the defined boundaries of the appropriate Safety Analysis Report (SAR) and applicable addenda. See Appendix B for status of Safety documentation.

- Environmental: All conditions of the applicable permits will be met to the extent that technology and available budget allow. See Appendix B for listing of applicable permits.

- Waste Removal from Type I, II and IV Tanks: HLW at SRS is stored in carbon steel tanks. Some of these tanks do not provide full secondary containment and, in some cases, no secondary containment is provided. Several of the HLW tanks have leaked in the past. The leakage history of each tank is provided in an annual report (reference F. G. McNatt to A. L. Schwallie, et. al., Annual Radioactive waste Tank Inspection report - 1992, WSRC-TR-93-0166). While no tanks have active leak sites and a formal monitoring program exists, the risk to the environment that could result from a leak outside of containment will be reduced by removing the HLW from the current storage tanks. The waste will be processed through the DWPF into a stable borosilicate glass waste form contained in stainless steel canisters. The ITP, ESP, Late Wash and DWPF are all new operations necessary to accomplish facilities is being expedited to ensure successful operability to support the waste removal mission.

- DWPF: The DWPF operation, being the cornerstone of the waste removal program and a one-of-a-kind operation, is currently expediting startup operations to support radioactive operation beginning 11/94. Subsequently, this drives HLW operations as necessary to supply both the initial and continuous feed to the DWPF per the 11/94 startup schedule.

- Tank Space Availability: Ensuring the availability of sufficient operating space in specific tanks at specific need dates is a key consideration for operating strategy. Due to a number of factors, the most important of which has been the extended outage of the 1H Evaporator, the inventory of waste in the HLW tanks is very high (>90 % of available capacity utilized). Process strategy, in addition to providing safe storage of waste and a feed stream to DWPF, must also generate additional tank space to serve as surge capacity. This recovered tank space results from waste removal through ITP or by processing of existing dilute HLW supernate through the evaporator systems. This space gain is extremely important for three reasons: 1) to maintain the evaporator systems on-line, 2) to provide space to receive the large volume transfers which are a part of the ESP and waste removal processes as well as the large waste water recycle from DWPF, and 3) to ensure flexibility to handle unanticipated problems that could require additional tank space.

5.7 Waste Removal Sequencing Considerations

The current sequencing of waste removal from the HLW tanks is per the following generalized priority:

1) Control tank chemistry including radionuclide and fissile material inventory
2) Maintain adequate emergency space per the Tank Farm SAR
3) Remove waste from tanks with a history of leakage
4) Remove waste from tanks which do not meet secondary containment requirements
5) Provide adequate salt receipt space to maintain the evaporator systems on line, which is necessary to process the waste and support the waste removal activities
6) Generate adequate available tank space (surge capacity) to handle the large volume waste transfers and waste removal processing recycle streams including DWPF recycle
7) Ensure blending of processed waste to meet the Saltstone and DWPF feed criteria
8) Maintain continuity of radioactive waste feed to the DWPF
9) Provide adequate receipt space for fresh waste
10) Remove waste from the remaining tanks

While the principal driver for the HLW System Plan is the removal of waste from the older style tanks, it is necessary to remove waste from some of the Type III tanks to support the cleanup of the older tanks. Removal of waste 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. For the current period, removal of salt from Type III Tanks 41, 29, 47 and 31 must receive priority to support the key waste removal mission of the 2H, 1H and 2F Evaporator systems. Relative to planning, it is the complex interdependency of the HLW and DWPF safety and process requirements that drives the actual sequencing of waste removal from tanks.

6.0 Integrated Schedule

6.1 General

This section will discuss each HLW System facility and its relation to other facilities from a schedule and process standpoint. WSRC has been requested to develop a proposal for an improved Integrated Flowsheet for all components in the High Level Waste System that will provide a material balance, radionuclide balance, chemical composition, and energy balance for each stream in the System. The Flowsheet is to be dynamic such that variations in the balance can be readily evaluated. The proposal was in the final stage of development at the time of this Plan and is therefore not discussed further at this time.

6.2 In-Tank Precipitation

The startup date used in this Plan is the "optimum" date of 3/5/94. This differs from the WSRC commitment date for ITP startup which is 6/16/94 based on a 68 day contingency and a 90 working day DOE ORR/authorization duration. The 3/5/94 schedule is based on a readiness date for the DOE ORR of 10/20/93 with the WSRC recommended 68 day contingency plus a 40 working day duration for the DOE ORR and subsequent startup authorization. The 68 days of contingency increase the confidence of meeting the schedule to 80%. The duration of the DOE ORR, disposition of findings and the startup authorization step is assumed to require 40 days in this Plan. WSRC has recommended a duration of 90 days based on experience with other similar project startups. Guidance is required from DOE prior to the final issuance of the ITP schedule.

The startup of ITP is driven by the need to support the DWPF startup and continued operation by providing the ability to handle the DWPF recycle stream rather than by the need to provide a salt precipitate feed stream to DWPF as is commonly thought. The planning basis is for DWPF to start up on sludge-only feed on 11/1/94 and operate at low attainment (defined as 25 to 50%) until batch#2 sludge feed is ready. The Tank Farm will therefore need to be able to handle forecasted Canyon receipts, DWPF recycle and ESP washwater generated during the processing of batch#2 sludge feed. The best evaporator system to handle the DWPF recycle and ESP washwater streams is the 2H due to the proximity of 2H to ESP and DWPF and also due to the piping configurations. This system has two salt receipt tanks: Tank 41 which is full of saltcake, and Tank 38 which is about half full of saltcake with most of the remaining tank space containing concentrated supernate that cannot be evaporated further. It is imperative to remove the salt from Tank 41 to enable the 2H Evaporator system to continue to operate and thus handle the recycle and washwater streams. The only way to remove the salt from Tank 41 is to feed it to ITP. The 3/5/94 startup date supports the production plan described above.

6.3 Extended Sludge Processing

ESP will start the Process Verification Test on or before 7/1/93 under the direction of the ITP/ESP Startup Test Group. A Test Plan will be used to govern the testing to gather data required to define long term operating parameters for the ESP Facility. The data will be obtained during the course of two washes in Tank 42 and Tank 51. This may be sufficient to prepare the batch#1 sludge feed for DWPF based on previous sludge sample analysis. Further ESP processing beyond the Test Plan will occur only after the ITP Readiness Self Assessment (RSA), WSRC ORR, and DOE ORR activities have been completed and authorization to restart ESP has been given. At this time, the Integrated Schedule shows significant float for batch#1 washing.

The current washwater generation for batch#1 is significantly less water than was used in the Waste Forecast for rev 0 which was based on three washes in Tank 42 and six washes in Tank 51. Washwater will be evaporated in the 2H Evaporator with the salt going to Tank 38. The salt level in Tank 38 after batch#1 washing will support further operation of the 2H Evaporator to handle Canyon receipts and DWPF recycle until Tank 41 salt removal is complete in late 1995.

6.4 Evaporators

There are three evaporators used to volume reduce the various waste streams coming into the Tank Farms: 1H, 2H and 2F. A fourth evaporator, 1F, is not planned to be operated. The 1H will be replaced with the RHLWE in 1997. The evaporators play a crucial role in the HLW System. Because the evaporators were shut down in April, 1993 to enable Conduct of Operations improvements to be made, it is generally accepted that the evaporators and ITP will be the limiting factors governing the startup of the DWPF and therefore the HLW System.

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 11/1/94. This state of readiness can generally be described as:

- ITP started up and running well,
- salt removal projects proceeding on schedule,
- salt space available in each evaporator system,
- tank space available in each system to receive the ESP and DWPF streams, and
- an adequate tank space contingency to receive DWPF recycle should there be some perturbation in the Tank Farm operation

A key planning variable is the assumption for the amount 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 an evaporator pot failure or a ConOps or technical problem that shuts down all evaporators for an extended period of time or whatever.

The Tank Farm plans to have a total of at least 3,000,000 gallons of available tank space at the time DWPF starts up. This value is proposed as the minimal contingency for unplanned events such as prolonged evaporator outages, evaporator utility less than planned, space gain less than planned, additional failures beyond those planned, delays in ITP startup, ITP operating at less than its planned rate, etc. The proposed 3,000,000 gallons can be thought of as enough space to hold about 20 months of low attainment DWPF recycle at 142,000 gallons per month. This space is further allocated to each of the three evaporator systems based on the number of tanks in the system, how full those tanks are and the capacity/utility of the evaporator as follows:

evaporator		allocated tank space
1H		1,450,000
2H		200,000
2F		1,350,000
	Total	3,000,000 gallons

Experience shows that total tank space in an evaporator system of less than 200,000 gallons is bordering on a waterlog condition. The evaporator system can be operated when waterlogged, however, it is very inefficient until more space is gained because of the following:

- the contents of the salt receipt tank must be frequently transferred back to the evaporator feed tank in small transfers,
- this frequency is about every 10 days when the tank space in the system is 200,000 gallons which does not allow the salt to completely cool, and
- the transfers back to the feed tank occur as the salt receipt tank is receiving salt concentrate from the evaporator

It could therefore be said that total tank space in the Type III Tanks must remain above 600,000 gallons, assuming an optimal distribution of tank space, to avoid a waterlog or gridlock condition for the entire Tank Farm. The 3,000,000 gallons recommended is not overly conservative given the high volume and intermittent streams that must be handled such as ESP decant water, ESP aluminum dissolution waste and ESP washwater. The washwater will routinely be about 400,000 gallons while the other two ESP streams can be up to 900,000 gallons. If 900,000 gallons of tank space is required to periodically receive waste from ESP and total tank space must not dip below 600,000 gallons, then total available tank space of 3,000,000 gallons at the time of DWPF startup is not overly conservative.

After DWPF starts up, washing of sludge batch#2 will start. The three existing evaporators will definitely not be able to keep up during this time until the RHLWE starts up. Any prolonged outages, pot failures, poor performance, etc. will start to consume the 3,000,000 gallons of tank space.

Space gain is defined as the difference between evaporator feed and evaporator concentrate correected for flush water and chemical additions necessary to operate the evaporator system. Planned utility and space gain for each evaporator system, based on historical averages, is as follows:

	utility	space gain (gal/mo)
1H Evaporator	40%	84,000
2H Evaporator	60%	126,000
2F Evaporator	60%	126,000
RHLWE	80%	360,000

The historical average will be difficult for each evaporator system to attain in the future for three reasons: 1) in the past, the Canyon receipts were over 3,000,000 gallons per year of relatively low sp.gr waste versus the high sp. gr. feed that is currently in the evaporator systems, 2) in the past, two salt receipt tanks were alternately filled and decanted to the evaporator feed tank versus the one salt receipt tank available now in each system, and 3) the response to upset conditions or needed maintenance was prompt albeit somewhat undisciplined versus the disciplined conduct of operations program currently being implemented. Because of the uncertainty in the planned evaporator operation as described in the previous paragraphs, two cases are presented: "planned space gain" and "1/2 of planned space gain". The "1/2 of planned" case was selected somewhat arbritrarily to represent the lower bound of realistic space gain scenarios. The material balance for the Tank Farm based on the key startup/restart dates and space gains for the "planned" and "1/2 of planned" cases are shown in Appendix J as two separate charts.

There are several points to note from the "planned space gain" chart. Available tank space at the start of DWPF operations is about 2,500,000 gallons thus indicating that SRS must make some sort of change to the planned operation of the Tank Farm such as:

- operate the evaporators in some fashion that enables space gain to be greater than planned,
- accept less than the 3,000,000 gallons of tank space at the start of DWPF radioactive operations,
- delay ESP sludge batch#1 washing,
- delay DWPF startup,
- design, build and start up some type of facility or peice of equipment that can assist the evaporators (such as feeding the RBOF streams directly to a cesium removal column (CRC) as was done in the past - this removes about 600,000 gallons per year from the evaporator load)
- gain approval from the Regulators that Tanks 2-8 can be used for emergency spare tank space in the F-Area Tank Farm (this has the effect of increasing the available tank capacirty in the 2F Evaporator System by 1,300,000 gallons)

The latter two options are recommended. The technical studies needed to determine the process requirements for feeding the RBOF stream directly to a CRC, equipment changes, resin changes, etc. are funded in the FY94 AOP. The

Regulators were requested to approve Tanks 2-8 for emergency spare tank space. They responded that the Type I tanks were "approvable" for this use. This issue will be elevated in priority and will be tracked in the High Level Waste System Plan of the Week until conclusion.

Also evident on the planned space gain graph is that the net gain in tank space due to evaporator operation alone is insufficient to offset the Tank Farm influent; the actual increase in available tank space occurs as a result of feeding ITP concentrated supernate or emptying a salt tank by feeding it to ITP. Also note that the Tank Farm rapidly loses space from the time sludge batch#2 washing starts until the time when the RHLWE starts up. This graphically shows that all three existing evaporators operating at planned space gain don't quite break even with planned influents to the Tank Farm after DWPF starts up.

The second chart showing tank space at the "1/2 of planned" evaporator space gain case is an unworkable case as the total available space actually drops below zero during most of 1995.

In summary, the two charts clearly show three things:

- the evaporators must start up as soon as possible,
- the evaporators must gain as much space as possible, and
- the tank space problem does not get significantly better until the RHLWE starts up in late 1997.

6.4.1 1H Evaporator

The 1H Evaporator was shut down in 1988 for hardware repairs and other upgrades as well as improvements to operator training and operating procedures. 1H restarted on 3/8/93 and ran until 4/13/93 when an operating incident occurred in the Concentrate Transfer System (CTS) Heating and Ventilation (H&V) System. The primary role of 1H will be to reduce the backlog of unevaporated High Heat Waste (HHW) in H-Area which totals about 5,600,000 gallons at this time and to assist the 2H Evaporator with the ESP washwater and DWPF recycle streams as needed in the future.

During the next 16 months, it is crucial that the 1H system gets into a condition by 11/1/94 where it can support DWPF sludge-only startup as well as the other missions described above. This condition is defined as follows:

- 1H is restarted and running,
- ITP is started up and running at planned production rates,
- the design, contruction and startup testing of Tank 29 salt removal equipment including control room scope as necessary is progressing as scheduled,
- there is available salt receipt space in Tank 30 to last until Tank 29 is empty, has the cooling coils replaced and is returned to salt receipt service, and

- there is at least 1,450,000 gallons of available tank space at the time of DWPF startup

The planned restart date for 1H is 9/1/93. 1H utility is planned to be 40% with a space gain of 84,000 gallons month during this period. The 84,000 gallon figure is the historical average for this system.

The first parameter to be determined is the currently available tank space. The tanks in the 1H system are 13, 29-32, and 35-37. All of the tanks are nearly full to the operating limit with about 355,000 gallons to spare between Tanks 13 and 30. This is approaching a "waterlog" condition.

The two space gain cases are as follows:

355	space available 6/1/93 (kgal)
-122	H-HHW receipts 6/1/93-11/1/94
233	space available 11/1/94 if no evaporation
+588	space gain by evaporation 9/1/93-11/1/94 @ 1/2 of planned
821	space available 11/1/94 at 1/2 of planned rate
+588	additional space gain if @ planned rate
1,409	space available 11/1/94 @ planned rate

The 821 means that the 1H will have available tank space under almost any reasonable operating scenario but the system must operate much better than 1/2 of the planned rate or other evaporator systems must make up for the shortfall. The 1,409 means that the 1H system will almost recover its allocated tank space of 1,450,000 if it operates at the planned rate.

The waste forecast incorporates two outages for this system: a 4 month outage to complete the NWTF tie-ins to H-Area Diversion Box (HDB)-5, and a 6 month outage for evaporator pot replacement assuming that the pot will fail. The tie-ins are very close to the evaporator feed and vent lines, therefore, the evaporator must be down during the tie-ins. The 4 months is conservative; the actual duration could be reduced to about one month with careful planning and good weather. The existing pot was last replaced in 1981. Typical pot life is eight to ten years so it could be assumed that the 1H pot is nearing the end of its useful life. For planning purposes, the two outages were assumed to occur simultaneously. A spare pot and transport/storage container is available if needed and there is one additional pot/container ordered. The 1H, 2H and 2F Evaporators all use the same pot.

6.4.2 2H Evaporator

The primary role of the 2H Evaporator will be to evaporate the 221-H Canyon Low Heat Waste (LHW) stream, Receiving Basin for Offsite Fuel (RBOF) waste, the future DWPF recycle stream and ESP decant and washwater to the extent possible. The Canyon, RBOF and DWPF streams are expected to be very steady and therefore easy to plan. Small batches are received on two or three day intervals. The two ESP streams are exactly the opposite: large in volume and spaced one to four months apart. Large transfers will therefore be necessary out of the 2H system to the 1H and 2F systems. As an example, a 700,000 gallon transfer is shown below from the 2H system to Tank 21. This is necessary as ESP generates washwater in 350,000 gallon batches at a time when the 2H Evaporator system is nearly full of other waste. The washwater stored in Tank 21 can be used later as washwater for early washes of batch#2 sludge.

In the near term, it is crucial that the 2H Evaporator system gets into a position where it can support completion of ESP batch#1 washing and DWPF recycle starting 11/1/94. This position is defined as follows:

- the 2H Evaporator is running,
- ITP started up and running at a rate to complete Tank 41 salt removal in 18 months or less,
- Tank 41 salt removal at least 1/3 complete (as of 11/1/94, about 7 months of the assumed 18 months will have expired thus Tank 41 should be at least 1/3 empty) and progressing on schedule,
- available salt receipt space in Tank 38 to last until Tank 41 is empty and returned to salt receipt service, and
- available tank space of 200,000 gallons (the minimum required to operate any evaporator system efficiently)

The planned 2H operation that would support DWPF startup 11/1/94 is based on the following. The planned restart date for 2H is 10/1/93. The planned utility is 60% with a space gain of 126,000 gallons per month. The two cases for this system are as follows:

295	space available 6/1/93 after 51 to 43 transfer (kgal)
-850	RBOF receipts 6/1/93 - 11/1/94
-1,300	remainder of ESP washwater to complete batch#1 washing
+700	ESP washwater transfer to Tank 21
-287	H-LHW receipts 6/1/93-11/1/94
(1,442)	space available 11/1/94 with no evaporation
+819	2H evap space gain 10/1/93-11/1/94 (@ 1/2 of planned rate)
(623)	space available 11/94 with evaporation @ 1/2 planned rate
+819	additional 2H evap space gain if @ planned rate
196	space available 11/1/94 with evaporation @ planned rate

The (623) in the 1/2 of planned rate case means that the 2H system cannot recover its allocated tank space even with the 700,000 gallon transfer of ESP washwater to Tank 21. The use of Tank 21 requires procedure development and associated training. Tank 40 could also be used but it will not be available until 1/94 when the Tank 40 Valve Box transfer line jackets are sealed. If ESP batch#1 washing is to be completed before 1/94, then the Tank 21 work must proceed as soon as possible.

The 196 in the planned rate case means that the system will just barely achieve its allocated tank space if the evaporator performs as planned. One process change that could help this system would be to resume direct processing of the RBOF stream to the Tank 24 Cesium Removal Column (CRC). This alone would reduce the evaporator load by 850,000 gallons prior to DWPF startup. This was done in the past but was discontinued in the late 1980's due to the high volume of spent CRC resin that was being discharged to Tank 24. The study that would define the operating requirements, better resins, process enhancements, etc., to enable CRC processing to resume is currently above the funding line in the FY94 AOP.

Transfers out of the 2H system and CRC processing were not planned in the past; they were reserved as contingency measures. This theme is consistent throughout this Plan: the HLW System can tolerate program delays but at great cost in terms of operating flexibility and contingency.

The waste forecast also assumes a 6 month outage for evaporator pot replacement. The existing pot was last replaced in 1983. Typical pot life is eight to ten years so it could be assumed that the 2H pot is also nearing the end of its useful life similar to the 1H pot. A spare pot and transport/storage container is available if needed.

6.4.3 2F Evaporator

The 2F Evaporator is currently shut down to prepare the evaporator system for HHW evaporation and for Conduct of Operations improvements. In the past, all F and H-Area HHW was evaporated in the 1H Evaporator. Due to the large backlog of unevaporated HHW in H-Area as well as the planned new H-Area waste loads from ESP and DWPF, a technical evaluation was performed to determine the requirements to evaporate HHW in the 2F system and drop the salt in Tank 46. It was determined that this was feasible. A program was then initiated to make the necessary alterations on 2F and Tank 46. This program was scheduled to be complete 7/1/93. Since then, it has been decided to keep the 2F down until 11/1/93 in order to implement the ConOps initiative.

The primary role of the 2F Evaporator starting 11/1/93 will be to evaporate 221-F Canyon LHW, HHW and the 2,100,000 gallon backlog of F-Area HHW in Tanks 33 and 34. Once this is complete, 2F's role will transition to becoming the primary HHW evaporator for F and H-Area HHW while keeping current with F-Canyon LHW waste receipts and assisting the H-Area evaporators with the DWPF recycle and ESP washwater streams as possible. Transfers from H-Area to F-Area will not be possible until the NWTF starts up in mid-1994. The necessary instrumentation and process control functions for H to F transfers do not currently exist. In the near term, it is crucial that the 2F Evaporator system gets into a position where it has worked off all available F-Area feed and can support the 1H and 2H systems as needed after DWPF startup and during ESP batch#2 washing. This position is defined as follows:

- the 2F Evaporator is running,
- Tank 46 is in use receiving 2F evaporator concentrate from HHW from Tanks 33 and 34,
- available salt receipt space in Tanks 27 and 46 to last until Tank 28 or 47 is empty and returned to salt receipt service, and
- available tank space of 1,350,000 gallons

2F utility is planned to be 60% with a space gain of 126,000 gallons per month during the planning period. Two cases will be shown below: one case based on planned evaporator production and one case based on 1/2 of the planned rate.

1,622	tank space currently available 6/1/93 (kgal)
-1,300	reserve for emergency spare tank space
-451	F-LHW from 6/1/93 to 11/1/94
-65	F-HHW from 6/1/93 to 11/1/94
(194)	tank space on 11/1/94 with no evaporation
+756	space gain by evaporation 11/1/93-11/1/94 @ 1/2 of planned
562	net space available 11/1/94 @ 1/2 of planned rate
+756	additional space gain if @ planned rate
1,318	net space available 11/1/94 @ planned rate

The 562 means that the 2F system will have available tank space under almost any reasonable operating scenario. The 1,318 means that the 2F system will not quite recover its allocated tank space at the planned space gain rate.

6.4.4 Replacement High Level Waste Evaporator (RHLWE)

The RHLWE is currently in the design and construction phase. Several problems have been defined which necessitate the need to rebaseline the project. At this time, a Baseline Change Proposal (BCP # 121) is being prepared that will move the radioactive operations date from 8/96 to 11/17/97. This startup date is draft and has not been approved by WSRC or DOE. It is used in this Plan for planning purposes. The delay in startup can be accomodated due to the delay in DWPF startup from 5/30/93 to 11/1/94, the associated delay in batch#1 sludge washing and the reduced Site production mission. A comparison of the FY92 and FY93 Radioactive Liquid Waste Forecasts shows the change in volume and timing of waste influent to the Tank Farms. This Plan is based on the FY93 Waste Forecast.

The RHLWE is planned to operate at 80% utility and at a space gain of 360,000 gallons per month. This space gain value, unlike the others, is not based on historical averages as this is a new design and higher capacity evaporator. The design basis is 7,600,000 gallons per year of overheads assuming feed at 33 gpm at 25-35 % dissolved solids. From this figure, engineering estimates were used to determine the number and volume of flushes, desalt-descale operations, chemical additions, etc., all of which are deducted from the overheads value to calculate space gain.

Given all of the planning bases, issues, assumptions and contingencies described in this Plan, 11/17/97 is an acceptable startup date. The justification for this project has been the subject of ongoing reviews and is therefore not a primary objective of this Plan, however, the two charts in Appendix J clearly show that the RHLWE (or some other form of space gain) is needed to support the long term operation of the HLW System, particularly at attainments above the 26% planned for batch#1 sludge feed. The two charts are also backed up by several pages of text that describe the evaporation needs opposite planned future System attainment.

6.5 New Waste Transfer Facility

NWTF is needed prior to DWPF radioactive startup which is currently planned for 11/1/94. The planned radioactive startup for the NWTF is 5/24/94. In the past, NWTF was to be used to transfer the DWPF mercury recycle stream to the Tank Farm. This is no longer the primary plan. Ongoing development work by Savannah River Technology Center (SRTC) and DWPF Engineering indicates that sending the mercury recycle to the Effluent Treatment facility (ETF) is technically feasible and operationally achievable with only minor modifications. This has the advantage of not burdening the Tank Farm evaporators with about 190,000 gallons of water. Another advantage is that DWPF could continue testing beyond the planned 190,000 gallons with no impact to the Tank Farm.

Transferring or trucking the mercury recycle waste to the Tank Farm will remain active as a contingency to ETF.

Jumper changes in other diversion boxes connected to the NWTF are being planned at the time of this report. These are not new activities. The jumper changes will cause localized outages in parts of the H-Tank Farm facility that could impact ITP, ESP and Evaporator operations. There is coordination between the various facilities intended to minimize or eliminate the impacts. This subject requires additional planning and coordination. It will be managed within HLW and reported in the bi-weekly HLW project reviews. At this time, it appears that the impacts can be managed.

There are several hot tie-ins that must be made. One such tie-in that will have a significant impact is HDB-5. The transfer lines from the NWTF to HDB-5 pass directly over the 1H evaporator feed and vent lines. Four months of 1H Evaporator downtime have been scheduled for these tie-ins. This planned downtime will undergo more detailed planning designed to reduce the period of downtime as part of the ongoing NWTF schedule rebaselining.

6.6 Diversion Box & Pump Pit Containment

This project installs a ventilated building and remotely operated bridge crane over HDB-7. HDB-7 is the most utilized diversion box in the Tank Farm and is the hub for all transfers into ITP, ESP and the 2H Evaporator System. The schedule used here is the project baseline schedule which shows construction activities complete 3/31/95. Three months are allowed for completion of Other Project Cost (OPC) activities thus setting Rad Ops at 6/30/95. The OPC fragnet shown is based on a rough estimate rather than on a resource loaded OPC schedule. The OPC portion of the schedule may be developed during the coming months as additional resources are added to the OPC effort. The word "may" is used because there is only $108,000 of OPC budgeted in FY94 and only $71,000 of OPC requested in FY95 due to the budget shortfall. This is less than one person per year to check out, start up, complete training and procedures, etc., for the entire project.

All significant interferences with other facilities will be identified and included in the HLW System Integrated Schedule. One potential interference is shown on the schedule; that being from the time building steel is erected 6/9/94 until the Rad Ops date of 6/30/95. A jumper failure such as a leak or damaged valve during this period could impact construction if it was determined that repairs must be made. This period of time is called the "Window of Vulnerability" on the Integrated Schedule. The duration of this window can be reduced through detailed planning, i.e. maximizing the timewhere a yard crane could be used and by accelerating the availability of the building crane. The latter would require some form of agreement ahead of time to allow limited operation prior to completion of all readiness review activities. There is potential to reduce the window to a few months; this effort will be manned as part of the OPC above.

A planned outage to replace the jumpers in HDB-7 is scheduled for 10/4/93 through 11/12/93. This is before ITP starts up and after the ESP testing is complete so it is not expected to be a problem.

6.7 Waste Removal

The technical basis for the order of waste removal from waste tanks is contained in several documents and is consolidated in a memorandum: G. K. Georgeton to B. L. Lewis, Processing Strategy for Waste Removal, October 15, 1992. The tank sequencing and the programmatic basis is further described in this section.

6.7.1 Salt Feed to ITP

There has been significant progress in this area since rev 0. Limited solubility data is now available for plutonium and uranium in HLW salt solution. 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. Salt samples have been taken from the top several inches of the saltcake in Tank 41. Preliminary results indicate that salt dissolution in Tank 41 can be safely initiated. A model has been developed however it is not possible to credibly predict the tank contents due to the uncertainty in the tank fill history and lack of salt samples throughout the tank which would validate/correct the model. Additional salt samples have been and will be obtained deeper in the tank to determine if there will be a criticality concern on subsequent salt removal batches. It is assumed that salt removal can proceed in Tank 41 using rigorously controlled sampling and a controlled dissolution process. The planning basis is that all of the salt will be removed from Tank 41 and fed to ITP prior to the time when the second salt tank (Tank 29) is ready for salt removal.

There has also been significant progress in the determination of the acceptability of alternate feeds to ITP, i.e. feeding existing concentrated supernate directly to ITP. A caustic rich liquor accumulates in evaporator systems that cannot be further evaporated. This concentrated supernate takes up space in the evaporator system that could be used to form saltcake. Currently, there are significant quantities of concentrated supernate in the 2F and 2H systems. It has been determined that Tanks 26, 27, 29, 30, 32, 38 and 43 can be fed to ITP without excessive dilution or criticality concerns. Alternate feeds must be very carefully planned as they contain from four to ten times the potassium concentration versus the ITP feed flowsheet average, thus they generate a lot of precipitate which rapidly fills Tank 49.

The second salt tank to be fed to ITP will be Tank 29 (see below). Tank 29 will not be ready for salt removal until 10/1/95, about two months after Tank 41 salt removal is complete. During this time, concentrated supernate from Tanks 32, 38 and 43 will be fed directly to ITP to maintain continuity of feed to ITP. This will have a positive effect on the 2H Evaporator system. It will also be necessary to eventually feed Tank 27 material directly to ITP to maintain salt space in the 2F system. These transfers are incorporated into the Waste Forecast (Appendix J) in support of this Plan.

The chart in Appendix J entitled "Tank 49 Precipitate Volume" shows the Tank 49 material balance and is based on the planned feed to ITP described in this section and based on the planned startup date for Late Wash of 10/30/96. There are several points to note from the chart:

- the bulk of the precipitate comes from the concentrated supernate feed thus the timing and amount of supernate feed must be carefully planned to avoid filling Tank 49 and forcing ITP to slow down or shut down, and
- the "need" date for Late Wash startup appears to be mid-1998, however, the precipitate level in Tank 49 remains high and actually increases after Late Wash starts up and does not start to decrease until the HLW System attainment increases during batch#2 feed which suggests that a 10/96 Late Wash startup is closer to the real "need" date

Tank 25 Salt Removal

Tank 25 was planned to be the second tank fed to ITP after Tank 41 in rev 0. This is no longer necessary now that Tank 46 will be used as a salt receipt tank when the 2F evaporator restarts (Tank 46 had formerly been maintained empty to serve as an emergency spare tank) and as the concentrated supernate in Tank 27 can be fed directly to ITP. These two changes were formerly held as contingency actions but are now part of the base plan. Salt removal from Tank 25 has been deferred until late 1999. This will enable Tank 29 to move up to the number two spot (see below).

Tank 29 Salt Removal

Tank 29 is now the second tank to be fed to ITP. All salt must be removed to permit the cooling coils to be replaced. Tank 29 salt removal/coil replacement will be completed by 8/97 to support the 11/17/97 RHLWE startup. The actual driver to complete salt removal/coil replacement is the fact that Tank 30 is scheduled to be full of salt at the time Tank 29 is ready to return to salt receipt service. Because Tank 29 will be the first tank to undergo the waste removal RSA/WSRC ORR/DOE ORR process, the duration of this portion of the schedule is assumed to be 14 months with 8 of those months occurring after Total Estimated Cost (TEC) is complete. An evaluation will be made opposite Tank 41 experience to explore potential cost and schedule savings.

Tank 31 Salt Removal

Tank 31 will be the third tank fed to ITP. Tank 31 will not be ready for salt removal when Tank 29 is empty. It is planned to feed concentrated supernate directly to ITP from Tank 27 during this period. Placing Tank 31 this early relative to other tanks is necessary because Tank 29 is planned to be filled with salt very quickly as it will be the first tank filled from the high capacity RHLWE. Tank 31, like Tank 29, must also have the cooling coils replaced before it can return to salt receipt service thus increasing the demand to get this tank fed to ITP.

Tank 47 Salt Removal

Tank 47 will be the fourth tank fed to ITP. The driver for salt removal from this tank is to enable sludge removal to begin. The salt must be removed prior to sludge removal. Tank 47 contains the largest volume of sludge of any tank remaining after the batch # 1 and #2 tanks. This makes it a very economical source of sludge feed to DWPF. Due to budget constraints, it is very important to have this tank as part of batch # 3 to help keep System attainment as high as possible.

Tank 28 Salt Removal

This is planned to be the fifth tank fed to ITP. Construction is nearly complete. Slurry pump run-in and installation are the primary work elements to be completed. Tank 28 will be the second F-Area tank fed to ITP. It will be necessary to feed the concentrated supernate in Tank 27 directly to ITP in order to maintain salt receipt space in the 2F system as described above.

Other Salt Tanks

The remaining salt tanks to be fed to ITP are shown in Appendix J. While almost all of the first sixteen sludge tanks emptied were old, the same cannot be said of the salt tanks. The needs of the Tank Farm to handle normal waste receipts combined with the need to handle sludge washwater and DWPF recycle dictate that those tanks that can be reused to store salt (i.e. the new tanks) must be emptied first. Of the old tanks, only Tanks 17, 19, 20 and 24 (all Type IV tanks emptied in the mid '80's) will be emptied of salt before the turn of the century.

6.7.2 Sludge Batch#1

Batch#1 contains 644,000 gallons of settled sludge. Three more washes are planned during the test program; two at 350,000 gallons and one at 225,000 gallons. The first two washes will be completed during the ESP Process Verification Test scheduled to start 7/1/93 and complete by year end. The third wash may not be necessary.

The net sludge available for feed during batch#1 will actually be 494,000 gallons due to the pump heels remaining in Tanks 42 and 51. Batch#1 sludge washing and characterization will support the earliest possible DWPF startup date.

6.7.3 Sludge Batch#2

The plan for sludge batch#2 is as follows:

Tank 8	164,000	
Tank 11	70,000	(1)
Tank 15	156,000	(1)
	173,000	(2)
Total	563,000	
	- 75,000	(3)
Net	488,000	gallons available for feed to DWPF

Notes:

(1) Tanks 11 and 15 must undergo aluminum dissolution which reduces the volume of the sludge. The volume of sludge shown here is after completion of aluminum dissolution.

(2) This sludge was left over in Tank 40 from the Type IV tank waste removal program conducted in the mid '80's.

(3) There will be a heel of sludge left in Tank 40 of 21" that cannot be removed because the slurry pumps must be shut down due to inadequate liquid cover above the pump discharge.

All attempts were made during the development of the FY95 FYP to maintain the "batch#2 ready to feed" date shown in rev 0 which was 10/1/98. This was not possible due to reduced funding levels; the date is now 6/1/99. Also due to reduced funding, significant waste removal infrastructure scope was deferred such as storage and maintenance facilities, control room upgrades, DCS upgrades, etc. This work will eventually be required. Deferring it creates a funding "bow wave". The impact of this is being evaluated at this time.

6.7.4 Sludge Batch#3

The plan for sludge batch#3 is as follows:

Tank 4	127,000	
Tank 7	206,000	
Tank 47	248,000	(1)
Tank 12	108,000	(2)
Total	689,000	gallons available for feed to DWPF

Notes:

(1) Salt removal must be complete before sludge removal can begin.
(2) Tank 12 must undergo aluminum dissolution which reduces the volume of the sludge. The volume of sludge shown here is after completion of aluminum dissolution.

The "batch#3 ready to feed" date from rev 0 was delayed from 9/01 to 5/1/02. This was accomplished by deferring sludge removal from three tanks that contained less than 35,000 gallons each (Tanks 5, 6 and 14), otherwise, the ready to feed date would have slipped by more than one year.

6.7.5 Future Sludge Batches

The deferrals that were done to minimize the schedule slip and batch size reduction for sludge batches#2 and #3 will have a definite negative impact on sludge batches#5 and #6. While the deferrals helped the cash flow in the short term, they added to the "bow wave". Note that batches#2 and #3 required new waste removal facilities on 3 and 4 tanks respectively. Batch#4 will require new waste removal facilities on 5 waste tanks for 714,000 gallons of sludge. Batch #5 will require new waste removal facilities on 5 tanks for 385,000 gallons of sludge. Batch #6 will consist of Tank 23, which must have new waste removal equipment installed, and the heels in Tanks 17, 18, 19, 21, and 22, which will require some equipment modification/installation. Batch #6 yields about 185,000 gallons of sludge. All sludge batches are shown in Appendix J.

After reading this section, one could conclude that it will not get any easier to increase DWPF attainment by accelerating sludge removal for batches#4-6 due to the large number of tanks containing small amounts of sludge. One important item of note concerns tank types. The Regulator would prefer that SRS remove sludge from the old (Type I, II and IV) tanks first and particularly the tanks with a leakage history. There could be a perception that WSRC is favoring waste removal from new double walled tanks (Type III) at the expense of the older tanks. This is absolutely not true for sludge tanks. Of the first 16 tanks prepared for sludge removal, 15 are of the old type and only one (Tank 47) is new.

6.8 Defense Waste Processing Facility

The startup date shown in this schedule is the "optimum" date of 11/1/94. This is the most aggressive schedule that assumes contingency and parallel WSRC ORR/DOE ORR/Waste Qualification activities. WSRC previously recommended the addition of 16 weeks of contingency (used here) which corresponds to an 80% confidence that the schedule can be met and an DOE ORR/authorization duration of 120 days (not used). The 11/1/94 startup date assumes that the DOE ORR and Startup Authorization activities require 20 days on the critical path.

The possible HLW System attainment given the funding cuts in waste removal has been the subject of considerable planning. If it is assumed that DWPF will operate at a steady attainment to match the available feed versus running fast and then going down to wait on the next batch of feed, then the attainment during the consumption of a batch of feed is dependent upon four things: 1) the start of consumption, 2) the volume of sludge in the batch being consumed, 3) the duration of any planned outages, and 4) the date on which the next batch will be ready to be fed. Expected attainments for the first four batches of feed to DWPF are listed below. At 25% attainment, sludge-only operation consumes 117,000 gallons of 19 wt % sludge per year while a sludge and precipitate operation consumes 113,000 gallons of 19 wt % sludge per year.

Batch#1

DWPF Startup	11/1/94
Batch#1 volume	494,000 gal
Planned Outages	6 months
Batch#2 ready to feed	6/1/99
Duration of feed (mos)	55 - 6 = 49
Average Attainment	26%

Batch#2

Start of batch#2	6/1/99
Batch#2 volume	488,000 gal
Planned Outages	0
Batch#3 ready to feed	5/1/02
Duration of feed (mos)	35
Average Attainment	37%

Batch#3

Start of batch#3	5/1/02
Batch#2 volume	689,000 gal
Planned Outages	0
Batch#4 ready to feed	11/1/04
Duration of feed (mos)	30
Average Attainment	61%

Batch#4

Start of batch#4	11/1/04
Batch#2 volume	714,000 gal
Planned Outages	0
Batch#5 ready to feed	5/1/07
Duration of feed (mos)	30
Average Attainment	63%

Note that the attainments shown for batches # 3-4 are based on the funding requested in the FY95 FYP. To actually achieve these attainments, strong funding support for Waste Removal would have to continue beyond the FY95 FYP planning period and several other programs would have to be funded to match these attainments (see section 7.1).

6.9 Late Wash Facility

The Late Wash Bypass Lines must be complete prior to sludge-only startup of DWPF on 11/1/94. The Bypass Lines will be ready for the DWPF DOE ORR by 6/10/94. The actual start of radioactive operations for the Bypass Lines is dependent on the duration of the DOE ORR and the startup of DWPF. The start of Rad Ops for the APP Modifications is planned to be 10/30/95. Note that the current FY95 funding allocation for the APP mods is less than originally required and that the FY93 Reprogramming authorization was received four months after the planned date. These two factors will make it difficult to achieve the 10/30/95 date. Other factors are being evaluated that could enable the 10/30/95 startup date to be maintained.

6.10 Solid Waste Projects

The Consolidated Incinerator Facility, the Hazardous Waste/Mixed Waste (HW/MW) Disposal Facility, HW/MW Disposal Facility Vault Expansion, and the M-Area Waste Disposal projects are included in the HLW System Plan. The CIF will become an integral part of the HLW System at the time when the benzene storage tankage at DWPF becomes full. Due to the low volume of precipitate generated in the early years of ITP operation, there will be less Sodium Tetraphenyl Borate (STPB) used in ITP and therefore less benzene generated in

DWPF when compared to the long term average flowsheets. CIF is not expected to be required to support the HLW System until 1999, well after its forecasted startup date. For this reason, CIF, HW/MW and M-Area are treated in a summary fashion in this document.

6.11 New Facility Planning

All projects pertinent to the HLW System that were submitted in the recent call for FY97 New Starts are shown in Appendix N. All projects planned to be submitted for the FY98 and FY99 New Start call are also listed. Note that there are many other WMER projects that are not listed because they have little or no direct bearing on the HLW System Plan. It is anticipated that not all of the projects will be supported by DOE. The amount of funding for Conceptual Design Reports and other early project activities has been forecasted in the FY95 FYP accordingly.

7.0 Planning Basis

7.1 . Funding

The budget to support the HLW System Plan through FY99 is shown in Appendix M. The bases for the values shown are:

1) the FY93 AOP with Omnibus Change Control and Installments land II to fully fund ITP,

2) the FY94 Office of management and Budget (OMB) Passback of $646 million assuming the SRS proposed Budget Amendment,

3) the FY95 FYP Target Levels, and

4) funding the ConOps initiative in FY94-95

The values shown are significantly lower than the FY94 FYP Targets. The allocations made to each ADS were developed by WSRC and presented to DOE-SR. The basis for the allocations is the priority system shown in Appendix L. Using the priority list in its purest sense with available funding would have drawn the funding line through the middle of #4, Consolidated Incinerator Facility. What actually occurs is that the programs immediately above the line get partial funding so that some of the programs below the line can get partial funding. This enabled SRS to fund priorities #4 and 5a, albeit at a delay to the startup date, at the expense of some of the higher risk programs in category 3.

All recurring Defense Waste projects such as Failed Equipment Storage Vaults, Saltstone Vaults and Glass Waste Storage Building#2 have been delayed because they could be delayed without effecting other projects/processes.

The cuts made in HLW to balance the budget were in two broad areas: reduction of uncosted balances in capital projects and waste removal. At this time, it will be at least 2002 before DWPF attainment can possibly average over 50% primarily because of the inability to fund sludge removal. In order to get attainment over 50% before 2002, additional funds will be required in the FY94-96 timeframe.

Deep cuts were made in Solid Waste in FY94 and FY95 to almost all programs including those that will eventually be needed to support the HLW System such as the HW/MW Vaults and M-Area Waste Disposal. These cuts did not effect the HLW System. Until the DWPF benzene tank is full (about the year 1999-2000) the Solid Waste projects are only peripherally linked to the HLW System.

It is very important to understand that funding has limited the HLW System to the "low attainment" mode, defined as 25 to 50%, for about eight years after DWPF startup. All related projects are staged to support only low attainment. In order to increase DWPF attainment, the following programs would have to be accelerated:

- salt removal
- sludge removal
- waste removal infrastructure
- Saltstone vaults
- HW/MW vaults
- Glass Waste Storage Building#2
- chemical procurement
- analytical support

Given the increasing potential for budget cuts, it will be very difficult to adequately fund all of the HLW System components to support an increase in System attainment much beyond 50%.

7.2 Manpower

Projected manpower levels for FY94 and FY95 are shown in Appendix K. The values are in Full Time Equivalents (FTE's) which is the average manpower level during the year (i.e. if you start the year with 0 and hire 1 person per month, then the average manpower for the year (i.e., FTE's) would be 6.5). The listing is broken down by ADS.

7.3 Liquid Waste Forecast

Key elements of the Waste Forecast using 6/7/93 as the cutoff date are shown in Appendix J. Included are the salt removal schedule and tank sequencing, the same for sludge, the Tank Farm Salt and Water Balances and the Tank 49 Precipitate Balance.

7.4 Key Projects

The project work required to support the DWPF operation and the waste removal operations in the HLW System Plan are listed in Appendix N.

Due to the interdependency of the many processes involved with waste removal through glass production, the timing and sequencing of project completion is crucial . For instance, the feed to the DWPF is dependent upon the ITP and ESP operations. ITP is further dependent upon the timely implementation of the new Late Wash project to produce acceptable feed for the DWPF. Simultaneous implementation of multiple waste removal projects is necessary to provide feed to ITP and ESP and these projects both support and require evaporator system performance. The successful operation of the DWPF depends upon the evaporator systems (the RHLWE system in particular in later years) being capable of supporting the large recycle waste water stream. Regulatory drivers also exist such as the CIF to handle the benzene from the DWPF operation and the waste removal schedule itself. It is therefore critical that adequate funding and manpower be maintained to keep the projects on schedule. This complex interdependency is further described in Appendix E with the appropriate implementation schedule shown in Appendix F.

In rev. 1 of this Plan, the proposed FY97-99 New Start line item projects have been added as appropriate. All project information has been updated from rev. 0.

7.5 Site Infrastructure

There are two changes occurring that influence the Site overhead allocation to the EM program: 1) the EM workforce is growing while the DP workforce is shrinking which tends to shift a greater burden of the Site overhead cost to EM, and 2) the Site overhead pool is decreasing which reduces the total cost of Site overhead to all programs. Unfortunely, the combined effect of the two changes results in a net cost increase to EM for Site overhead. This increase totalled about $21 million in FY94 and is expected to cost an additional $13 million in FY95 and beyond. The FY95 FYP was developed using this basis. The actual cost to EM could increase beyond what is shown above if there are further cuts to the DP budget. This would have the effect of shifting funding away from WMER projects/programs to pay for Site overheads.

The SRS has always been a DP "owned" site. DP therefore pays for the operation and maintenance of common components of the Site infrastructure such as roads and bridges, railroads, etc., via the GE-03 account. Starting in FY95, EM will pay for its share of Site infrastructure, however, the funding will come from DP to EM to pay for it. This is not expected to have an impact to the WMER or HLW mission.

8.0 Contingency Analysis

8.1 Programmatic Contingency

Uncertainties are listed in Appendix H. Programmatic Uncertainties are defined as those unknowns that do not involve resolution or definition of technical issues. In other words, the fix is known but there may be insufficient manpower or funding to implement the fix. Each is defined as an issue, assumption and contingency action (s).

8.2 Technical Contingency

These are also listed in Appendix H as above. The bulk of the technical uncertainties relate to the operation of the DWPF and ITP processes.

Appendix A - HLW System Description

This appendix provides an overview of the processes and facilities included in the HLW System. A figure of the system is included at the end of this appendix.

High Level Waste

High Level Waste is defined as the highly radioactive waste material that results from the reprocessing of spent nuclear fuel. This includes liquid waste produced directly in reprocessing and any solid waste derived from the liquid. The HLW contains a combination of transuranic waste and fission products in concentrations requiring permanent isolation.

SRS liquid waste, as received in the waste tanks, is made up of many waste streams generated during the recovery and purification of transuranic products and unburned fissile material from spent reactor fuel elements. These wastes are neutralized to excess alkalinity (pH 10 to 13) before transfer to the Tank Farm underground storage tanks.

HLW is separated in the F- and H-Area Canyons according to radionuclide and heat content. High Heat Waste (HHW) is primarily generated during the first extraction cycle in the Separations Canyon and contains a major portion of the radioactivity. Low Heat Waste (LHW) is primarily generated from the second and subsequent extraction cycles in the Canyons. HHW is aged at least one year in receipt tanks to reduce the concentration of short-lived radionuclides before evaporation.

Waste Tanks

Waste Management operates 51 waste tanks and 3 evaporators (a fourth evaporator has been retired and there are no plans to reactivate it) for the purpose of safely storing and volume reducing liquid radioactive waste. The major waste streams into the F- and H-Area Tank Farms include HHW, LHW, receipts from RBOF and DWPF recycle (future). Other major miscellaneous inputs internal to the Tank Farm include additions and byproducts of processes required for preparation of DWPF feed such as sludge washwater, sludge removal decant water, tank and annulus spray washing, inhibitor additions for corrosion control, caustic used for aluminum dissolution, and recycle of washwater from the planned Late Wash Facility.

Of the 51 tanks, 29 are located in the H-Area Tank Farm and the remainder are located in F-Area Tank Farm. All of the tanks were built of carbon steel and reinforced concrete, but they were built with four different designs. The newest design (Type III) has a full-height secondary tank and forced water cooling. Two designs (Types I and II) have five foot high secondary pans and forced cooling. The fourth design (Type IV) has a single steel wall and does not have forced cooling.

Evaporators

Each Tank Farm has two single-stage, bent-tube evaporators that are used to concentrate waste following receipt from the Canyons. HHW is segregated and allowed to age before evaporation. The aging allows separation of the sludge and supernate and also allows the shorter-lived radionuclides to decay to acceptable levels. LHW is sent directly to an evaporator feed tank. The sludge settles to the bottom of the feed tank, and the supernate can be processed immediately through the evaporator. Salt crystallized from high-heat waste and low-heat waste is also segregated in separate tanks because the high-heat waste must be stored for a number of years (up to 12 years), primarily to allow decay of ^{106}Ru before ITP/DWPF/Saltstone processing. The low-heat waste can be processed in 0 to 3 years.

Radioactive waste, as received and stored in the Tank Farms, can be reduced to about 25% of its original volume and immobilized as crystallized salt by successive evaporation of the liquid supernate. Such a dewatering operation has been carried on routinely in F-Area since 1960 and in H-Area since 1963. Since the first evaporator facilities began operation in 1960, more than 98,000,000 gallons of space has been reclaimed. Seventy additional waste tanks valued at more than $50 million each would have been required to manage this waste had evaporation not been used.

Two evaporators currently process low-heat waste: 242-16F (called 2F), and 242-16H (2H). The 242-H (1H) evaporator processes high-heat waste and plans for the 242-16F include HHW service as well starting 11/1/93. Another evaporator, the Replacement High-Level Waste Evaporator (RHLWE), is being constructed to replace the 242-H evaporator, which cannot be reliably maintained based on historical data that lead to an assumed 40% utility for this evaporator. The new evaporator will have more than twice the capacity of the 242-H evaporator that it replaces and will be able to accept the DWPF recycle (a low-heat waste stream of about three million gallons per year that contains very little solids) in addition to the high-heat waste. The RHLWE is currently scheduled to be on-line by 9/97. The 242-F Evaporator is not currently being utilized to process dilute wastes. For purposes of this Plan, the resumption of operation for the 242-F evaporator is not considered practical and not required to meet the mission of the HLW System Plan.

Each evaporator is equipped with a Cesium Removal Column (CRC) located in a riser through the top of a waste storage tank. These columns remove cesium from the evaporator overheads condensate produced by the concentration of waste supernate. The columns are normally maintained off-line and placed in service only if required to reduce the cesium concentration prior to transferring the condensate to the Effluent Treatment Facility. The CRC is capable of achieving cesium DF's of 10 to 200 depending on the cesium concentration of the feed. When the zeolite becomes fully loaded, it is discharged directly to the waste tank.

Waste Removal Program

The primary objective of the High-Level Waste System is shifting from waste storage to removal of radioactive waste from the older style tanks to prepare the waste, including liquid, salt, and sludge, for feed to the DWPF. The waste removal program includes removal of salt and sludge by mechanical agitators, cleaning the tank interior by spray washing of the floor and walls, and steam/water cleaning of the tank annulus. The waste processing program includes decontamination of the salt and liquid for incorporation into saltstone and aluminum dissolution and washing of the sludge for feed to the DWPF.

The schedules of waste removal and waste processing are closely linked to each other and with the DWPF schedule. The scheduling objective is to remove the waste from the Types I, II, and IV Tanks as rapidly as possible without exceeding the capacity of the Tank Farm processes or the DWPF.

Processes and equipment for waste removal and waste processing have been developed and demonstrated in several successful full-scale radioactive demonstrations. Sludge removal by hydraulic slurrying and chemical cleaning with oxalic acid has been demonstrated in Tank 16H. Salt removal and sludge removal using mechanical agitation has also been demonstrated on Tanks 17-22. Facilities have been designed using data and experience gained from these demonstrations. To date, 3.4 million gallons of salt and 1.1 million gallons of sludge have been removed from Types I, II, and IV Tanks.

The Waste Removal Program is a series of projects that install waste removal equipment on the existing waste tanks. The objective of the Waste Removal Program is to remove the waste contained in the tank primary vessel so that the tank can be reused or retired. In general, the Type III tanks will be reused while the Type I, II and IV tanks will be retired when all waste has been removed. The tanks to be retired will also undergo a water washing operation in the primary vessel and an annulus cleaning operation in the annulus if the annulus is contaminated.

Waste removal equipment consists of slurry pump support structures above the tank top, slurry pumps (typically three for salt tanks and four for sludge tanks), bearing water and electrical service to the slurry pumps, motor and instrument controls, tank sampling equipment, tank interior water washing piping and spray nozzles, pressurized wash water supply skids and H&V skids to augment the existing tank H&V during spray washing.

On salt tanks, the slurry pump discharges are positioned just above the saltcake level. Water is added to the tank, the slurry pumps are started and salt is dissolved. The dissolution ratio is typically 2 parts water to 1 part saltcake. The slurry pumps serve to displace the boundary layer of saturated water in contact with the saltcake and expose the underlying salt to unsaturated water. When the water is fully saturated, the dissolved salt solution is transferred to ITP, the slurry pumps are lowered and the process is repeated.

On sludge tanks, the four slurry pumps are typically positioned in the top layer of sludge, water is added and the pumps are started. When the layer of sludge is well mixed (i.e. the sludge is suspended) as indicated by sampling, the transfer pump is started and the suspended sludge is transferred to ESP. Note that the slurry pumps continue to operate during the transfer so that the suspended sludge does not resettle. The pumps are then lowered, more water is added, and the process is repeated. Sludge tanks require more pumps than salt tanks due to the effective sludge cleaning radius of the standard slurry pump.

For tanks that contain mixed salt and sludge, the salt will be removed first followed by the sludge. The process is similar to salt removal described above except that the sludge is allowed to settle before the saturated salt solution is transferred out of the tank.

When the salt or sludge contents have been removed from the old-style tanks, the tank interior is washed with heated water. The water is sprayed throughout the tank using rotary spray jets installed through the tank risers. The water is supplied to the jets by a skid mounted tank and pump system. For those tanks with contaminated annuli, recirculating jets are installed in the annulus through annulus risers and heated water is circulated in the annulus and than transferred to the waste tank primary. At the completion of water washing, there may be some residual waste that cannot be removed with water. Removal of this waste is not part of the scope of the existing Waste Removal Program and will be handled on a case-by-case basis as the Transition and Decontamination & Decommissioning missions are developed. Oxalic acid cleaning has been demonstrated in Tank 16 as a viable process to remove residual waste.

New Waste Transfer Facility

The NWTF is currently undergoing final construction and startup testing activities. The facility consists of four pump tank cells and a large diversion box cell located inside a building outfitted with a remotely operated crane. This facility is the hub for transfers between the F-Area Tank Farm, the H-Area Tank Farm, DWPF and ETF. It is currently scheduled to begin operation 5/94. The NWTF will replace the HDB-2 complex. It's primary mission will be to serve as a highly reliable and flexible receipt and distribution point for the DWPF recycle and Intra-Tank Farm streams.

Diversion Box & Pump Pit Containment

This project provides a containment building outfitted with a remotely controlled crane for H-Area Diversion Box 7 (HDB-7) similar to the building for the NWTF described above. HDB-7 is the hub for all transfers within H-Area as required to support H-Canyon, ITP, ESP 2H Evaporator and the 1H Evaporator. This project increases the reliability and flexibility of HDB-7 as well as reduces radiation exposure to personnel during routine maintenance.

There will be two periods of time when this project could effect the other operations listed above. The first occurs in 11/93 and lasts for 5 weeks. HDB-7 will be down to replace most of the jumpers. Waste receipts from the Canyon in support of the Cassini Mission will be supported during this time. Early transfer of salt solution from Tank 41 to ITP could not occur, nor could the transfer of washwater between Tank 42 and Tank 51. This impact is manageable and represents a small impact.

The second period starts when the building steel is erected and finishes when the facility becomes operable. Building steel will interfere with a yard crane if maintenance is required inside HDB-7. This second time period will be the subject of additional planning during the coming months as a dedicated startup team is staffed. It is shown on the Integrated Schedule as a "window of vulnerability". If there are no leaks or jumper failures during this time, then there would be no need to enter HDB-7 and thus no impact to other operations.

Extended Sludge Processing

Sludge that is removed from waste tanks is washed in the ESP facility to reduce the concentration of soluble salt in the sludge before it is fed to the DWPF. Sludge processing includes four processing steps: 1) aluminum dissolution (required for H-Area HHW) using sodium hydroxide and elevated tank temperature, 2) washing with inhibited water to remove dissolved solids, 3) gravity settling, and 4) decanting the salt solution to the Tank Farm for evaporation. Before washing, H-Area HHW sludge is mixed with sodium hydroxide to dissolve aluminum. The quantity of aluminum in other waste tanks is low and therefore does not require aluminum dissolution. After aluminum dissolution, two tanks will be used to wash sludge concurrently, with the wash water from the first tank being reused to wash the sludge in the second processing tank. When all washing is complete, the sludge is consolidated into one tank to be fed to the DWPF. Processing begins again using a third tank for co-processing with the empty tank from the prior batch. Four slurry pumps supply the agitation for washing. Wash water that results from this process will either be transferred to an evaporator system or stored for reuse to dissolve saltcake, depending on the salt concentration. Tanks 21 and 23, Type IV tanks, will be used for staging this wash water.

In-Tank Precipitation

Salt will be removed from the waste tanks and processed via ITP. ITP conducts a precipitation/adsorbtion reaction with sodium tetraphenylborate and sodium titinate in Tank 48. The resultant precipitate slurry is continuously pumped to a filter cell, filtered, and then returned to Tank 48. Filtering is continued until the precipitate reaches 10 wt % solids. The filtrate produced during the filtering step is collected, stripped of benzene, sampled and then pumped to Saltstone to be incorporated into a cement/flyash matrix. The concentrated precipitate is washed to reduce the sodium content using the same filters as before and then transferred to Tank 49 for feed to DWPF. At DWPF, the washed precipitate is blended with washed sludge and incorporated into the glass product. ITP is the only currently planned process to remove salt from the Tank Farm inventory and thus keep the Tank Farm from becoming "saltbound".

F/H Effluent Treatment Facility

Low level aqueous streams currently sent to the F/H ETF from the 200-Areas consist of: segregated cooling water, contaminated surface runoff from the Tank Farms, some evaporator overheads, cesium removal column effluent, condensate from the Separations general purpose evaporator and acid recovery units located in Building 211, selected liquid regeneration wastes from the resin regeneration facility in H Area, and water collected in H-Area catch tank from transfer line encasements.

The F/H ETF treats the waste water that was previously sent to seepage basins. The treatment process includes filtration, organic removal, reverse osmosis, and ion exchange. The facility consists of process waste water tanks, treated water tanks, basins to collect contaminated cooling water and storm water runoff and a water treatment facility.

Facilities had not previously been available for treating all types of contaminated water releases from the Canyons nor were there facilities to send contaminated water in the retention basins to the Tank Farms for storage and/or treatment via the Tank Farm evaporators. The F/H ETF corrects this by providing treatment facilities for all types of low-level waste water.

In the future, the ETF may be required to support DWPF Cold Chemical and Mercury Runs. Water and cold chemicals used in the DWPF Cold Chemical Runs test program after melter heatup will be trucked to the ETF if this stream cannot go to Horse Creek Valley. Permit and piping modifications were in progress at the time of this report. The Mercury Runs test program generates a similar waste stream that is spiked with trace amounts of mercury. In the past, this stream was to be trucked to the Tank Farm. Studies conducted by SRTC have shown that it is feasible to process this stream in the ETF. There is an agressive program underway to make the necessary piping and process changes to enable the ETF to process the mercury runs recycle.

Defense Waste Processing Facility

The DWPF consists of several facilities: the Vitrification process (commonly called DWPF), Saltstone, and Late Wash. These facilities will be discussed below. These facilities require several recurrent projects to maintain operations: additional Glass Waste Storage Buildings, Saltstone Vaults, Melters, and Failed Equipment Storage Vaults (used to store failed melters and other large equipment). The recurrent facilities will not be discussed but will be shown on the Integrated Schedule and project lists.

Late Wash Facility (LW)

The Late Wash Facility (formerly the Auxiliary Pump Pit) will receive washed precipitate stored in ITP Tank 49. Late Wash will reduce the nitrite concentration from the precipitate by a filtration/dilution process in a stainless steel facility utilizing a cross flow filter. Sodium nitrite is added to ITP to mitigate pitting corrosion of carbon steel waste tanks and components. Nitrite, if not removed in Late Wash, results in high boiling organics in the DWPF process which foul heat transfer surfaces and plug filters and instrumentation. The Late Wash batch operation processes approximately 3,400 gallons of precipitate every 43 hours. During the process, the slurry is reprecipitated to capture cesium which has returned to solution during Tank 49 storage, re-concentrated to 10-12 wt %, and washed to remove the nitrite from the slurry to ≤ 0.01M using a filtration process. The washed slurry is transferred to the Low Point Pump Pit for subsequent transfer to the DWPF. The filtrate produced during the filtering process is stripped of benzene, chemically adjusted, and transferred to Tank 22 for reuse in the ITP process.

Vitrification (DWPF)

The objective of the DWPF S-Area Vitrification process is to take the liquid high-level radioactive waste which is processed in ITP and ESP and permanently immobilize it as a glass solid. The vitrification operations include chemically treating two unique waste streams, mixing them with a ground borosilicate glass and then heating the mixture in an electric melter to 1130 degrees centigrade. The molten mixture is then poured into ten-feet-tall, two feet in diameter stainless steel canisters and allowed to harden. The outer surface of the canisters is then decontaminated to DOT standards, welded closed and temporarily stored onsite for eventual transport to and disposal in a permanent federal geological repository.

Saltstone (Z-Area)

The Z-Area Saltstone facility processes low-level radioactive liquid waste salt solution from the In-Tank Precipitation Facility and the Effluent Treatment Facility. The solution is mixed with a blend of cement, flyash and blast furnace slag to form a grout. The grout is pumped in disposal vaults where it hardens into a solid non-hazardous waste form for permanent disposal.

Solid Waste

Consolidated Incineration Facility (CIF)

The CIF, while not currently a portion of the HLW System, will play an important role in the success of the waste removal mission in the future. Benzene generated from the DWPF processing of the ITP precipitate will be incinerated in the CIF.

The CIF will be built to treat various site-generated combustible waste before final disposal and to reduce the volume of the current inventory of waste stored at SRS. The waste to be treated will include waste defined as hazardous by South Carolina Hazardous Waste Management Regulations and federal RCRA regulations, waste contaminated with low levels of beta-gamma radioactivity, and mixed waste that are both hazardous and low-level radioactive. The facility will not treat waste containing dioxins or polychlorinated biphenyls (PCB's).

Facilities to be provided on the CIF project consist of a main process building which includes an area for boxed waste receipt, boxed waste handling, a rotary kiln incinerating system including incinerator ash removal and offgas cleaning, and the necessary control room and support facilities. The rotary kiln primary combustion chamber will be used for the incineration of solids and various organic and aqueous liquid wastes. A secondary combustion chamber will also incinerate organic solvent waste as well as destroy any remaining traces of hazardous constituents in the primary offgas. Offgas exiting the secondary combustion chamber will be cooled and treated by a wet offgas treatment system. Pollutants in the offgas will be removed to below regulatory limits before the offgas is discharged to the atmosphere.

Liquid waste from the offgas system will be solidified in the proposed Y-Area Saltstone Disposal Facility. An area is provided for installation of an existing solidification process for incinerator ash. Facilities included on the project but remote from the main process building include a liquid waste storage area.

Appendix B - HLW System Safety Documentation and Permits

Process	Safety Documents	Permits	Comments
1. Sludge Waste Removal	Not covered by current SAR, OSR's and Technical Standards	1, 2, 5, 6, 7, 9, 16, 17, 21, 22, 23, 30, 31	An Unreviewed Safety Question Determination (USQD) will be required to determine the authorization basis for sludge removal
2. Salt Waste Removal	Covered by current (old format) Liquid Waste Handling Facilities SAR, DPSTSA-200-10-SUP-18 February, 1988 as well as OSR's and Technical Standards	1, 2, 5, 6, 7, 9, 16, 17, 21, 22, 23, 30, 31	An USQD will be required to determine the authorization basis for salt removal
3. Evaporation	Covered by current (old format) Liquid Waste Handling Facilities SAR, DPSTSA-200-10-SUP-18 February, 1988	1, 2, 5, 6, 7, 9, 16, 17, 21, 22, 23, 30, 31	
4. Replacement High Level Waste Evaporator (RHLWE)	Not covered by current SAR, OSR's or JCO's.	1, 2, 5, 6, 7, 9	Safety Analysis underway.
5. In-Tank Precipitation (ITP)	SAR Addendum 1 and OSR WSRC-RP-90-1124	1, 2, 5, 6, 7, 9, 16, 21, 22, 30	In process of review for approval
6. Extended Sludge Processing (ESP)	Covered by ITP Addendum and OSR WSRC 93-224	1, 2, 5, 6, 7, 9, 16, 21, 22, 30	
7. Late Wash (LW)	Not covered by current SAR, OSR's or JCO's.	5, 9	
8. Defense Waste Processing Facility (DWPF)	SAR, DPSTA-200-10-SUP-20, Rev 3. Cold Chemical OSR's, WSRP–RP-92-975. Other OSR's under development.	3, 4, 7, 10, 14, 19, 21, 27, 33	SAR to DOE for Approval, 8/92 Cold chemical OSR's to DOE for approval, 10/92
9. Saltstone	SAR, WSRC SA3.	3, 7, 11, 14, 20, 21, 28, 34	SAR with DOE for approval. OSR's included in the SAR.
10. F/H Effluent Treatment Facility (ETF)	Not covered by current SAR, OSR's or JCO's. DPSTSAD-200-5, 12/86 and HAD WSRC TR-93-031, rev 1	1, 2, 12, 13, 15, 21, 26, 32	

Process	Safety Documents	Permits	Comments
11. Transfer Facilities: New Waste Transfer Facility (NWTF), Diversion Boxes, Inter Area Lines, Pump Pit Facilities, etc	NWTF covered by current SAR, OSR's and Technical Standards. Other facilities covered by Tank Farm SAR. See #3 above!	NWTF - 1, 2, 5, 6, 7, 9, 21, 24 All others - 1, 2, 5, 6, 7, 9, 16, 17, 21, 22, 23, 30, 31	An USQD will be required to determine the authorization basis for sludge removal
12. Consolidated Incinerator Facility (CIF)	SAR submitted for WSRC Review	1, 6, 7, 8, 14, 15, 21, 29	

Applicable Permit or Environmental Documents

National Environmental Policy Act:

1 ERDA-1537 "Final Environmental Impact Statement - Waste Management Operations - Savannah River Plant - Aiken, South Carolina."

2 DOE-EIS-0062 "Final Environmental Impact Statement - Supplement to ERDA-1537 - Waste Management Operations, Savannah River Plant, Aiken, South Carolina - Double Shelled Tanks for Defense High Level Radioactive Waste Storage."

3 DOE-EIS-0082 "Final Environmental Impact Statement - Defense Waste Processing Facility - Savannah River Plant, Aiken, South Carolina "

4 DOE-EA-0179 "Environmental Assessment - Waste Form Selection for SRP High-Level Waste"

Federal Facility Agreement:

5 Savannah River Site Federal Facility Agreement, Administrative Docket Number: 89-05-FF.

Land Disposal Restriction-Federal Facility Compliance Agreement:

6 Federal Facility Compliance Agreement; Savannah River Site, EPA Docket #91-01-FFR, EPA ID #SCI 890 008 989.

Resource Conservation and Recovery Act:

7 RCRA Part A Permit #SC1890008989 for Savannah River Plant.

Air Pollution Control Permit:

8 Permit #0080-0041-H-CG for the Consolidated Incinerator Facility.

South Carolina Department of Health and Environmental Control Industrial Wastewater Permit

9 SCDHEC Permit #17,424-IW for F/H Area Tank Farms.

10 Permit #16783: Vitrification Facility

11 Permit #12683: Saltstone Facility

12 Permit #12870 and Addendums: Effluent Treatment Facility

National Emission Standard for Hazardous Air Pollutants

13 Outstanding NESHAP permit for ETF.

14 NESHAP Radionuclide Permit

15 NESHAP Benzene Permit

South Carolina Department of Health and Environmental Control Air Quality Control Permit

16 Permit to Operate Seven (7) Diesel Generators at Waste Management Facilities in H-Area - Permit #0080-0046.

17 Permit to Operate Five (5) Diesel Generators at Waste Management Facilities in F-Area - Permit #00800-0045.

18 Air Quality Control Construction Permit #0080-0046-CE for Diesel Generator at the ITP Facility (241-4H).

19 Air Quality Control Permit #0080-0066 and Addendums.

20 Air Quality Control Permit #0080-0080 and Addendums.

National Pollution Discharge and Elimination System

21 NPDES Permit for Savannah River Site; Permit # SC000175.

South Carolina Department of Health and Environmental Control Domestic Water Permit

22 Permit SC#405556: H-Area Facilities.

23 Permit SC#405566: F-Area Facilities.

24 Permit SC#401118: New Waste Transfer Facility.

25 Permit SC#LS91007: Replacement High Level Waste Evaporator.

26 Permit SC#LS-233-W: ETF.

27 Permit SC#402186 and Addendums: DWPF.

28 Permit SC#400737: Saltstone.

29 Permit Pending for CIF

South Carolina Department of Health and Environmental Control Sanitary Water Permit

30 Permit #12910 and Addendum: H-Area Facilities.

31 Permit #9326 and Addendum: F-Area Facilities.

32 Permit #9998 and Addendum: ETF.

33 Permit #9888 and Addendum: DWPF.

34 Permit #13717; Saltstone.

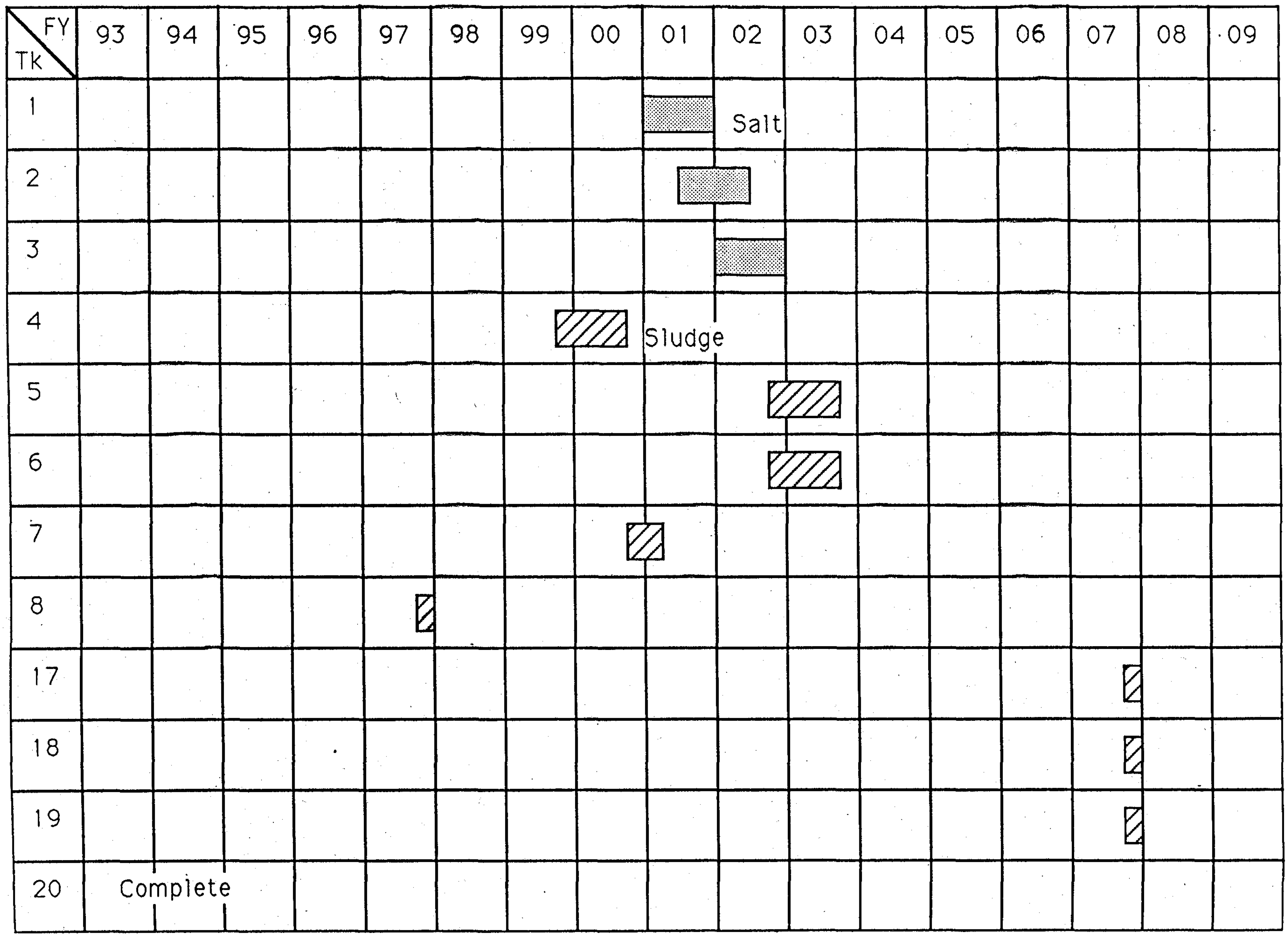
Appendix C - Waste Removal Regulatory Schedule

Appendix C shows the current waste removal plan for Type I, II and IV Tanks. These tanks do not meet the standards for secondary containment as outlined in the Federal Facilities Agreement (FFA).

There are two charts: one for the F-Area salt and sludge tanks, and one for the H-Area tanks.

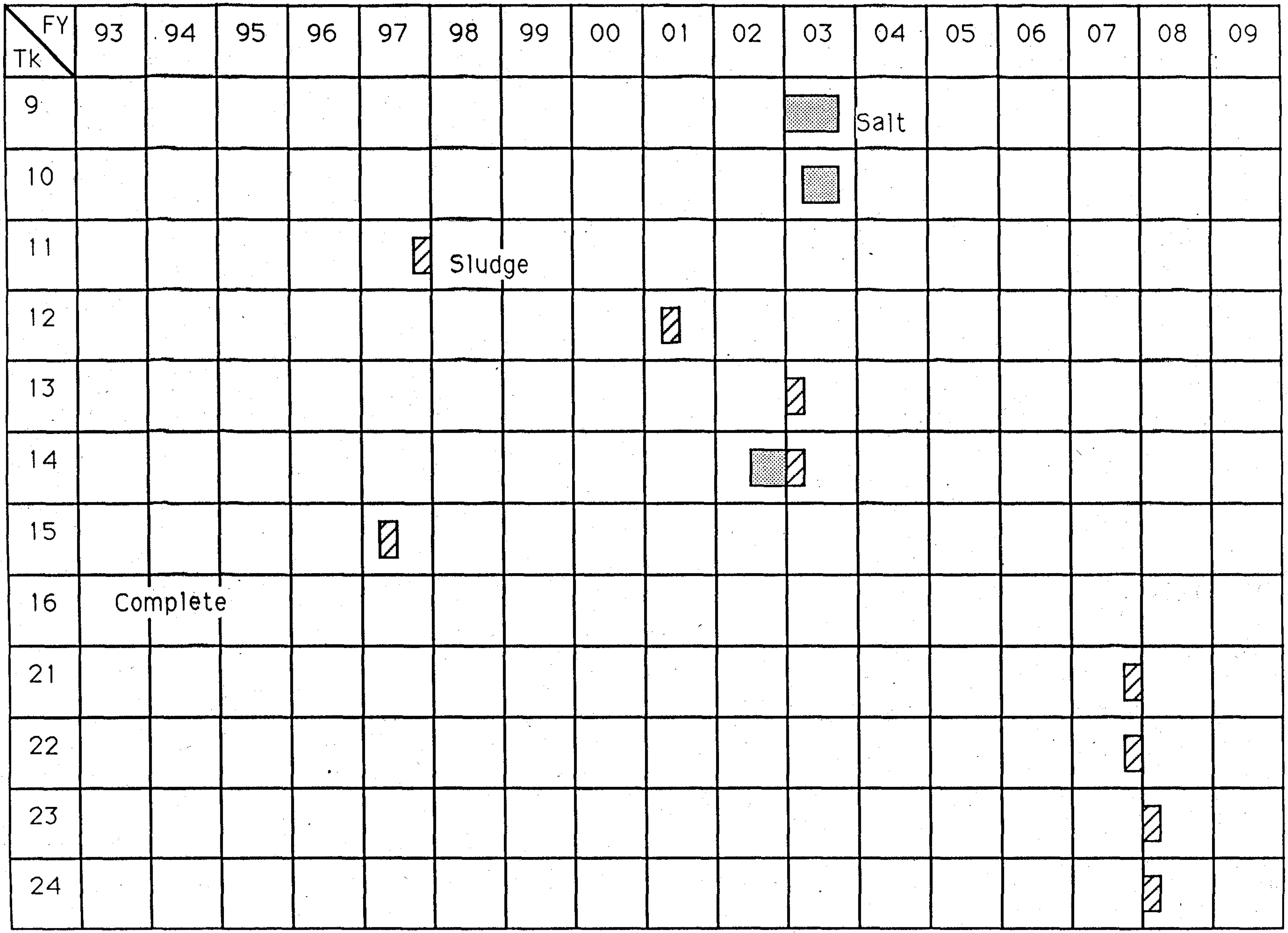
Appendix C - Waste Removal from Type I, II, and IV Tanks

F-Area Tanks

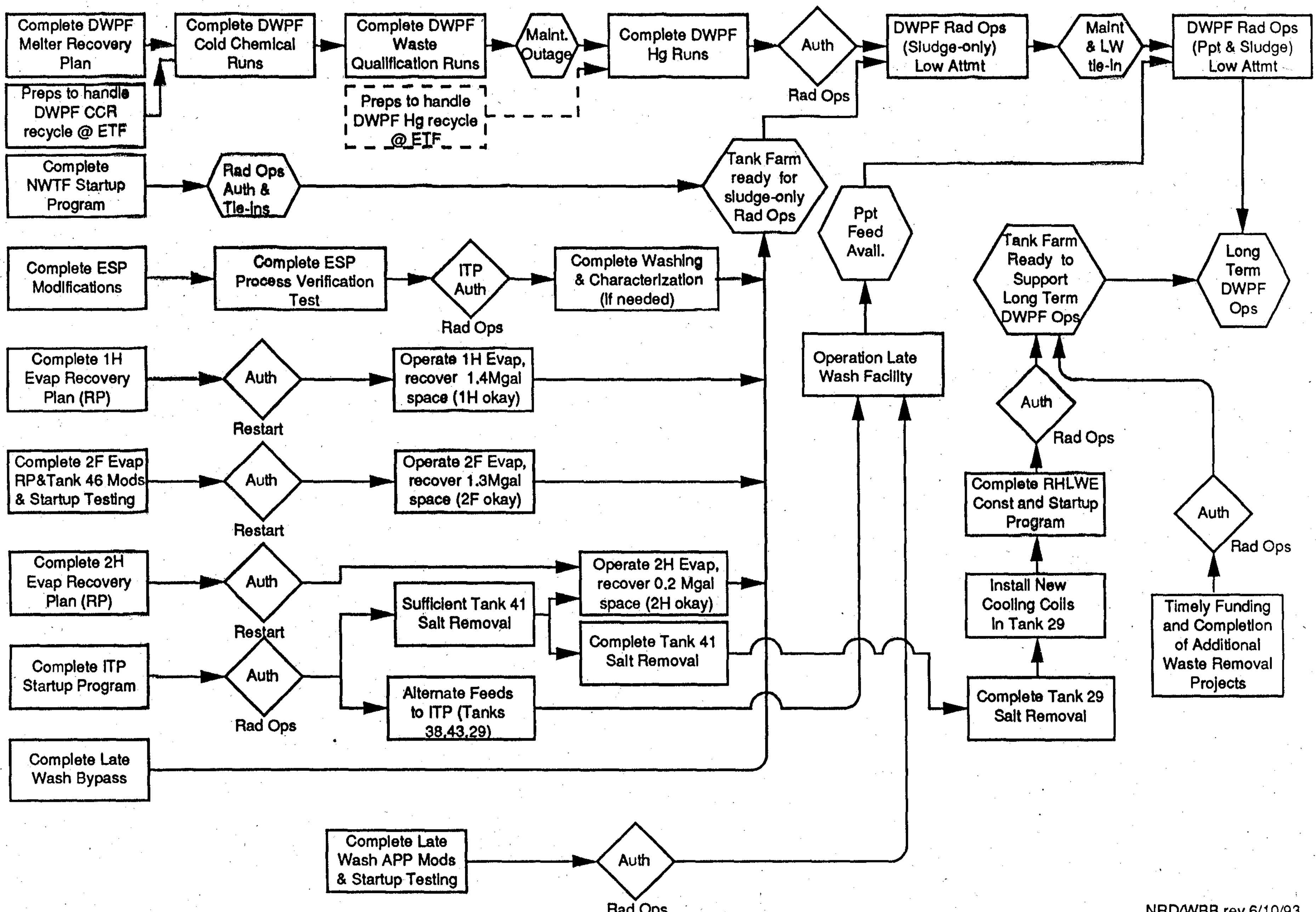


Appendix C - Waste Removal from Type I, II and IV Tanks

H-Area Tanks



Appendix D - Process Logic Diagram



NRD/WBB rev 6/10/93

Appendix E - Process Interactive Logic Matrix

The attachments to Appendix E contain a brief description matrix of the extremely complex interaction between the various processes and facilities required to successfully support waste removal from the HLW Tanks. The fourth column is the key in that it lists the other facilities or processes which have a direct influence on that facility's operation.

The following facilities have been characterized in the HLW System Process Logic Interactive Matrix:

1. Sludge Waste Removal
2. Salt Waste Removal
3. Evaporation
4. Replacement High level Waste Evaporator
5. In-Tank Precipitation
6. Extended Sludge Processing
7. Late Wash
8. Defense Waste Processing Facility
9. Saltstone
10. Effluent Treatment Facility
11. Transfer Facilities (In general)
12. Consolidated Incinerator Facility

Appendix E - Process Logic Interactive Matrix

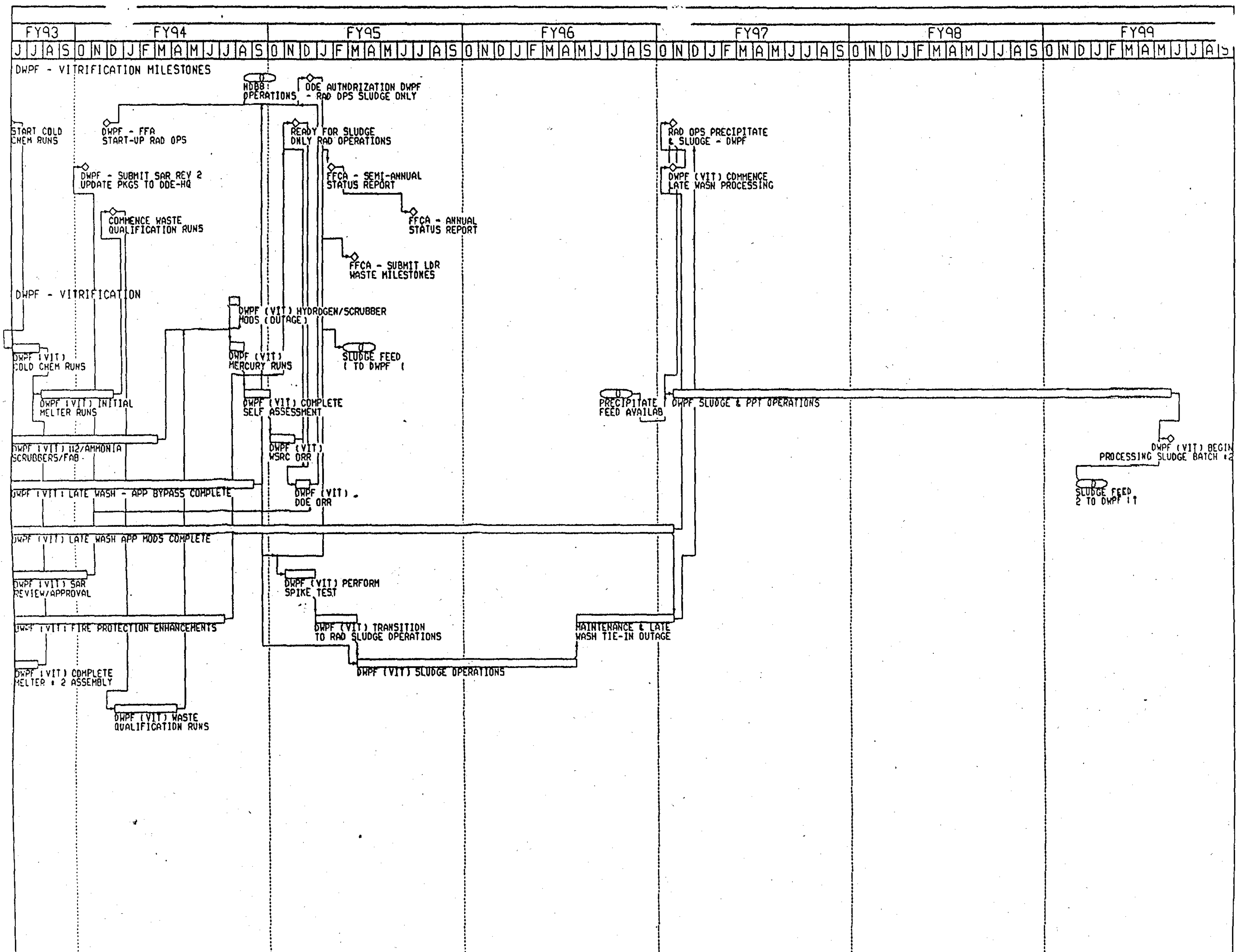
Process	Limiter	Solution	Dependent Upon
1. Sludge Waste Removal	1. $, time and manpower to erect steelwork, pumps, etc. 2. Manpower available/qualified 3. Chemistry Appropriate for ESP Blending 4. Transfer route available 5. ESP Processing available (Al Dissolution or not) 6. ESP rate of processing	1. Fund projects to implement in a timely manner 2. Ensure ESP space by running DWPF 3. Effective WR schedule to avoid transfer conflicts 4. Timely Analytical Results	1. Budget 2. Manpower 3. ESP Operation 4. DWPF Operation 5. Transfer Facilities Operation 6. SRTC Analytical Operations 7. Space Gain through ITP Operation
2. Salt Waste Removal	1. $, time and manpower to erect steelwork, pumps, etc. 2. Manpower available/qualified 3. Chemistry Appropriate for ITP Blending 4. Transfer route available 5. ITP Processing available 6. ITP rate of processing 7. Tank 49 not full 8. Saltstone availability	1. Fund projects to implement in a timely manner 2. Timely Analytical Results 3. Run ITP at maximum rate 4. Run LW and DWPF at a rate equal or greater than ITP 5. Run Saltstone as needed 6. Effective WR schedule to avoid transfer conflicts	1. Budget 2. Manpower 3. ITP Operation 4. LW Operation 5. DWPF Operation 6. Saltstone Operations 7. Transfer Facilities Operation 8. SRTC Analytical Operations
3. Evaporation	1. Available Salt Receipt Space 2. Availability/Utility of Evaporators 3. ETF capable of handling evaporator overheads	1. Run ITP to remove salt or concentrated supernate from Evaporator salt receipt tanks 2. Implement ConOps Initiative and restart 1H by 9/93. 3. Maintain adequate capacity in the ETF	1. Startup and operation of ITP 2. Funding for ConOps, available manpower. 3. No major upset scenarios in Tank Farms/Canyons that would consume ETF capacity.
4. Replacement High Level Waste Evaporator (RHLWE)	1. $, time and manpower to complete and startup 2. Concentrate receipt space with adequate cooling 3. Tank 32 use as feed tank 4. Startup Authorization	1. Fund project to implement in a timely manner 2. Run ITP to empty Tank 29 3. Install additional cooling in Tank 29 4. Timely Readiness Reviews	1. ITP Operations 2. Authorization Process

Process	Limiter	Solution	Dependent Upon
5. In-Tank Precipitation (ITP)	1. $, time and manpower to complete and startup 2. Startup Authorization 3. Technical Concerns: Tank 41 Criticality Deflagration PRA/HRA Geotechnical 4. Successful startup testing 5. Available Feed from Salt Tanks 6. Tank 49 not full 7. Tank 50 not full 8. Saltstone operational 9. Saltstone Vaults Available	1. Fund project to implement per 3/94 startup schedule 2. Timely Readiness Reviewst 3. Prompt resolution of process technology concerns 4. Timely availability of salt waste removal projects 5. Startup LW and DWPF before Tank 49 is full 6. Evaluate use of supernate as feed to ITP in lieu of salt waste removal operation	1. Authorization Process 2. Saltstone Operation 3. LW Operation 4. DWPF Operation 5. Waste Removal Operations 6. Transfer Facility Operation
6. Extended Sludge Processing (ESP)	1. Manpower to support startup 2. Startup Authorization 3. Available Feed from Sludge Tanks 4. Evaporator System capacity to handle wash water transfers, evaporation and salt content 5. Processing space available in ESP Tanks 6. Processing cycles as required to meet DWPF feed acceptance criteria 7. DWPF capable of receiving sludge	1. Timely Readiness Reviews 2. Timely availability of sludge waste removal projects 3. Maintain Evaporators on line 4. Complete Batch #1 and feed to DWPF 5. Prompt resolution of process technology concerns 6. Tank 21 use for wash water	1. Authorization process 2. Management of personnel resources 3. Waste Removal Operations 4. Evaporation Operations 5. DWPF Operations 6. Transfer Facility Operation 7. Space Gain through ITP Operation
7. Late Wash (LW)	1. Fund and implement in a timely manner 2. Startup Authorization 3. Technical Concerns Filter Operation Benzene Stripping 4. Tank 22 available for recycle of wash water 5. DWPF on line 6. Feed available from Tank 49	1. Fund projects to implement in a timely manner 2. Prompt resolution of process technology concerns 3. Timely Readiness Reviews 4. Run ITP to supply feed to Tank 49 5. Run ITP to maintain level in Tank 22 6. Run DWPF to accept Feed	1. Budget 2. Permitting Action 3. Authorization process 4. ITP Operation 5. DWPF Operation 6. Transfer Facility Operation 7. Saltstone Operation

Process	Limiter	Solution	Dependent Upon
8. Defense Waste Processing Facility (DWPF)	1. Startup Authorization 2. Successful Cold Chemical Runs 3. Technical Concerns Ammonium Nitrate Formation Organic Fouling 4. Availability of sludge feed 5. Availability of precipitate feed 6. Tank Farm capable of handling the recycle water 7. Benzene appropriately stored or incinerated	1. Timely Readiness Reviews 2. Prompt resolution of process technology concerns 3. Run ESP 4. Run LW from Tank 49 Feed 5. Run ITP 6. Maintain and increase Evaporator capacity 7. Implement CIF project	1. Budget 2. Permitting Action 3. Authorization process 4. ESP Operation 5. LW Operation 6. ITP Operation 7. Evaporator Operation including the RHLWE 8. Transfer Facility Operation 9. CIF Operation
9. Saltstone	1. Feed available from Tank 50 2. Single shift operation 3. Vaults must be available	1. Run ITP and ETF 2. Man two shift operation if required 3. Timely funding and construction of new vaults	1. Budget 2. ITP Operation 3. ETF Operation
10. F/H Effluent Treatment Facility (ETF)	1. Feeds must meet acceptance criteria 2. Operational utility 3. Tank 50 not full 4. Ready to recieve DWPF CCR Recycle	1. Maintain controls on generators for feed 2. Implement utility improvements as required 3. Run Saltstone 4. Complete unloading piping.	1. Evaporator Operations 2. Canyon Evaporator Operations 3. Saltstone Operation 4. DHEC change approval.
11. Transfer Facilities New Waste Transfer Facility (NWTF) Diversion Boxes Inter Area Lines Pump Pit Facilities, etc.	1. Jumper changes required 2. Weather can extend maintenance duration 3. Limited number of transfer routes available 4. Operational utility	1. Support projects as practical to enclose high traffic diversion boxes 2. Effective scheduling of waste transfers 3. Implement utility improvements as required	1. Weather 2. Budget
12. Consolidated Incinerator Facility (CIF)	1. $, time and manpower to complete and startup 2. Permitting Process 3. Startup Authorization 4. Provide for secondary waste treatment or disposal	1. Fund project to implement in a timely manner 2. Timely Readiness Reviews 3. Implement CIF operation before Benzene Storage at DWPF is full	1. Budget 2. DWPF 3. Mixed Waste/ hazardous Waste Facility (Also new project)

Appendix F - HLW Integrated Schedule

The integrated schedule shown on the next several pages is based on the funding described in section 7.1 of this Plan and as listed in Appendix M. The schedule is resource loaded down to Level 3 in the ADS structure ifor all ADS's and lower for some ADS's. The resources have not been leveled at the time of this report.



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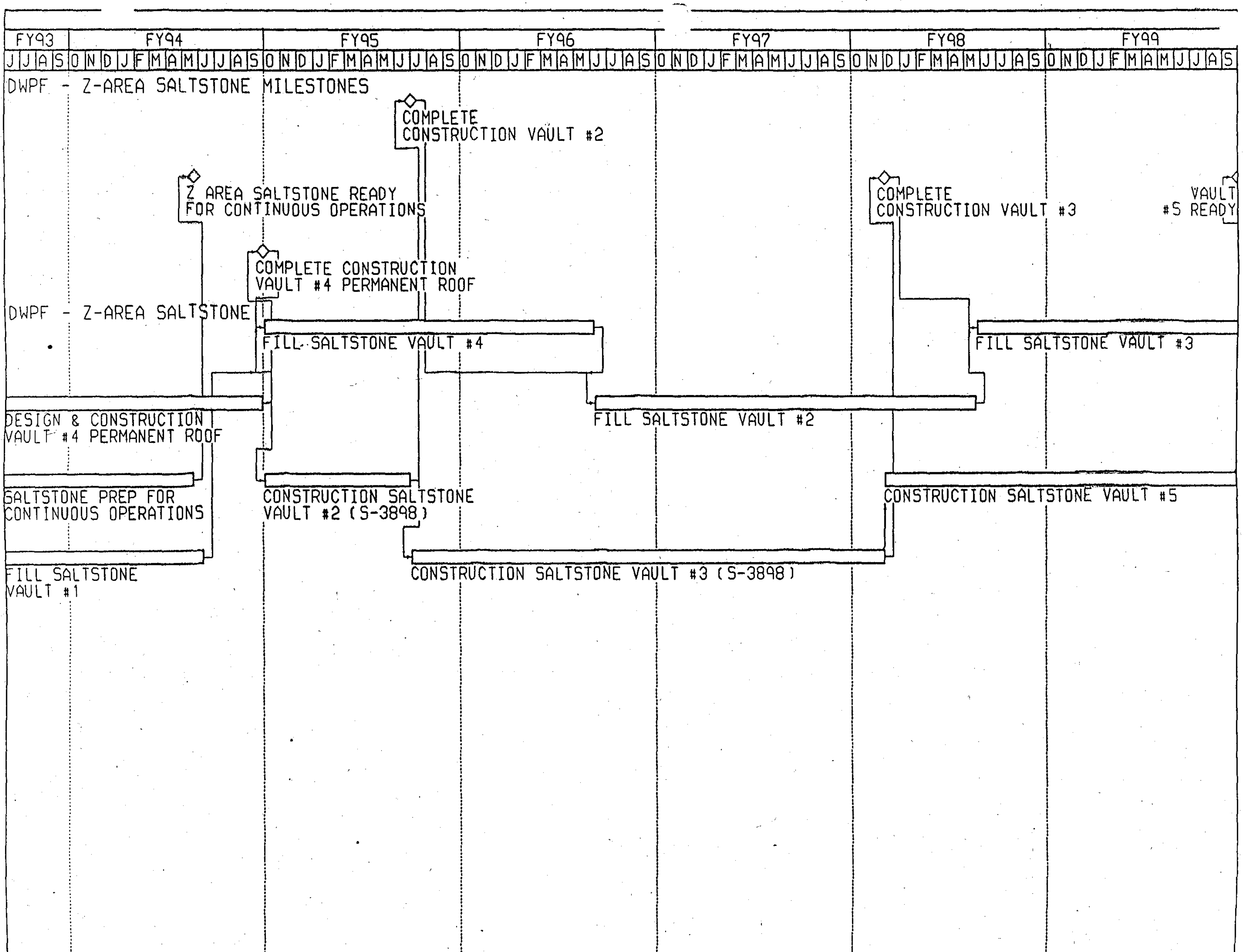
Data Date 1JUN93
Project Start 1OCT90
Project Finish 2NOV11

Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity
Connecting Activity on Sheet #

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Date	Revision	Checked	Approved



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Progress Bar
Milestone/Flag Activity

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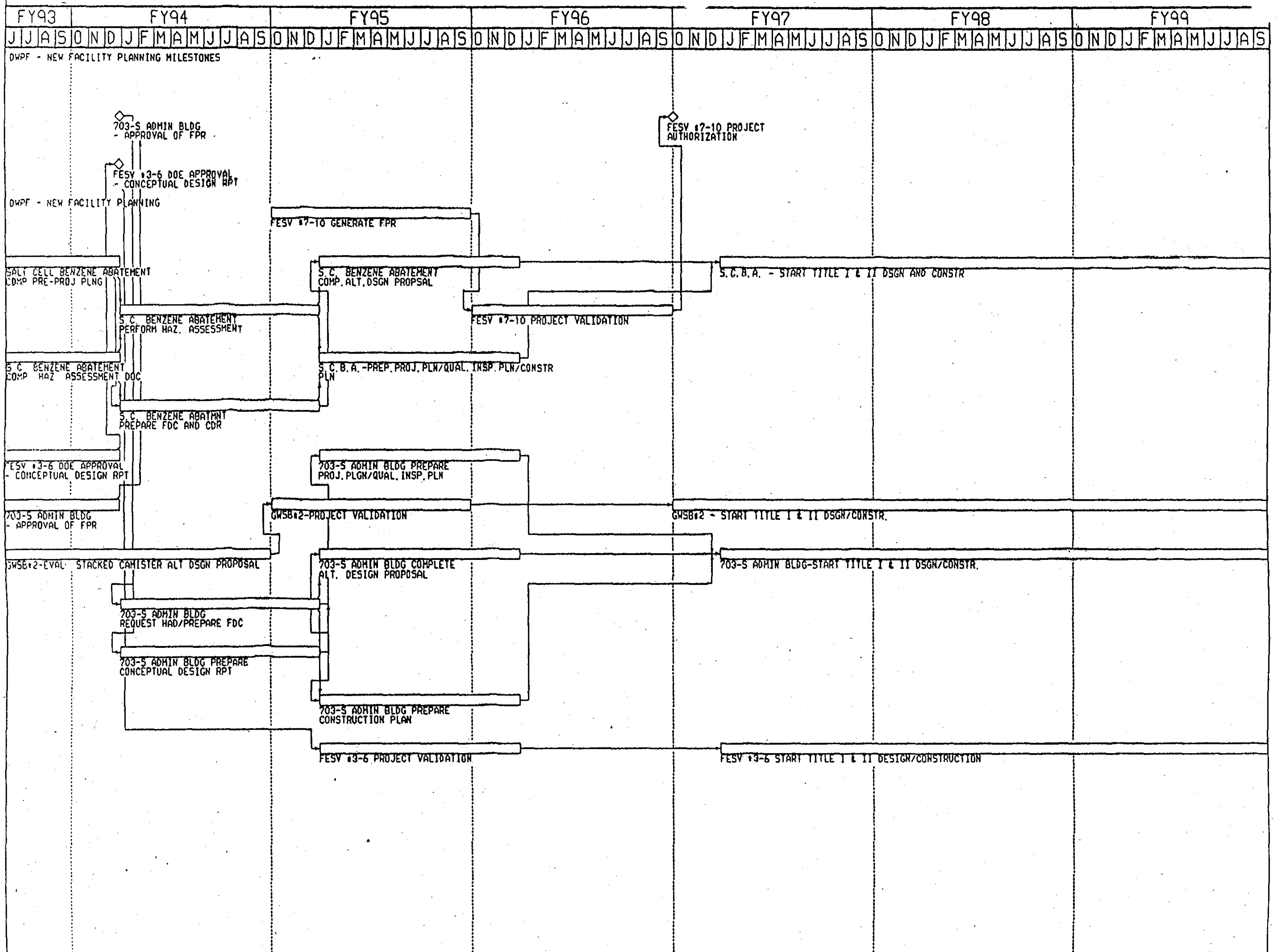
WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

Date	Revision	Checked	Approved



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Critical Activity
Progress Bar
Milestone/Flag Activity

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
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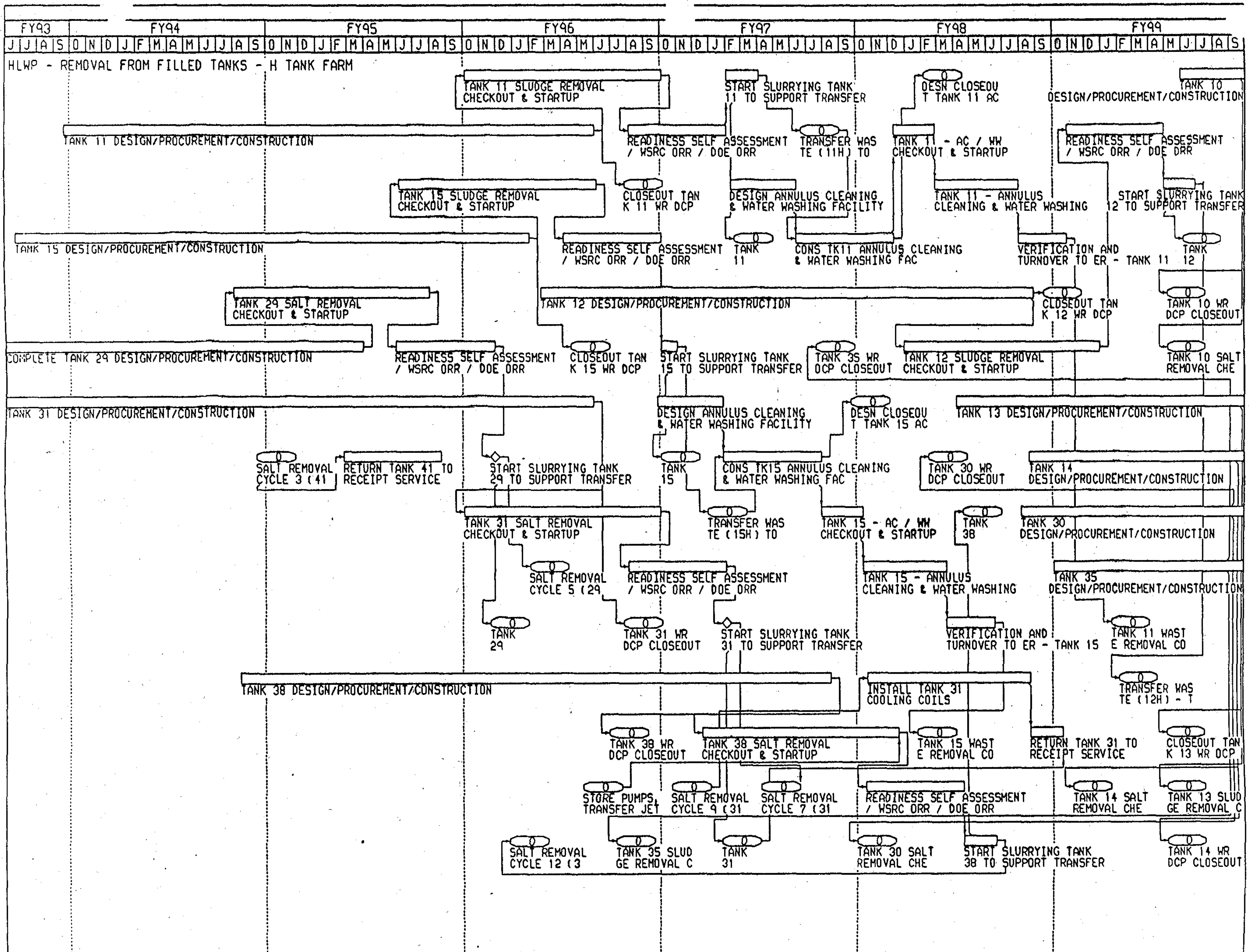

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Project Start	1OCT90
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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity
Connecting Activity on Sheet #

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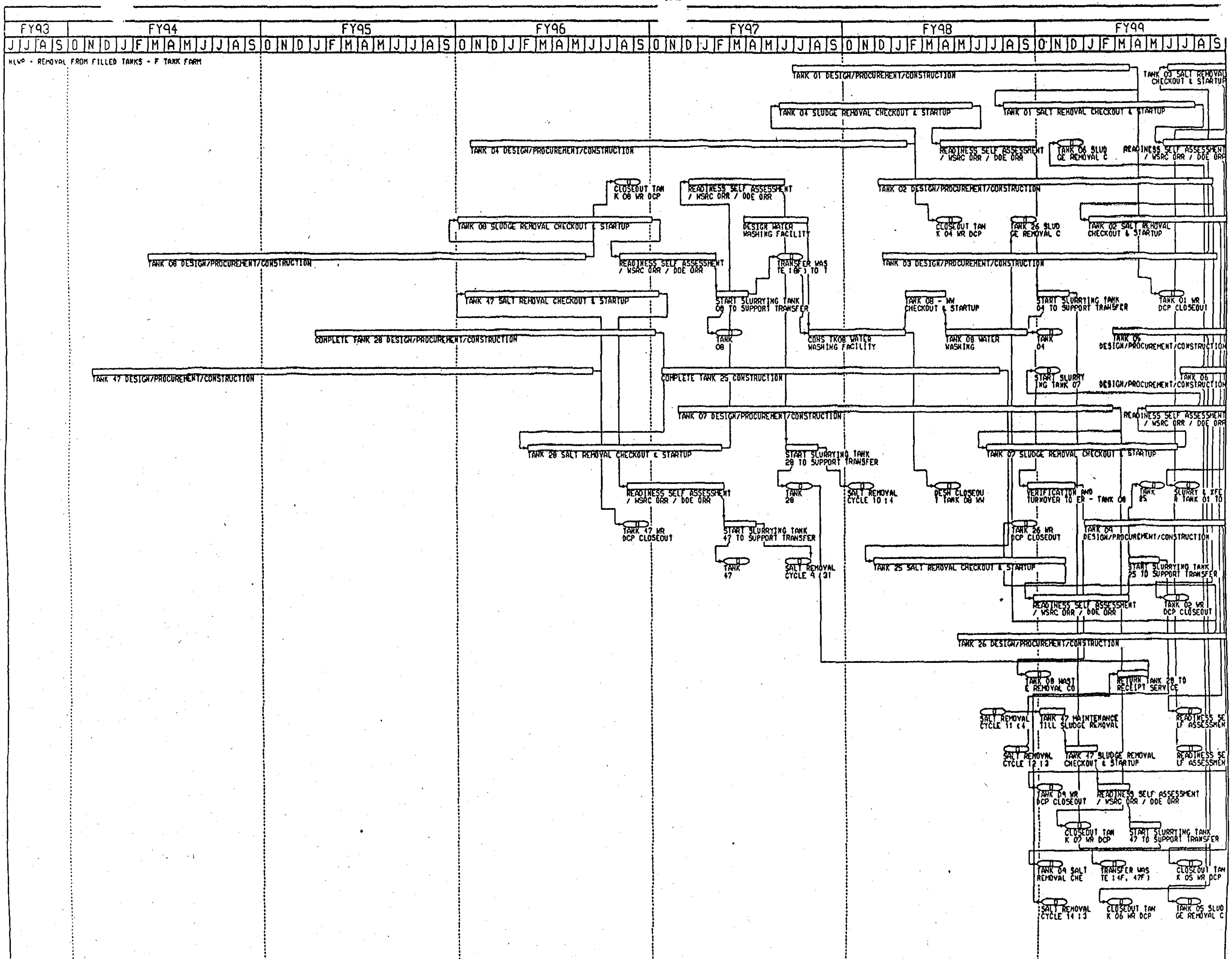
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

Date	Revision	Checked	Approved



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Critical Activity
Progress Bar
Milestone/Flag Activity
Connecting Activity on Sheet #

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
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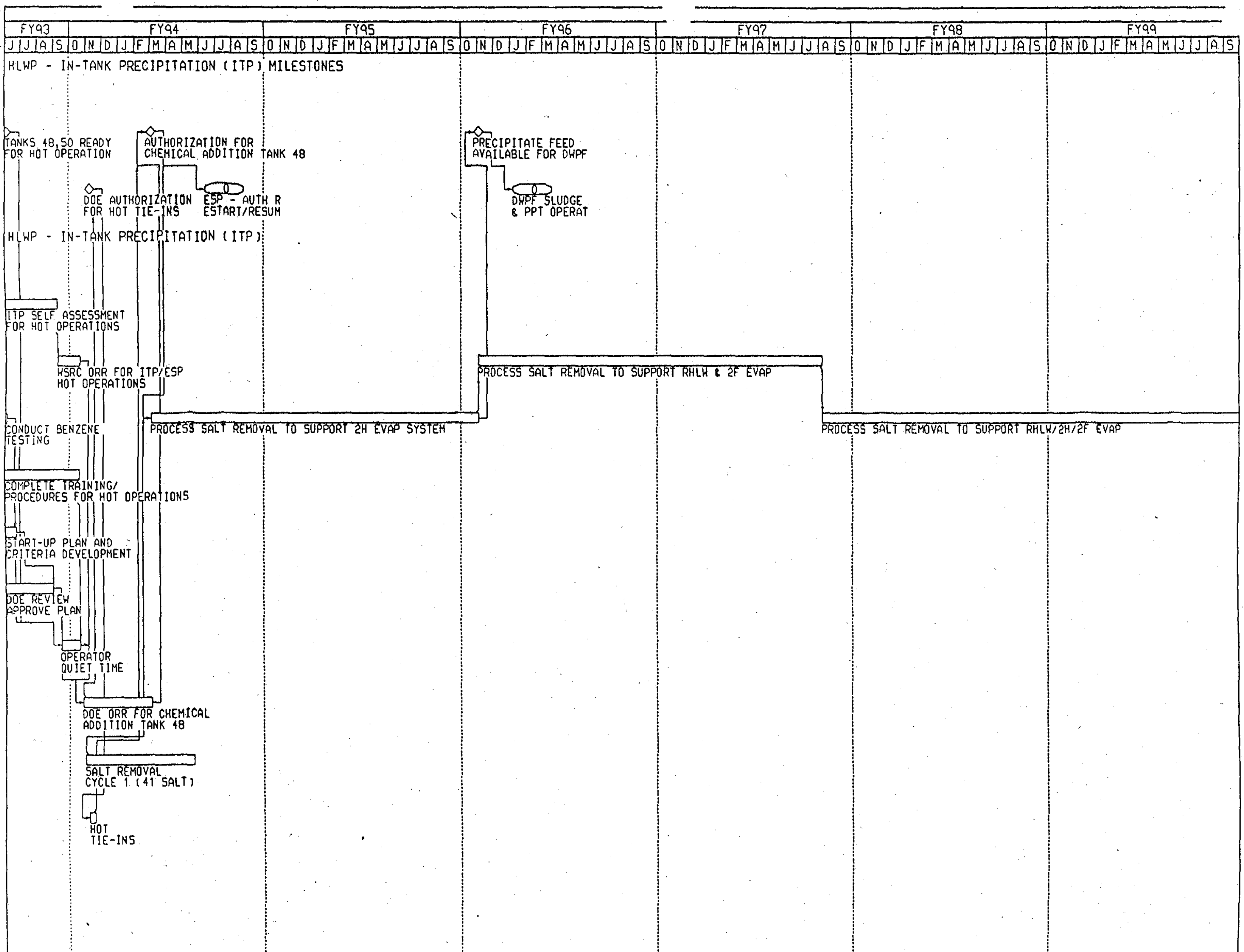

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity
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Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

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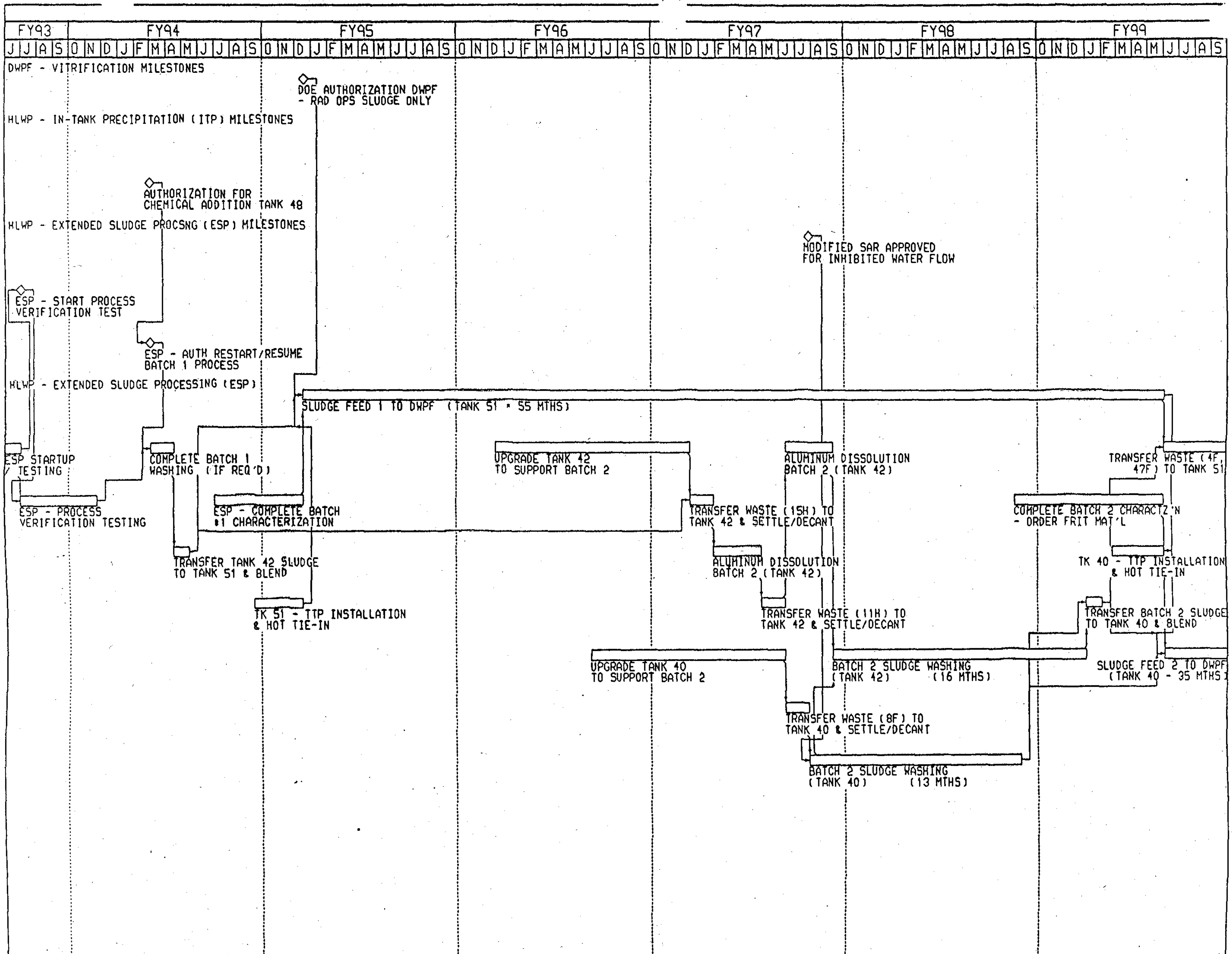

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

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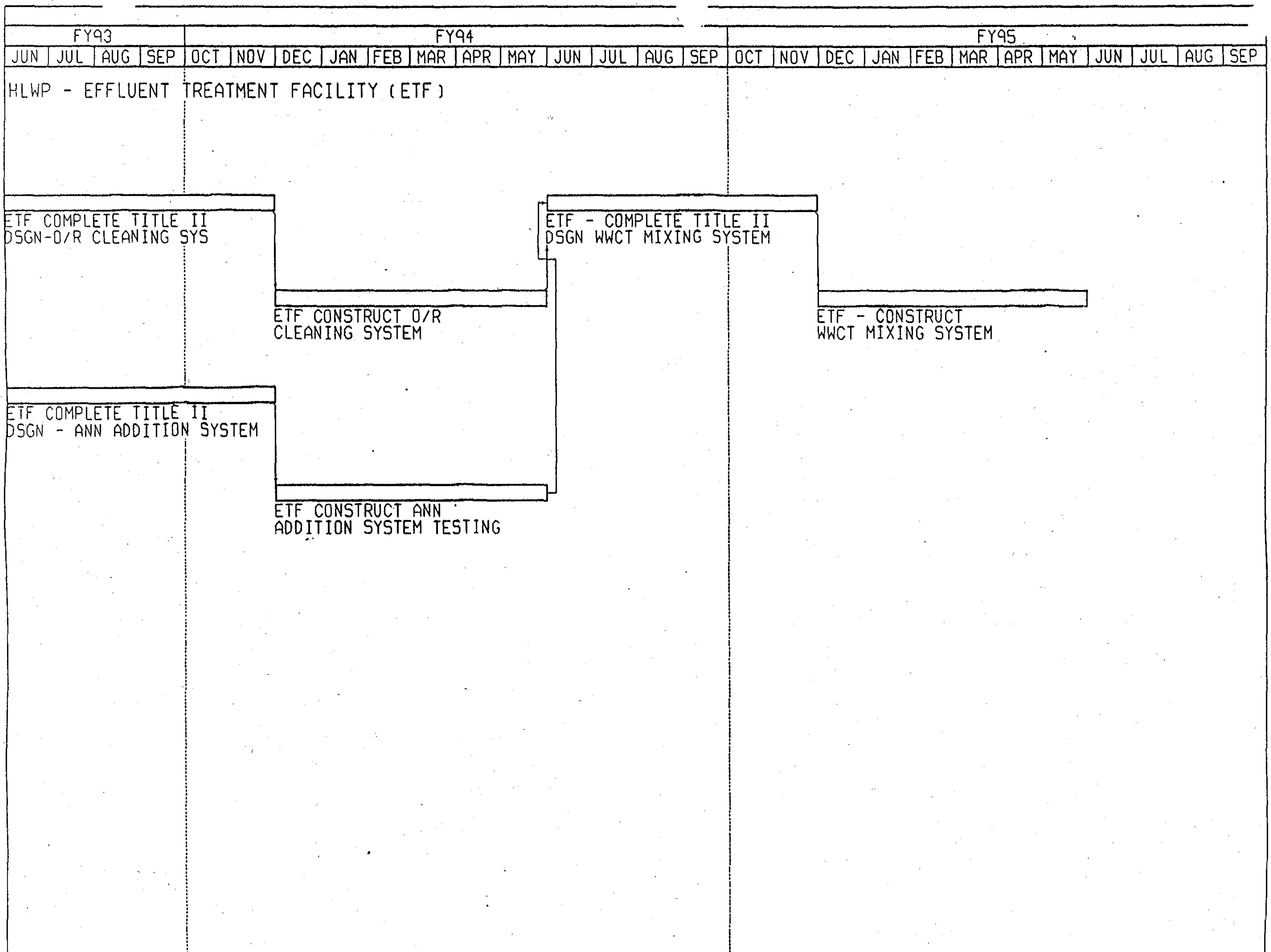
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

Date	Revision	Checked	Approved



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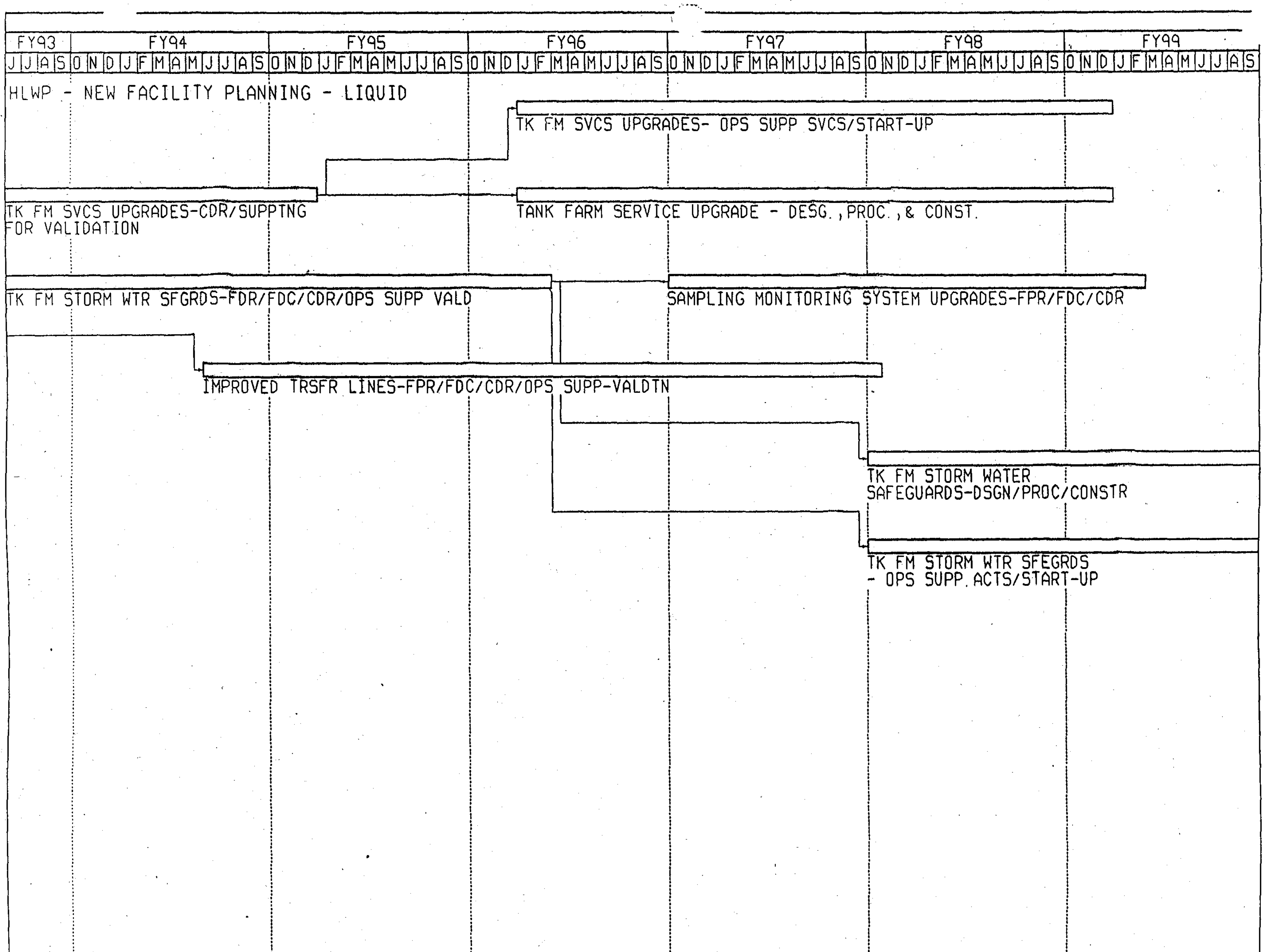

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
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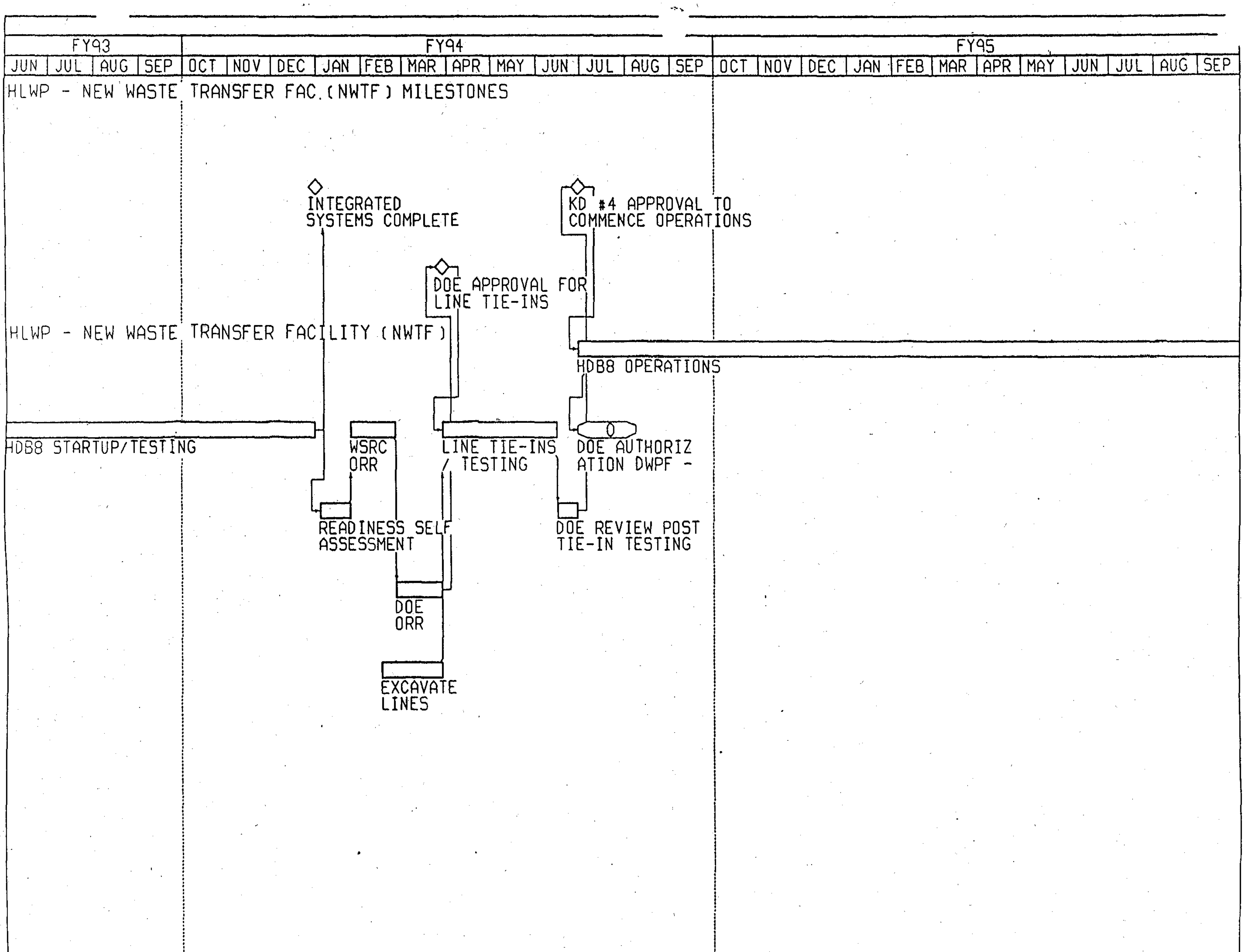

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity
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Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

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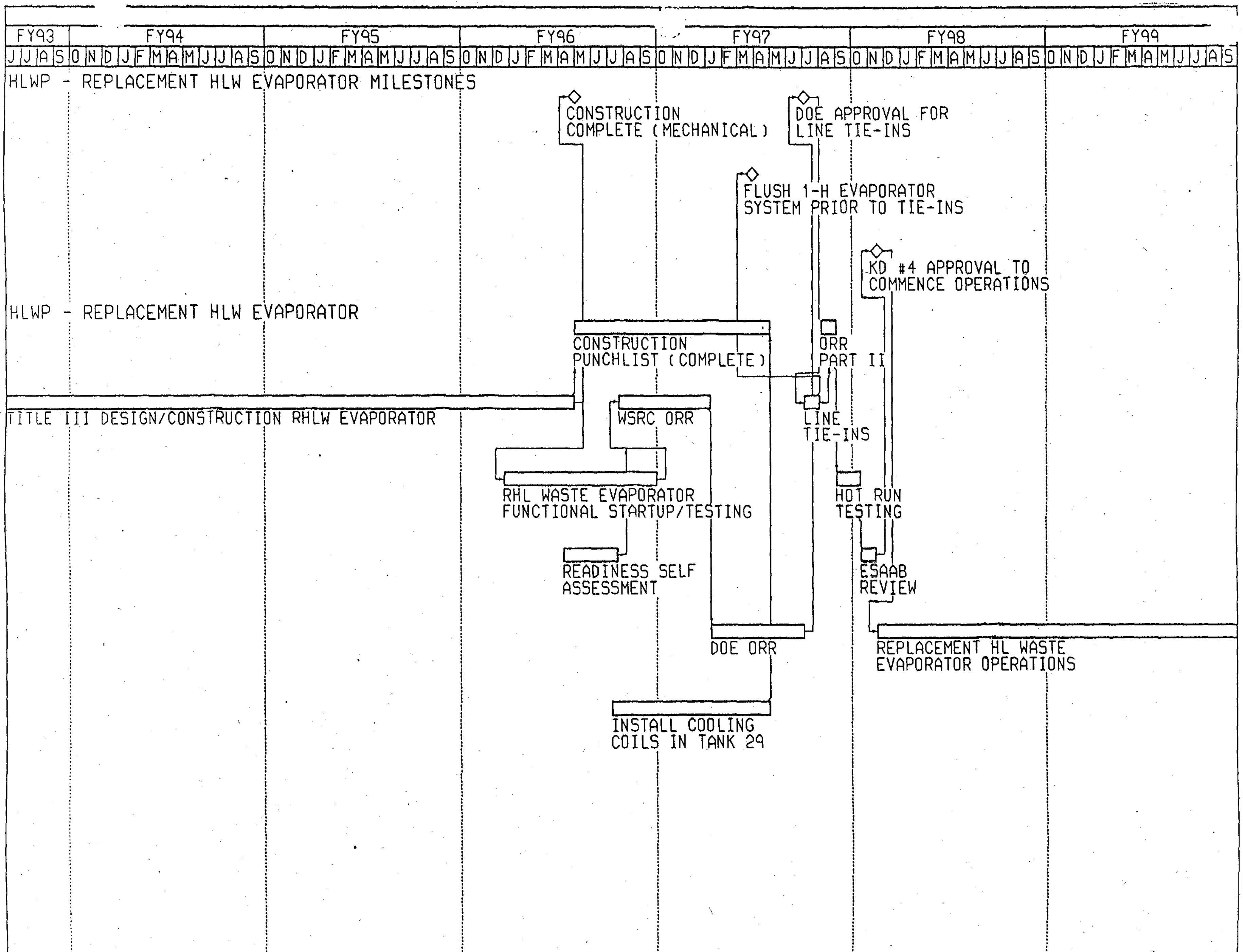

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WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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Sheet 1 of 1

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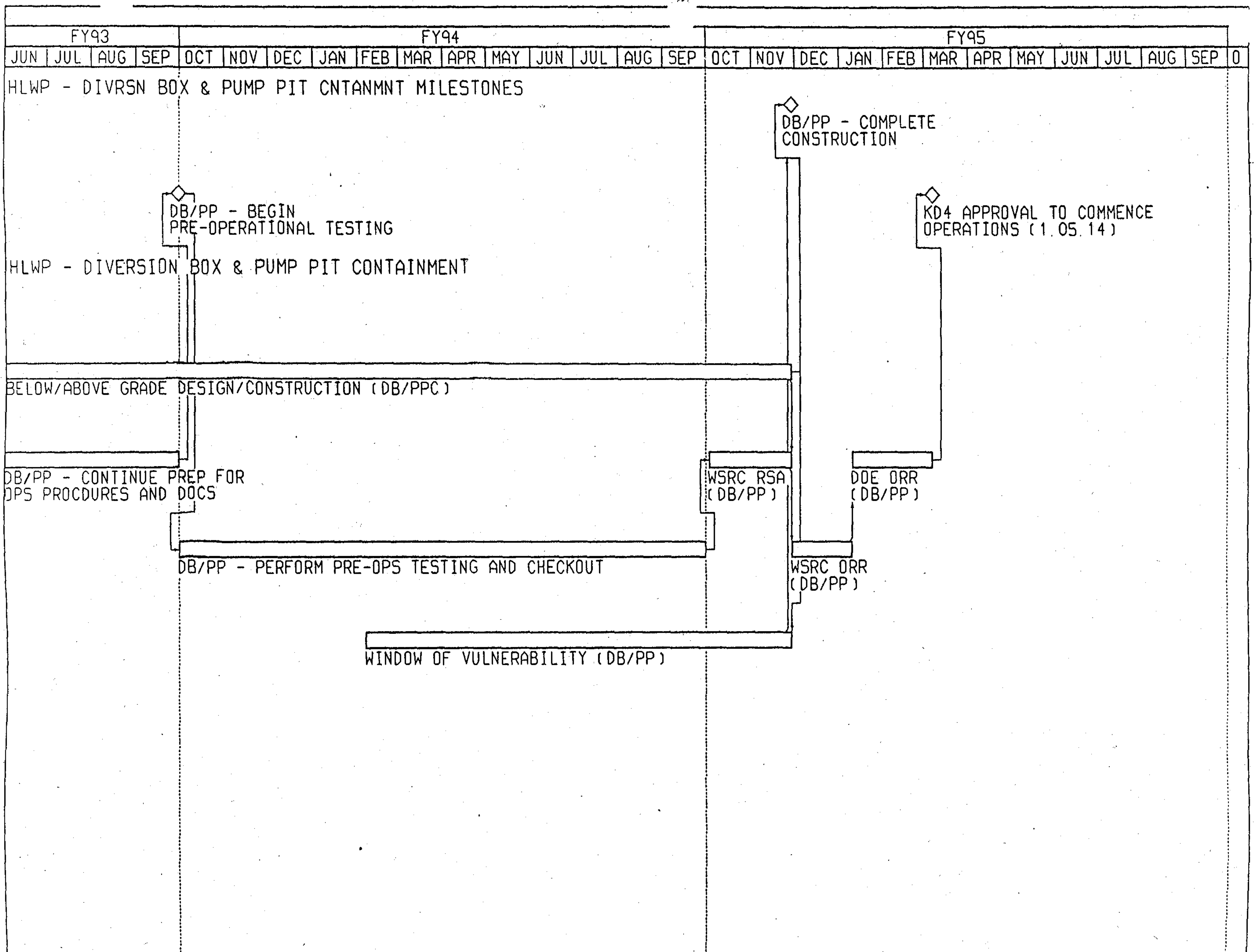

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Critical Activity
Progress Bar
Milestone/Flag Activity

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WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

Date	Revision	Checked	Approved

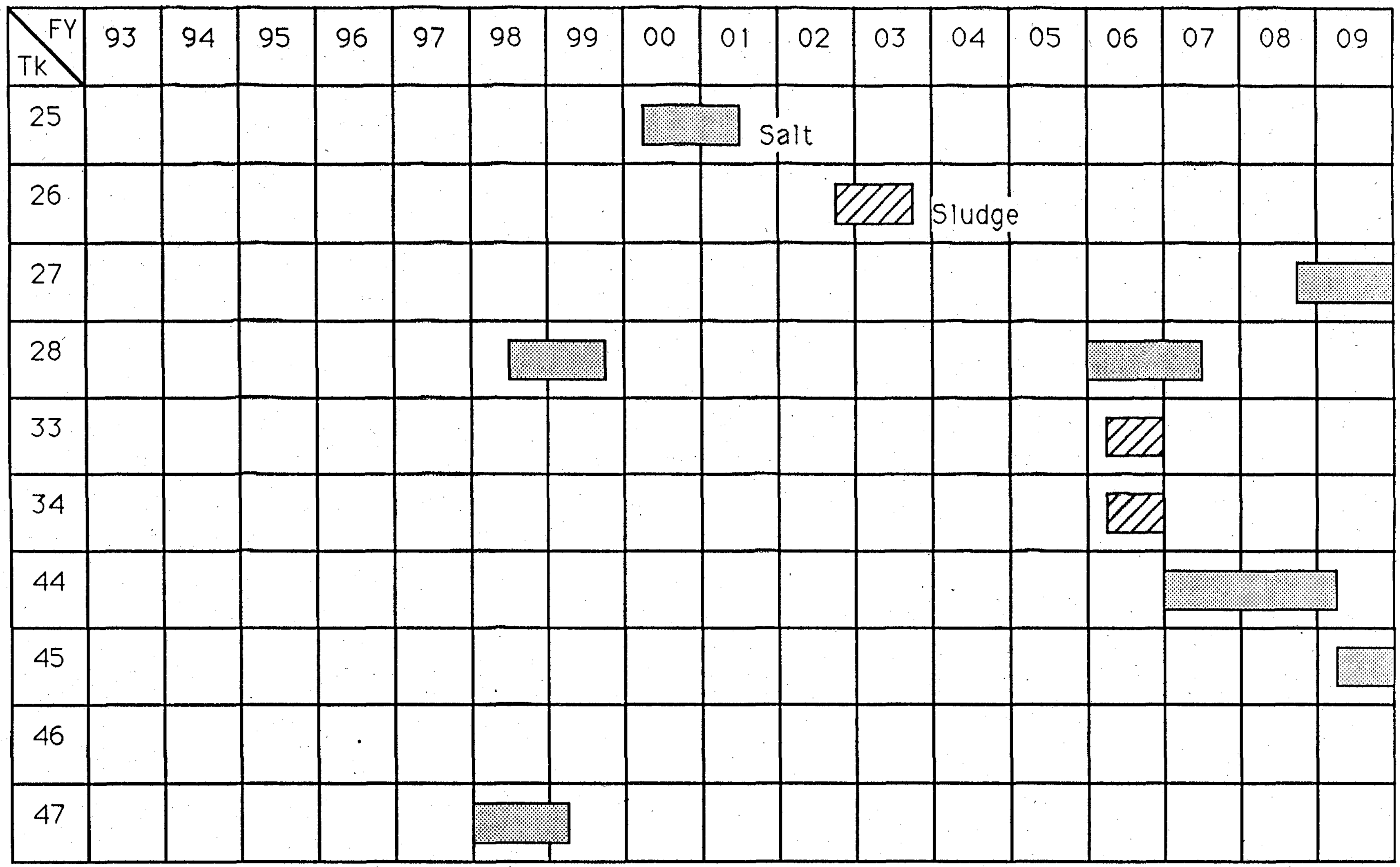
Appendix G - Type III Tanks Waste Removal Schedule

Appendix G shows the current waste removal plan for Type III Tanks. Waste removal from these tanks is required to maintain adequate operating space for the evaporator systems, surge capacity for large transfers of ESP washwater and DWPF recycle and continuity of feed to DWPF.

There are two charts: one for the F-Area salt and sludge tanks and one for the H-Area tanks.

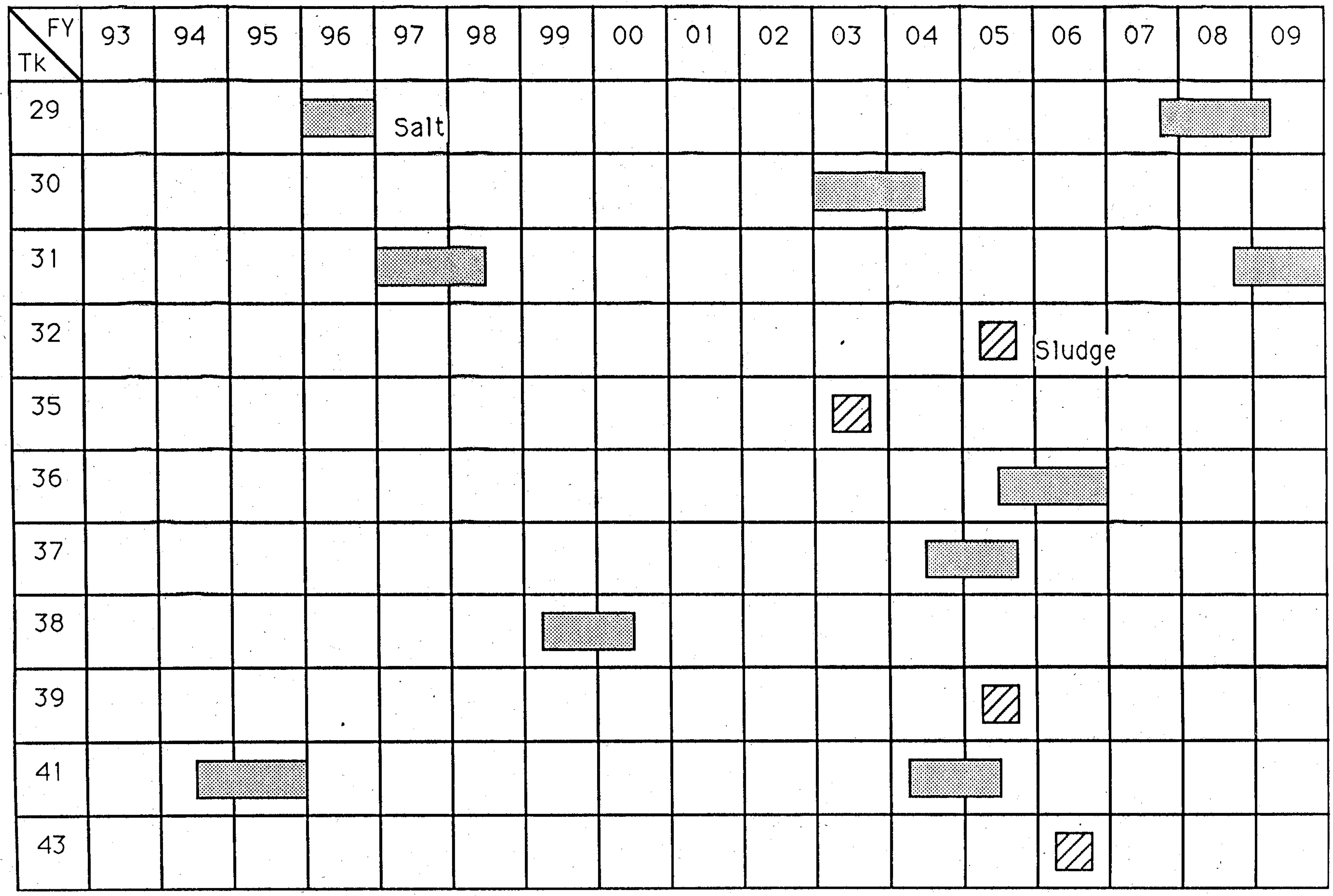
Appendix G - Waste Removal from Type III Tanks

F-Area Type III Tanks



Appendix G - Waste Removal from Type III Tanks

H-Area Type III Tanks



Appendix H - Contingency Analysis

The following attachments provide a brief description of the open technical issues with significant potential to impact the HLW Plan Schedule. In addition to the issue description is a logic tie to the HLW Plan Integrated Schedule and the projected date at which time the issue must be successfully resolved.

H.1 Programmatic Issues

H.2 Technology Issues

Appendix H.1 - Programmatic Uncertainties

Issue	Assumption	Contingency/Action
• Integrated HLW System Schedule has no schedule contingency for unanticipated processing problems	• The schedule is success driven and problems will be dispositioned in a way so as not delay the schedule.	• Review each facility and quantitatively assign contingency based upon a recognized method. • Jointly agree to accept schedule risk where there is no contingency. • Use contingency in a consistent manner.
• Qualified personnel have historically not been available when needed	• Filling vacancies with qualified personnel will be accomplished in a much more timely fashion than in previous years.	• Fill vacancies prior to the end of FY93 so that the headcount is right where it needs to be at the start of FY94. • Qualified personnel should be available from all over the country due to cutbacks in DOE, DOE, etc.
• Requirement to issue waste removal schedule 90 days after approval of FFA in spite of funding & processing uncertainties	• The schedule set forth in this Plan can be used to build a schedule for the Regulator and he will accept the schedule for the current budget year.	* Negotiate with Regulator a strategy where firm commitments are made for the budget year and forecasts thereafter. • Negotiate a schedule where there is increasing contingency each year after the current budget year. • Provide a forum for public participation.
• Requirement to issue DWPF waste processing schedule to the Regulator 90 days after radioactive startup in spite of funding & processing uncertainties	• The Regulator will accept the SRS schedule and plan for one year commitments.	* Negotiate with Regulator a strategy where firm commitments are made for the budget year and forecasts thereafter. • Negotiate a schedule where there is increasing contingency each year after the current budget year. • Provide a forum for public participation.
• Plan for relocation of Tank 41 controls and return to salt service not complete	• A plan will be implemented prior to feeding the second tank to ITP	• Continue existing engineering study, determine funding source, implement. • Track progress in HLW System POW. • Extend life of Tank 38 by direct feeding concentrated supernate to ITP from tanks 38, 41 and 43. • Form salt in Tank 40.
• There is no plan for receiving RBOF waste after Tank 23 has been removed from service	• RBOF will cease operations prior to waste removal from Tank 23.	• Review Separations plans for RBOF. • Investigate routing RBOF waste directly to a Type III tank. • Investigate direct feeding of RBOF to a CRC as was done for several years.

• Waste Removal includes only water washing, some tank contents will not be removed, i.e. zeolite, sand, etc.	• Current plans and capabilities for water washing tank interiors and annuli will be acceptable prior to transition to EM-60	• Continue to develop D&D plans with EM-60. • Do not remove washing equipment in case it is needed later.
• The Site may not be able to to handle the increased analytical requirements resulting from startup of ITP, ESP, DWPF, Late Wash, etc.	• Shortfalls, if any, can be identified and corrected without delaying key schedules.	• Complete Site studies regarding need for new laboratories, consolidating existing labs, restart of 772-F lab, etc., see WSRC-RP-92-9210. • Continue corrective actions as necessary.
•A Reduction in Force could strip trained supervisors, operators and mechanics from key facilities thus delaying startups or planned operations	•A RIF will occur.	•Recognize that a RIF will occur. •Determine how many of each type of personnel needs to be in the "pipeline" to ensure that there will be enough people to fill in for those being bumped. •Fund and fill the "pipeline" as part of the ConOps initiative.
• EM funding will be severely cut below what this Plan is based upon which may not be enough to safely support DWPF and Canyon missions..	• There will be enough funding to safely store existing inventories and fund base operations.	• The Canyon mission could be stopped or delayed. • DWPF startup could be delayed. • Washing of sludge batch#2 could be delayed. • SRS could request the Regulator to allow the use of Tanks 2-8 to store waste.
• The ITP startup date and processing rates are uncertain.	• ITP will start up on 3/5/94 and process Tank 41 salt in 18 months.	• DWPF startup could be delayed to allow ITP/Tank 41 time to "catch up", or DWPF startup could be delayed to allow a sludge and precipitate startup as soon as Late Wash is ready.
• The schedule for ESP completion of batch#1 washing is uncertain.	• The PVT will start 7/1/93 and washing will be finished 12/31/93.	• Washing could be resumed after the ITP DOE ORR is complete 3/5/94. • There is about 10 months of float for washing.
• The DWPF startup schedule is highly variable. It is difficult to identify the exact startup date and processing rate.	• DWPF will start up 11/1/94 and operate at about 26% attainment to match the available supply of sludge.	• Startup delays beyond 11/94 positively effect the rest of the HLW System because the Tank Farm is "behind" schedule in some areas in support of DWPF startup.
• The CIF is needed in the 1999 timeframe to dispose of DWPF benzene. There is an 18 month moratorium on new incinerators. The CIF may be delayed or cancelled. Outside groups could impact the project and schedule.	• The CIF "fresh look" white paper will adequately show the need for the project. Successfully managing the project and schedule will make it less vulnerable to delays or cancellation.	• There is approximately 3 years of float between the scheduled 1/96 startup and the date when the CIF is required to support the DWPF.

• After the Canyons shut down in 1997-98, there will be no 211-F facility to evaporate miscellaneous waste if DP does not support. This combined stream to the Tank farm could be 940,000gallons/year.

• The Canyons can continue to run their evaporators until the RHLWE starts up.

• Canyon personnel have stated that they can operate their evaporator after the 1997-98 timeframe if needed. This needs to be formally agreed upon by effected parties.

• Improvements to Conduct of Operations are needed accross WM&ER, this will result in more manpower which will require more funding or deeper cuts to other programs.

•The ConOps initiative as proposed to DOE SR by WSRC will be full funded in FY94-95.

• Continue the DOE SR budget scrub to identify sources of funding from the indirect budget allotment.
• Meet goals for hard and soft dollar savings.

Appendix H.2 - Technical Uncertainties

Issue	Assumption	Contingency
• Disposition of DWPF Hg recycle streams not determined	• Mercury recycle stream can be treated at DWPF and trucked to the F/H ETF.	• Continue ongoing studies to evaluate. • Maintain NWTF schedule in support of pumping Hg Recycle to Tank Farm if needed. • Maintain trucking Hg Recycle to NWTF or Tank 47 as an option.
• Tank 41 criticality concerns may delay salt removal from Tank 41 and thus impact the 2H Evaporator operation.	• Rigorous sampling of Tank 41 will enable salt removal to proceed as planned.	• Continue salt sampling program to get samples from deeper in the tank. • Feed concentrated supernate to ITP as needed to provide evaporator salt space and ITP feed. • If all else fails, investigate using Tank 40 for salt receipt.
• ITP deflagration Probablistic Risk Assessment (PRA) not finalized and agreed upon by outside agencies.	• The PRA will be completed on time and accepted by the Technical Review Group (TRG).	• Continue studies to show that the deflagration is determined to be incredible. • Complete documentation and peer review. • • Continue to define the consequence just in case it is needed.
• HLW tank temperature rise due to slurry pump operation not known and could reduce planned production rates	• Temperature can be controlled in a way that does not significantly reduce production.	• Start ESP PVT 7/1/93, generate data, evaluate and make recommendations. • Continue Tank Farm Services Upgrades project planning and support as needed.
• ITP ability to withstand seismic event not known, geotechnical studies may identify corrective actions that would delay startup.	• Ongoing seismic/geotechnical studies will not identify any unplanned work that will delay ITP startup.	• Complete the seismic/geotechnical study currently in progress, evaluate data, recommend fixes if any, implement on fast track schedule.
• Final feed specs for DWPF sludge only feed and future sludge and precipitate feed not finalized, some waste may not be able to be processed.	• There are adequate planning tools to enable all waste to be planned for and processed in a manner defendable to outside agencies.	• Complete the Integrated Flowsheet task team study commissioned 6/93 by 7/31/93, implement the recommendations, plan all batches until the end of the sludge removal campaign.
• Tank 29 cooling coil removal plan not known (coils not expected to retract to facilitate easy removal).	• The coils will be removed in a safe and timely fashion to support the return of Tank 29 to salt receipt service.	• Sections of cooling coils have been remotely cut and removed from the tanks in the past.
• ITP failed filter box design not final, could be very expensive, may delay startup.	• The filter box will be designed, built, and tested prior to 3/94 startup.	• Delay ITP startup. • Investigate reusable shipping casks, and use of FESV at DWPF to dispose of filters.

• ITP benzene strippers will not operate at planned rates due to high pressure.	• The pressure can be controllled by some means without delaying startup.	• Install TBP addition equipment. • Operate at reduced flowrates. • Increase allowable column pressure.
• There is no Integrated Flowsheet for all HLW System processes, startup of individual processes may be delayed or not authorized.	• Ongoing studies will gernerate an Integrated Flowsheet agreed upon by WSRC and DOE that will withstand onsite and outside scrutiny.	• Delay startups until the Integrated Flowsheet is finished. • Do a better job of coordinating existing efforts to yeild an adequate flowsheet capability.
• There are some Canyon waste streams for which there is no disposal plan. Future disposal of these streams to the Tank Farm could impact other downstream processes.	• The risk is small • All streams will be dispositioned.	• Each stream will be handled separately using a USQD and Technical Evaluation. • Problematic radionuclides and chemicals, if any, could be diluted with other waste.
• There are no current production plans for ITP and ESP. The processing rates have been effected by temperature concerns, criticality and other process changes. Schedules and planning for other facilities could be effected.	• Adequate coontingency has been applied to the now obsolete ITP/ESP flowsheets to accomodate process changes.	• Facility flowsheets need to be rebaselined and then production plans created. • There is several months of float in the ESP batch#1 washing schedule. • There is 6 months float in the Tank 41 salt removal schedule.
• The ITP DCS reliability is suspect, ITP process controlled by TI system, Tanks by suspect Classics system, may not be reliable enough to support 3/94 startup.	• The DCS can be made reliable and so demonstrated to outside agencies.	• Delay ITP startup. • Accelerate Phase II Classics replacement. • Develop technical basis to quantitatively show that the failure mode is failsafe. • Evaluate combinations of the above to reduce schedule delay while enhancing safety.

Appendix I - DOE Milestones

Defense Waste

21-AA DWPF Program Management

•none

22-AA DWPF Vitrification

•Commence Cold Chemical Runs	3/8/93A	
•Submit DWPF SAR, Rev2, to DOE-HQ	7/29/93	
•Commence Waste Qual Runs	9/20/93	
•Complete preps for hydrogen & ammonia scrubber mods	11/24/93	
•Ready for mercury runs	3/8/94	
•Complete Late Wash Bypass	6/10/94	
•Commence Sludge-only Rad Ops	11/1/94	
•Commence Late Wash Rad Ops	10/30/96	
•Begin Processing Sludge Batch#2	10/31/98	

23-AA Z-Area Saltstone

•Saltstone Continuous Operations	3/1/94	
•Complete Vault#4 Permanent Roof	9/1/94	[1]
•Saltstone Vault#2	6/1/95	[2]
•Complete Saltstone Vault#3	11/1/97	[2]

24-GP DWPF General Plant Projects

•none

25-LI DWPF New facility Planning

•none

26-LI DWPF Line Item 81-T-105

•none

Notes:
[1] This project will cancelled to fund the ConOps initiative.
[2] The timing of these vaults will be delayed by 8 months to fund the ConOps initiative.

High Level Waste

31-AA	HLW Program Management		
	•Submit RCRA Quarterly Hazardous Waste Report for HLW	9/30/94	[1]
	•Submit RCRA Quarterly Hazardous Waste Report for HLW	9/30/95	[1]
	•Submit Annual SARA III Chemical Release Report for HLW	7/1/94	
	•Submit Annual SARA III Chemical Release Report for HLW	7/1/95	
	•Annual NESHAPS Report	6/30/94	
	•Annual NESHAPS Report	6/30/95	
	•Annual Emission Report	3/31/94	
	•Annual Emission Report	3/31/95	
	•Schedule for Removing Waste Tanks/System Components	TBD	
	•Annual Report on Status of Tanks being Removed from Service	TBD	
32-AA	H-Tank Farm		
	•SRTC Complete (for WSRC Review) SAR Chapters 3,5,7,8,10,12-15	2/28/94	
	•Reclaim 1,000,000 gallons of tank volume using 1H evaporator	9/30/94	
	•Reclaim 250,000 gallons of tank volume using 2H evaporator	9/30/94	
	•Reclaim 1,000,00 gallons of tank volume using 1H evaporator	9/30/95	
	•Reclaim 250,000 gallons of tank volume using 2H evaporator	9/30/95	
33-AA	F-Tank Farm		
	•Reclaim tank volume of 720,000 gal/yr	9/30/94	
	•Reclaim tank volume of 720,000 gal/yr	9/30/95	
	•SRTC complete (ready for WSRC review) SAR chapters 3, 5-8, 10, 12-15	2/28/94	
34-AA	ITP/ESP		
	•Resume Extended Sludge Processing (Batch 1)	3/5/94	[2]
	•Start up ITP in radioactive operations	3/5/94	
	•Begin to remove waste from Tank 41	TBD	

39-LI	New Waste Transfer Facility		
	•Issue Start-up Plan to DOE for Approval	4/30/93	
	•Submit WSRC Operational Readiness Review to DOE-SR for Review	5/31/93	
	•Commence Hot Operation	10/31/93	[3]
	•Commence Mercury Runs with DWPF	7/1/94	[4]
310-LI	Replacement HLW Evaporator		
	•Complete Title II Design Activities	12/31/93	
	•Complete Construction Activities	12/31/95	
	•Complete project closeout	10/31/97	
311-LI	Diversion Box & Pump Pit Containment		
	•Begin Pre-Operational Testing	3/1/95	[5]
	•Construction Complete	3/30/95	
	•Project Completion	6/30/95	
314-LI	HLW Removal from Filled Waste Tanks		
	•Tank 25F, Waste Removal Facility-Mechanical Completion	9/30/98	
	•Tank 29H, Waste Removal Facility-Mechanical Completion	12/31/94	
	•Tank 28F, Waste Removal Facility-Mechanical Completion	831/96	
	•Tank 25F, Waste Removal Facilities-Ready to Operate	11/30/98	
	•Tank 28F, Waste Removal Facilities-Ready to Operate	3/31/97	
	•Tank 15H, Waste Removal Facilities-Mechanical Completion	8/15/95	[6]
	•Tank 11H, Waste Removal Facilities-Mechanical Completion	11/18/95	[6]
	•Tank 29H, Waste Removal Facilities-Ready to Operate	6/30/95	
	•Tank 8F, Waste Removal Facilities-Mechanical Completion	1/31/96	[6]
	•Tank 15H, Waste Removal Facilities-Ready to Operate	2/28/96	[6]
	•Tank 11H, Waste Removal Facilities-Ready to Operate	5/31/96	[6]

Notes:
[1] A total of four separate reports are due, one per quarter. The last day of the year is used to consolidate what is really four separate milestones.
[2] The ESP Process Verification Test is scheduled to start 7/1/93. The authorization to restart ESP is part of the ITP DOE ORR/Authorization process.
[3] The current schedule shows rad ops 5/24/94 which is the date used throughout this Plan.
[4] At this time, the DWPF mercury run recycle is planned to be pumped to the Tank Farm. There is an agressive program to enable the ETF to handle this stream. Trucking this stream to the Tank Farm (Tank 47) will be a contingency.
[5] There is no funding in the Five Year Plan to support these OPC activities.
[6] These dates will be delayed in order to fund the Conops initiative. This has the effect of having batch#2 sludge ready to feed 6/1/99 instead of 10/1/98.

Solid Waste

45-LI	Consolidated Incineration Facility		
	•Complete construction	3/29/95	
	•Physical trial burn	10/26/95	
	•Commence operation of the CIF (KD4)	2/2/96	[1]
47-LI	M-Area Waste Disposal		
	•Start Title II design	11/1/01	
	•Start construction	1/1/03	
	•Commence operations	10/1/04	
48-LI	Hazardous Waste/Mixed Waste Disposal Facility		
	•Perform HW/MW Treatment Bldg Title II design	3/31/00	
	•Construction complete for disposal vaults	6/30/01	
	•Construction complete for Treatment Bldg	12/31/04	
	•Commence vault operations	12/31/01	
	•Commence Treatment Bldg operations	6/30/06	
	•Submit FFCA Schedule to EPA for Treatment Bldg	11/30/93	

Notes:
[1] $2.4 M of OPC will be diverted to fund the Conops initiative. This will delay the rad ops date by an assumed 4 months.

Appendix J - Waste Forecast

The following key Waste Forecast data is presented in this appendix in tabular or graphic form:

- Salt Removal Sequncing
- Sludge Removal/Batch Sequencing
- Tank Farm Material Balance
- Tank 49 Precipitate Material Balance

SALT REMOVAL SCHEDULE - (HLW System Plan Rev 1)

06/16/93

CYCLE	TRANSFER DATE	TYPE I & II TANK 1	TANK 2	TANK 3	TANK 9	TANK 10	TANK 14	2 F EVAP SYSTEM TANK 25	TANK 27	TANK 28	TANK 44	TANK 45	TANK 46	TANK 47	1 H / RHLW EVAP SYSTEM TANK 29	TANK 30	TANK 31	TANK 32	TANK 36	TANK 37	2H EVAP SYSTEM TANK 38	TANK 41	TANK 43
	Prev. Fill							12/86						8/87	1/84		1/84		12/88	5/89			
	ITP-3/5/94								XXXX		XXXX	XXXX				XXXX					XXXX		
1	11/1/93												XXXX			XXXX					XXXX	500	
2	8/19/94												XXXX			XXXX					Supernate	500	Supernate
3	2/8/95												XXXX		Supernate	XXXX		Supernate			300	231	300
4	6/25/95												XXXX		220	XXXX		1030			XXXX	RTS	
5	11/3/95	Tk 14 - batch 4 - Aug/Sept '02											XXXX		500	XXXX					XXXX	XXXX	
6	4/24/96								Supernate				XXXX		500	XXXX	Supernate/Salt					XXXX	
7	9/13/96	Tk 9 & 10 - batch 5 - Nov/July '05							389				XXXX		COIL	XXXX	244/167					XXXX	
8	3/6/97												XXXX		COIL	XXXX	500					XXXX	
9	8/6/97												XXXX	167	~~XXXX~~	XXXX	333					XXXX	
10	2/10/98	Tk 7F batch 3 sludge removal - Jun/July '00								167			XXXX	333	XXXX		COIL					XXXX	
11	7/21/98	Tk 7F batch 4 - May '02 - Apr '03								167			XXXX	326	XXXX		COIL					XXXX	
12	12/16/98	Process tks 1,2 & 3 between above 7F batch dates								333			XXXX		XXXX						167	XXXX	
13	6/18/99	Allow time for sludge to settle								XXXX			XXXX	Need	XXXX						500	XXXX	
14	11/22/99	MCC limits area to 2 tanks operating at same time						167		XXXX				Jun '99	XXXX						333	XXXX	
15	4/23/00							500		XXXX				for	XXXX						XXXX	XXXX	
16	10/27/00	167						333		XXXX				sludge	XXXX		XXXX				XXXX		
17	4/5/01	233	267							XXXX							XXXX				XXXX		
18	9/6/01		269	231						XXXX							XXXX				XXXX		
19	3/22/02			305			156			2 F Evaporator Shut Down							XXXX				XXXX		
20	8/2/02				251		Lock			for Sludge Removal						249	XXXX				XXXX		
21	12/31/02				285	213	date			from Feed Tank Mar '02							XXXX				XXXX		
22	7/23/03															500	XXXX				XXXX		
23	12/5/03															250	XXXX				XXXX	250	
24	4/22/04															COIL	XXXX			167	XXXX	333	
25	10/10/04															COIL	XXXX			250	XXXX	251	
26	4/1/05															XXXX	XXXX		167	333	XXXX	XXXX	
27	8/16/05	DATES AT TOP OF EACH COLUMN								167						XXXX			333	CNVRT		XXXX	
28	2/20/06	INDICATE DATE THAT TANK								167						XXXX			333	for		XXXX	
29	7/2/06	FILLED WITH SALT								333						XXXX			167	21H		XXXX	
30	10/16/06									333	167					XXXX			CNVRT			XXXX	
31	5/20/07	XXXX INDICATES THE CURRENT									333				167	XXXX			HHW			XXXX	
32	9/25/07	CONCENTRATE RECEIVER									167				333	XXXX			RECPT			XXXX	
33	1/30/08										167				333	XXXX			(TK35)			XXXX	
34	7/30/08	NUMBERS REPRESENT SALT							167		167				167	XXXX			CNVRT			XXXX	
35	12/4/08	REMOVED IN 1000 GALLONS							333			167			XXXX	XXXX			FOR 22H			XXXX	
36	4/10/09								333			167			XXXX							XXXX	
37	10/5/09	SHADED AREAS REPRESENT							167			333			XXXX							XXXX	
38	2/23/10	TANKS THAT ARE FULL										333	167		XXXX							XXXX	
39	7/14/10												333		XXXX		167					XXXX	
40	1/25/11												333		XXXX		167					XXXX	
	TOTALS	400	536	536	536	213	156	1000	1000	1667	1001	1000	833	826	2220	999	1167	1030	1000	750	1300	2065	300

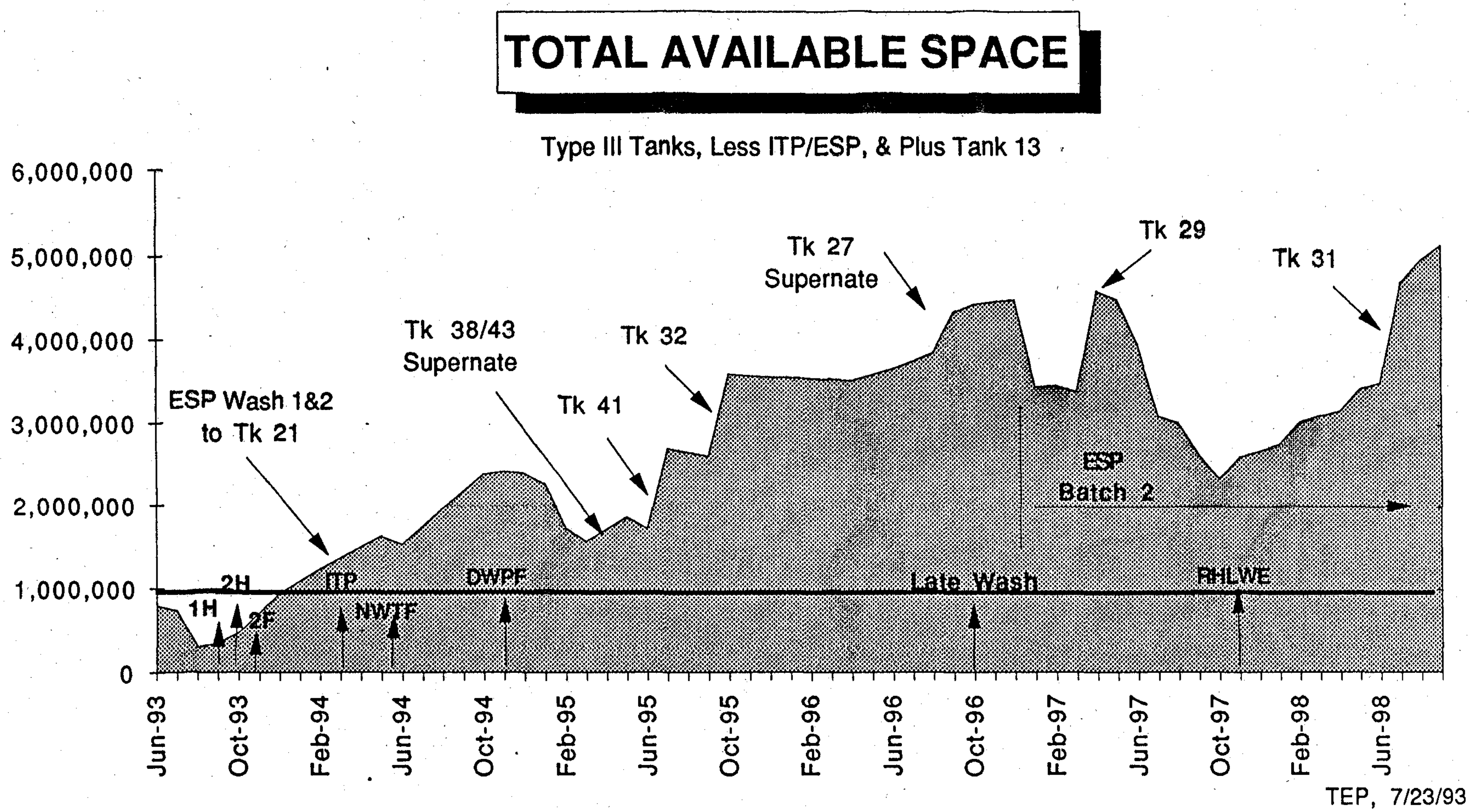
TANK 1	TANK 2	TANK 3	TANK 9	TANK 10	TANK 14	TANK 25	TANK 27	TANK 28	TANK 44	TANK 45	TANK 46	TANK 47	TANK 29	TANK 30	TANK 31	TANK 32	TANK 36	TANK 37	TANK 38	TANK 41	TANK 43
2081	2081	2081	2081	2081	2081	3291	UF	3291	3025	UF	UF	2860	3291	UF	2860		3025	3025	3025	UF	

Appendix J - Sludge Batches

Batch	Tank	Volume (kgal)	Available Volume	Notes
1	15			
	18			
	21			
	22			
		644	**494**	[1]
2	40	173	173	
	8	164	164	
	11	140	70	[2]
	15	312	156	[2]
		789	**488**	[1a]
3	7	206	206	
	12	216	108	[2]
	4	127	127	
	47	248	248	
		797	**689**	
4	13	403	302	[3]
	35	52	26	[2]
	14	28	14	[2]
	5	34	34	
	6	25	25	
	26	298	298	[4]
	7	15	15	[5]
		855	**714**	
5	32	158	79	[2]
	39	101	50	[2]
	9	4	4	[6]
	10	4	4	[6]
	33	42	42	
	34	45	45	
	43	161	161	[7]
		515	**385**	
6	17	2	2	[8]
	18	42	42	[8]
	19	20	20	[8]
	21	14	14	[8]
	22	60	60	[8]
	23	43	43	[8]
	24	4	4	[9]
		185	**185**	

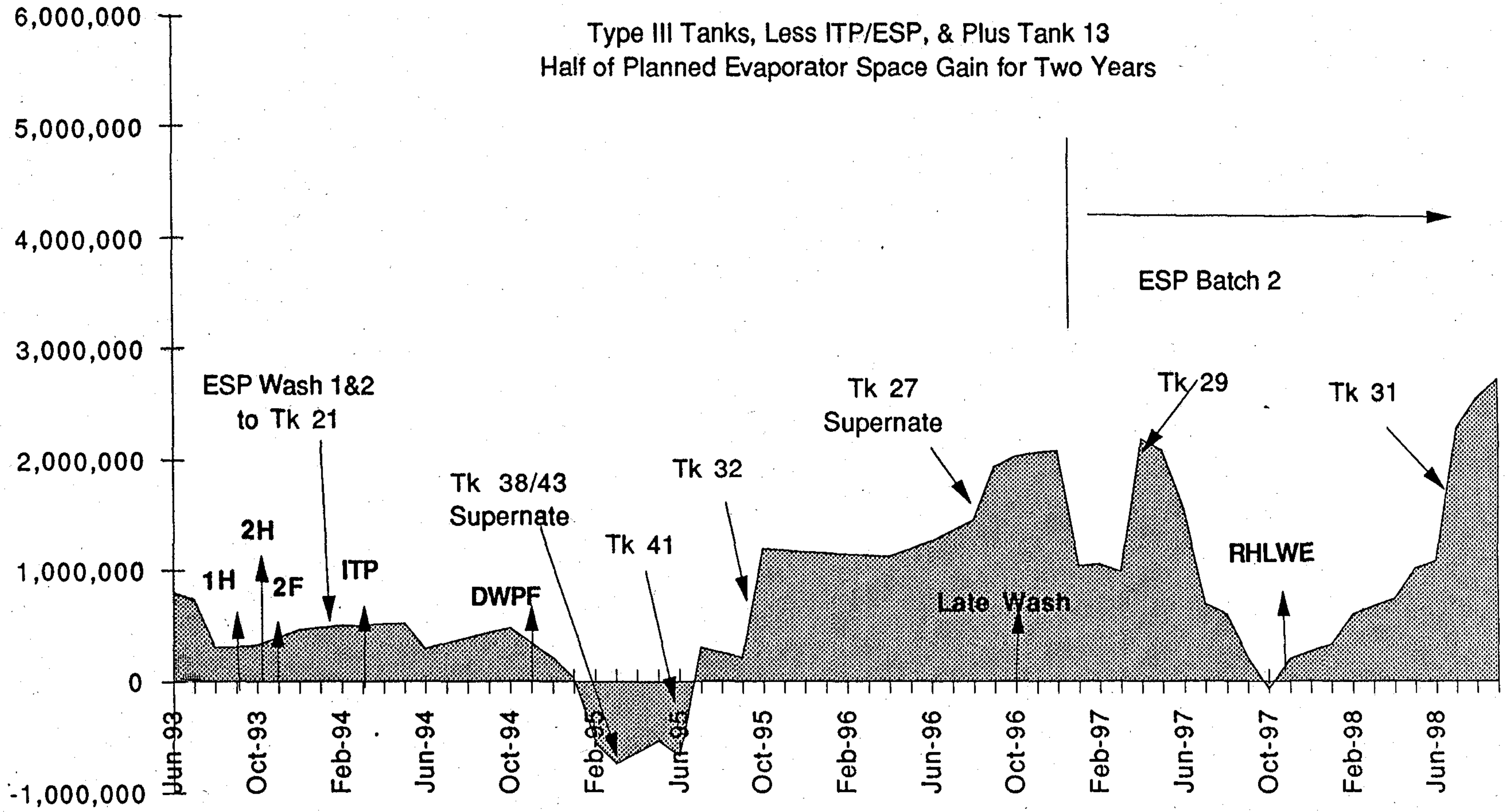
Notes:

[1] It is assumed that there will be a pump heel left in Tanks 42 and 51 of 75,000 gallons.
[1a] It is assumed that there will be a heel left in Tank 40 of 75,000 gallons.
[2] The current sludge volume in the tank is 2 X that shown, the difference is aluminum dissolution.
[3] The current sludge volume in Tank 13 is 1.33 X that shown, the delta is aluminum dissolution.
[4] The 2F evaporator will be down during sludge removal operations.
[5] This is the residual sludge left behind after other tanks have passed through Tank 7.
[6] This is residual sludge that was contained in the saltcake.
[7] The 2H evaporator will be down during sludge removal operations.
[8] This is residual sludge from the Type IV Tank waste removal program conducted in the mid-80's
[9] This material is zeolite.



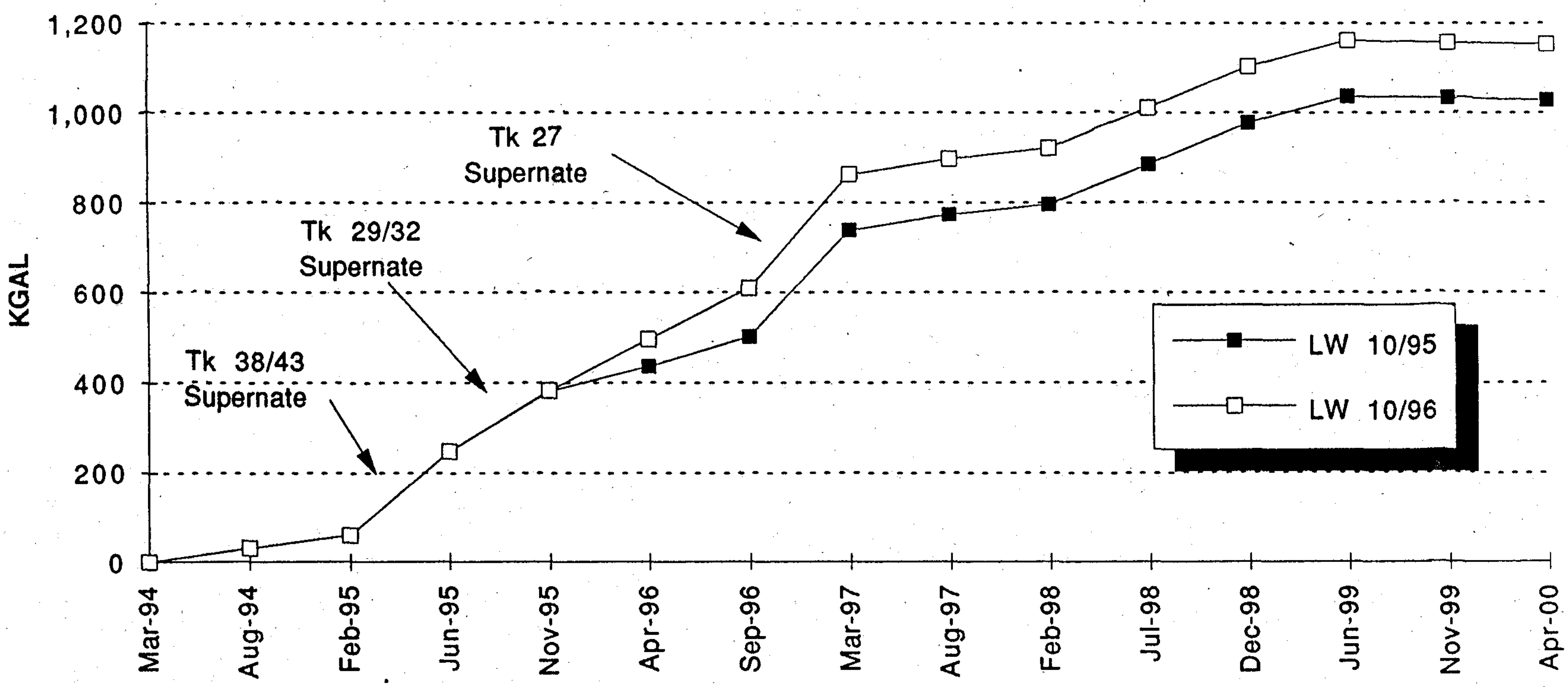
TOTAL AVAILABLE SPACE
Type III Tanks, Less ITP/ESP, & Plus Tank 13
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
ESP Wash 1&2 to Tk 21
Tk 38/43 Supernate
Tk 41
Tk 32
Tk 27 Supernate
Tk 29
Tk 31
ESP Batch 2
1H
2H
2F
ITP
NWTF
DWPF
Late Wash
RHLWE
Jun-93
Oct-93
Feb-94
Jun-94
Oct-94
Feb-95
Jun-95
Oct-95
Feb-96
Jun-96
Oct-96
Feb-97
Jun-97
Oct-97
Feb-98
Jun-98
TEP, 7/23/93

TOTAL AVAILABLE SPACE



TEP, 7/23/93

Tank 49 Precipitate Volume



TEP, 7/23/93

Appendix K - Manpower

ADS #	Title	FY94 WMER	FY94 Total	FY95 WMER	FY95 Total
21-AA	DWPF Program Management	34	51	37	77
22-AA	Vitrification	812	1,285	820	1,377
23-AA	Saltstone Z-Area	54	131	74	232
24-GP	General Plant Projects	0	0	0	0
25-LI	New Facility Planning	0	12	0	2
26-LI	Defense Waste Processing Facility	0	322	0	407
	Total Defense Waste	900	1,801	931	2,095
31-AA	HLW Program Management	117	181	117	246
32-AA	H-Tank Farm	353	604	368	633
33-AA	F-Tank Farm	218	350	218	350
34-AA	In-Tank Precipitation/Extended Sludge Proc.	172	434	178	306
35-AA	Effluent Treatment Facility	106	175	106	181
36-AA	L-Effluent Treatment Facility	0	90	0	83
37-GP	HLW General Plant Projects	0	35	0	10
38-LI	HLW New Facility Planning	1	6	1	6
39-LI	New Waste Transfer Facility	53	61	0	0
310-LI	Replacement High Level Waste Evaporator	43	350	70	257
311-LI	Diversion Box & Pump Pit Containment	0	42	0	0
312-LI	Hazardous LLW Processing Tanks	0	0	0	0
313-LI	Inter-Area Line Upgrade	0	0	0	0
314-LI	Waste Removal	136	279	161	642
	Total High Level Waste	1,199	2,607	1,219	2,714

Appendix K - Manpower, continued

ADS #	Title	FY94 WMER	FY94 Total	FY95 WMER	FY95 Total
13-AA	Waste Minimization	4	7	5	7
14-AA	Defense Programs (Reactor Materials)	0	5	0	3
41-AA	Solid Waste Program Management	18	23	18	36
42-AA	Solid Waste Storage & Disposal	155	234	168	251
43-GP	Solid Waste General Plant Projects	1	8	1	11
44-LI	Solid Waste New Facility Planning	4	6	4	6
45-LI	Consolidated Incinerator Facility	38	126	45	152
46-LI	Burial Ground Expansion	0	16	0	0
47-LI	M-Area Waste Disposal	0	0	0	0
48-LI	Hazardous Waste/Mixed Waste Disposal Fac.	2	42	4	9
49-LI	Transuranic Waste Facility	17	39	3	15
410-LI	New Sanitary Landfill	8	29	7	21
411-LI	Int. Level & Low Activity Waste Vault#2	7	7	12	23
412-LI	Solvent Storage Tanks	2	5	6	18
	Total Solid Waste	256	547	273	552
	Total DW, HLW and SW	2,355	4,955	2,423	5,361

Notes:

- The FY93 budget is the current baseline which reflects the Omnibus Change Control and no other changes as those changes have not cleared through IBARS at the time of this report.
- The FY94 budget is based on a successful Budget Amendment. The totalis the same as the OMB Passback.
- The FY95-99 values are from the 5/13/93 run of System W and as transmitted to DOE-SR & HQ.
- FY94-95 assume that the WSRC proposed ConOps initiative is funded.

Appendix L - EM-30 Priorities

1. Essential Base Program
    - 1a. health & safety of workers & public
    - 1b. stewardship of current waste inventories
    - 1c. improvement programs critical to 1a and 1b
    - 1d. maintenence of facilities to ensure 1a and 1b
2. "In Progress" projects/programs to handle waste safely
    - 2a. TRU Waste Facility (drum retrieval only)
    - 2b. In-Tank Precipitation (ITP startup/Tank 41 salt removal)
    - 2c. Saltstone operation and vault capping
    - 2d. New Sanitary Landfill
    - 2e. Solvent Tanks
3. High Level Waste System to support DWPF sludge-only startup
    - 3a. DWPF vitrification plant and sludge-only startup
    - 3b. convert 2F Evaporator to HHW service
    - 3c. ESP restart and batch#1 processing
    - 3d. New Waste Transfer Facility startup
    - 3e. Replacement High Level Waste Evaporator
    - 3f. Waste Removal (salt tanks 29&31 and control rooms)
4. Consolidated Incinerator Facility
5. High Level Waste system to support DWPF precipitate startup
    - 5a. DWPF Late wash
    - 5b. Waste Removal as needed for precipitate feed
6. Other Regulatory Driven Programs
    - 6a. Y/M-Area Waste Disposal
    - 6b. Hazardous Waste/Mixed Waste Disposal Vaults
    - 6c. TRU Waste Facility (remainder of LATF)
    - 6d. Hazardous Waste/Mixed Waste Disposal Facility
7. Continuity of Operations, Improvement Programs and New Projects

Appendix M - Funding

ADS #	Title	FY93	FY94	FY95	FY96	FY97	FY98	FY99
21-AA	DWPF Program Management	10,020	17,990	28,657	27,937	27,681	28,192	29,132
22-AA	Vitrification	167,407	166,949	178,416	179,258	174,207	179,573	186,434
23-AA	Saltstone Z-Area	10,172	13,589	32,575	16,928	30,468	19,972	17,191
24-GP	General Plant Projects	5,950	300	650	1,800	2,510	1,950	2,000
25-LI	New Facility Planning	50	1,525	208	271	16,092	43,246	42,152
26-LI	Defense Waste Processing Facility	32,600	43,873	20,200	19,000	0	0	0
	Total Defense Waste	226,199	244,226	260,706	245,194	250,958	272,933	276,909
31-AA	HLW Program Management	26,424	35,481	55,459	55,863	55,700	56,911	58,658
32-AA	H-Tank Farm	61,041	76,749	73,956	76,838	84,384	86,914	91,324
33-AA	F-Tank Farm	35,068	46,584	42,160	44,694	47,555	51,770	53,155
34-AA	In-Tank Precipitation/Extended Sludge Pr(	58,414	67,390	48,516	52,094	50,348	52,193	55,878
35-AA	Effluent Treatment Facility	20,876	20,786	23,333	23,975	25,986	27,502	29,501
36-AA	L-Effluent Treatment Facility	7,697	9,126	9,618	10,430	10,901	10,993	10,971
37-GP	HLW General Plant Projects	2,589	674	741	5,851	5,214	5,137	5,214
38-LI	HLW New Facility Planning	275	769	825	2,829	11,863	33,193	53,447
39-LI	New Waste Transfer Facility	7,228	4,588	0	0	0	0	0
310-LI	Replacement High Level Waste Evaporator	16,830	18,219	22,181	23,599	17,964	0	0
311-LI	Diversion Box & Pump Pit Containment	2,004	2,245	71	0	0	0	0
312-LI	Hazardous LLW Processing Tanks	15,300	0	0	0	0	0	0
313-LI	Inter-Area Line Upgrade	3,170	0	0	0	0	0	0
314-LI	Waste Removal	28,631	40,603	60,978	76,730	74,699	93,049	87,312
	Total High Level Waste	285,547	323,214	337,838	372,903	384,614	417,662	445,460

Appendix M - Funding, continued

ADS #	Title	FY93	FY94	FY95	FY96	FY97	FY98	FY99
13-AA	Waste Minimization	964	1,100	1,062	996	1,132	1,141	1,172
14-AA	Defense Programs (Reactor Materials)	1,191	836	517	551	330	195	207
41-AA	Solid Waste Program Management	4,233	4,873	8,620	7,608	7,843	7,993	8,318
42-AA	Solid Waste Storage & Disposal	27,496	33,930	36,328	38,222	43,182	46,337	49,108
43-GP	Solid Waste General Plant Projects	1,350	1,767	1,644	2,083	2,176	2,214	2,287
44-LI	Solid Waste New Facility Planning	976	651	796	897	1,149	11,126	16,508
45-LI	Consolidated Incinerator Facility	13,573	11,674	20,127	10,422	0	0	0
46-LI	Burial Ground Expansion	10,613	10	0	0	0	0	0
47-LI	M-Area Waste Disposal	86	0	0	0	0	0	0
48-LI	Hazardous Waste/Mixed Waste Disposal Fa	8,966	209	1,100	2,221	10,881	15,486	21,626
49-LI	Transuranic Waste Facility	6,206	2,009	2,000	716	1,754	5,561	8,345
410-LI	New Sanitary Landfill	2,266	2,021	3,613	15,722	18,008	2,397	0
411-LI	Int. Level & Low Activity Waste Vault#2	0	714	4,032	16,166	24,643	7,615	0
412-LI	Solvent Storage Tanks	0	2,040	2,647	1,062	0	0	0
	Total Solid Waste	77,920	61,834	82,486	96,666	111,098	100,065	107,571
12-AA	DOE Program Support	15,038	10,925	13,500	12,950	12,425	10,380	10,350
3031-1	DOE Program Direction	5,663	6,633	7,117	7,455	7,775	8,124	8,475
	Total DW, HLW and SW	610,367	646,832	701,647	735,168	766,870	809,164	848,765

Notes:

- The FY93 budget is the current baseline which reflects the Omnibus Change Control and no other changes as those changes have not cleared through IBARS at the time of this report.
- The FY94 budget is based on a successful Budget Amendment. The totalis the same as the OMB Passback.
- The FY95-99 values are from the 5/13/93 run of System W and as transmitted to DOE-SR & HQ.

Appendix N - HLW System Project Listing

The following attachments list the key projects to support the overall HLW System Plan. This listing is not meant to be an all inclusive listing of WM&ER project activities. Only projects with significant impact to the HLW Plan and Integrated Schedule are listed and discussed.

The projects included are listed by title, scope and driver relative to the HLW System Plan.

Defense Waste

S-1780	Defense Waste Processing Facility
S-2045	Interim Glass Waste Storage Building #2
S-2048	Failed Equipment Storage Vaults #3-6
S-3898	New Saltstone Vaults #2-5
S-4620	Site Fire Protection - DWPF Improvements
W-2093	Salt Cell Benzene Abatement
W-2094	Failed Equipment Storage Vaults#7-10
W-2500	Distributed Control System Replacement

High Level Waste

S-1588	ITP Environmental & Safety Enhancements
S-2081	Waste Removal and Extended Sludge Processing
S-2821	Diversion Box and Pump Pit Containment Buildings
S-2860	Type III Tanks Salt Removal, Phase II
S-3025	High Level Waste Removal from Filled Waste Tanks
S-3122	New Waste Transfer Facility
S-3291	Type III Tanks Salt Removal, Phase I
S-3781	In-Tank Precipitation
S-4062	Replacement High Level Waste Evaporator
S-4878	ITP Benzene Abatement

Solid Waste

S-2787	Consolidated Incinerator Facility
S-2943	M-Area Waste Disposal
S-2944	Hazardous Waste/Mixed Waste Disposal Facility
S-4779	Hazardous Waste/Mixed Waste Disposal Facility Vault Expansion

Appendix N - High Level Waste System Project Listing

Defense Waste

Project No.	Project ADS	Project Title	TEC (K)	Driver	Scope
S-1780 81-T-105	SR-26-LI	Defense Waste Processing Facility	$1,246,974	FFA	This FY81 line item provides a process building to receive washed sludge and salt precipitate from the Tank Farms and incorporate this waste into a stable glass waste form suitable for final disposition in a future federal repository. Facilities include the main processing building, an interim glass waste storage building and administrative offices.
S-2045 97-SR-127	SR-25-LI	Glass Waste Storage Building #2	$91,000	DOE Orders 5820.2A 6430.1A 5480.11 SCDHEC Permit # 16,783	GWSB #2 is scheduled as a FY97 line item. If deferred until FY98, the construction completion milestone will be delayed until 12/30/02. Canister production would be limited or cease until commissioning is completed in mid 2001. FYP required due date is 4/1/00.
S-2048	SR-25-LI	Failed Equipment Storage Vaults #3-6	$4,700	DOE Orders 5820.2A 5480.11	FESV's are proposed as a FY97 line item to provide four additional storage vaults to store failed melters or other failed equipment that contains high level contamination. By mid FY97, it is projected that two melters will have been used and a third vault will be needed for storage. FYP required due date is 3/30/97.
S-3898	23-AA	New Saltstone Vaults #2-5	#2 $19,500 #3 $16,500 #4 & #5 TBD	LDR-FFCA SCDHEC Permits #12,683 #IWP-217 DOE EIS-0082 Record of Decision FR23801, 6/1/82	OUTYEARS (FY95-FY98) Construction of #2 must begin no later than 3Q FY93. Construction of #3 must begin no later than 1Q FY95. Construction of #4 must begin no later than 3Q FY96. Construction of #5 must begin no later than 1Q FY98. Vaults must be funded and constructed on schedule to support full scale Saltstone operations.

Project No.	Project ADS	Project Title	TEC (K)	Driver	Scope
S-4620	LI-90-D-149	Site Fire Protection Project-DWPF Fire Protection Improvements	$10,564	DOE Order 5480.7	S-4620 is to correct deficiencies identified as a result of compliance assessment of S-1780 by WSRC in 1990 & DOE-HQ in 1991.
W-2093	SR-25-LI	Salt Cell Benzene Abatement	$15,000	EPA NESHAP	Due to the promulgation of the new Clean Air Act regulations, 95-99% of the benzene must be removed from the Salt Cell Vent Condenser Off-Gas Stream. Not currently supported by DOE as an FY97 Line Item.
W-2094	SR-25-LI	Failed Equipment Storage Vaults #7-10	$5,500	DOE Orders 5820.2A 5480.11	This project is proposed as a FY99 line item to provide four additional storage vaults to store failed melters or other failed equipment that contains high level contamination. By mid FY97, it is projected that two melters will have been used and a third vault will be needed for storage.
W-2500	SR-25-LI	Distributed Control System Replacement	$18,000		This FY98 project will replace the existing DCS. This is necessary because the DCS will be almost 20 years old by the time this project is finished. Service and replacement parts are becoming increasingly difficult to procure and it is expected that they will be completely unavailable by 1998.

High Level Waste

Project No.	Project ADS	Project Title	TEC (K)	Driver	Scope
S-1588	SR-34-AA	ITP Safety and Environmental Enhancements	$37,190	1-WR 2-FFA	Project provides fire water suppression system, liquid nitrogen storage and unloading system, benzene stripper, laboratory, and other miscellaneous equipment necessary for the safe operation of ITP and protection of the environment.
S-2081	OE	Waste Removal and Extended Sludge Processing	$328,000	1-WR 2-FFA 3-FFCA	Provide facilities to remove high level radioactive waste from 23 underground waste tanks each with a nominal capacity of a million gallons. Included are transfer pumps and transfer jets which will transfer the slurry or salt solution to the newer Type III Tanks for further processing and eventual feed to the Defense Waste Processing Facility (DWPF) or to the Saltstone Facility. Design and installation for conversion of existing instrumentation and control (I&C) for Tanks 1 through 24 and associated peripherals from the old control room to a distributed control system in the new control rooms.
S-2821 87-D-181	SR-311-LI	Diversion Box and Pump Pit Containment	$24,100	1-Envir. Imp. 2-Imp. in OPS	Provide a metal enclosure building over H-Area diversion box no. 7 (HDB7). Consist of a remotely operated bridge crane capable of accomplishing equipment change operations in the diversion box. It will have a ventilation system to maintain a lower atmospheric pressure. HEPA filters will be used for exhaust. All the equipment required to perform remote operations in the diversion box will be provided by this project. The building and equipment allows all weather, remote, and contained work preventing 5 to 6 weeks of lost operation per year.
S-2860	SR-314-LI	Type III Tanks Salt Removal, Phase II	$121,000	1-WR 2-FFCA 3-OPS Support	Provide facilities to dissolve salt contained in two Type III storage tanks and to transfer the solution to the In-Tank Precipitation (ITP) facilities for processing as DWPF feed. In addition, it provides salt removal facilities on tanks 31H and 47F, control systems upgrades to 17 Type III tanks, new control room facilities 241-2H, and the Centralized Support facility 241-4H.

Project No.	Project ADS	Project Title	TEC(K)	Driver	Scope
S-3025 part of 93-D-187	SR-314-LI	Waste Removal Facilities, Phase III	$112,500	1-WR 2-FFCA 3-OPS Support	Provides permanent and reusable facilities for Type III tanks for use in future waste removal operations which provide feed for ITP and Extended Sludge Processing (ESP) processes prior to being fed to the DWPF. Included are pump support structures, slurry pumps, slurry pump motors, and associated equipment for salt dissolution and sludge suspension; transfer jets for transfer of the dissolved salt solution, caustic system for pH adjustment on Tanks 35H, 36H, and 37H; and equipment storage facility for staging support equipment on this project as well as for use in future tank farm operations.
S-3122 85-D-159	SR-39-LI	New Waste Transfer Facility	$54,870	1-WR 2-FFCA 3-OPS Support 4-Envir.	Replace an existing obsolete diversion box/pump pit waste transfer facility with one of current design. The facility is designed to transfer waste between the Type III tanks in the east and west H Area waste tank farms and between F and H Areas. This project will include all required transfer piping and equipment, instrumentation and controls and consist of a new diversion box with jumpers and service piping that will provide ten transfer lines to existing facilities and six lines for future long-term waste programs.
S-3291	SR-314-LI	Type III Tanks Salt Removal, Phase I	$41,200	1-WR 2-FFCA	Provide facilities to dissolve high level radioactive salt contained in three interim storage tanks and transfer the solution to an ITP facility for processing as feed for the DWPF. Provides expansion to control room building 241-18F to support the process control system being provided by the Level III program.
S-3781	SR-34-AA	In-Tank Precipitation	$55,270	1-WR 2-FFA	ITP will provide a process to decontaminate the salt solution. Sodium tetraphenylborate will be used to precipitate cesium. Sodium titanate will be used to absorb strontium and plutonium. The precipitate will be transferred to DWPF for additional processing. This project provides a filter building, a cold chemical area, a control room, and pumps.

Project No.	Project ADS	Project Title	TEC (K)	Driver	Scope
S-4062 89-D-174	SR-310-LI	Replacement High Level Waste Evaporator	$118,200	1-Envir. Imp. 2-FFA (Tk 13) 3-FFCA (DWPF)	Provide a cost-effective waste concentration facility necessary to continue waste solidification and other waste management programs at the Savannah River Site (SRS). The high level waste evaporator is capable of producing 7.6 million gallons of products (overhead) each year which can be removed from the waste management complex after final processing through the existing Effluent Treatment Facility (ETF).
S-4878 98-SR-208	SR-38-LI	ITP Benzene Abatement	$14,000	EPA NESHAP	The ITP facility will discharge up to 24 tons of benzene to the atmosphere per year. The recently promulgated Clean Air Act of 1990 stipulates that benzene emmissions must be reduced by 95%. This proposed FY98 project will achieve this reduction by installing treatment equipment on three emmission points in the ITP facility.

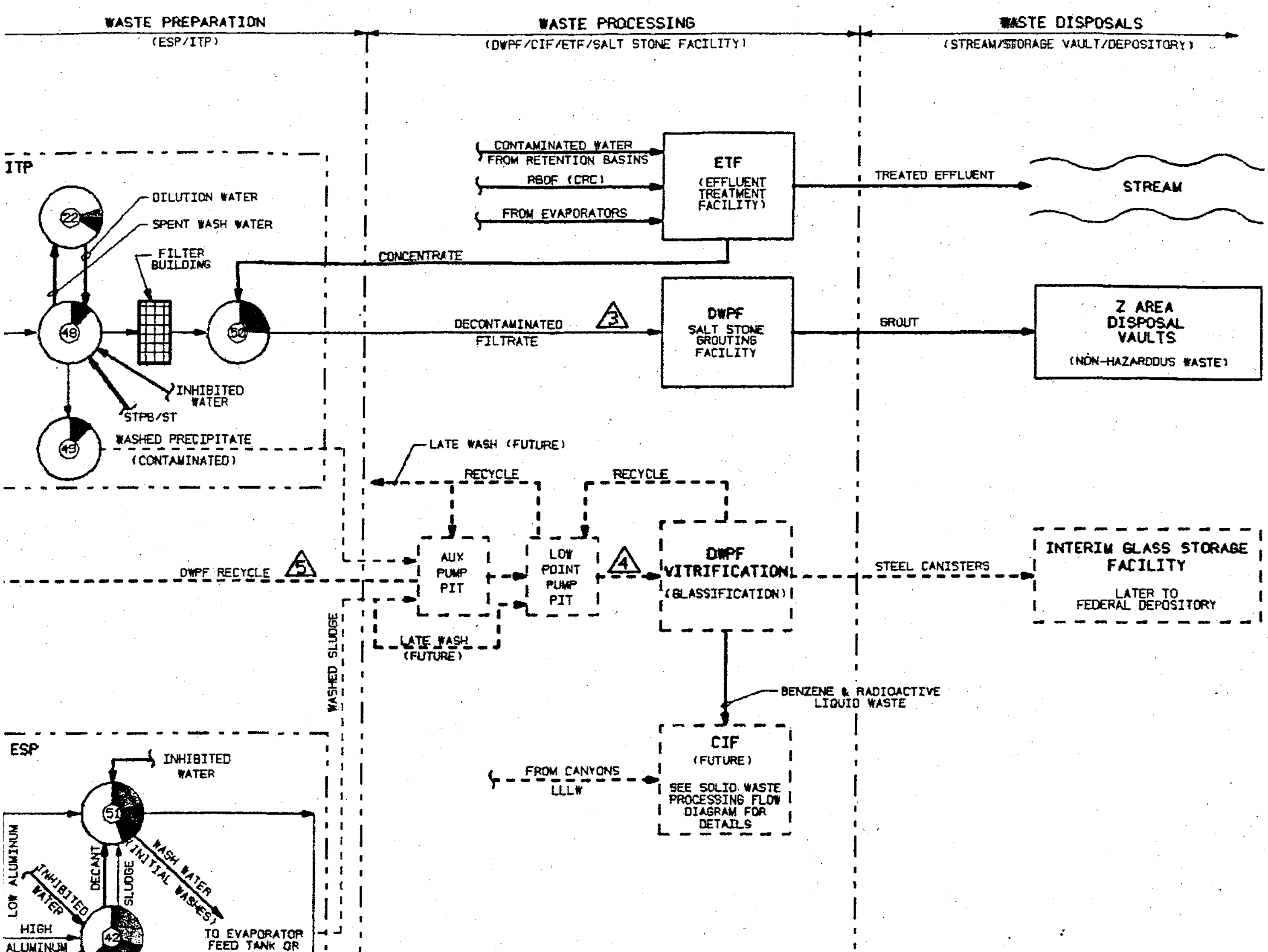
Solid Waste

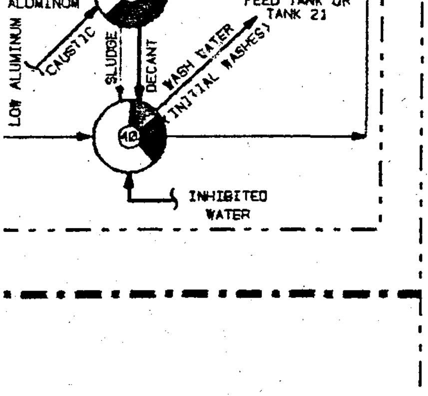
Project No.	Project ADS	Project Title	TEC (K)	Driver	Scope
S-2787 83-D-148	SR-45-LI	Consolidated Incineration Facility	$99,034	1-RCRA 2-FFCA (DWPF)	Provide a facility to incinerate hazardous, low-level radioactive, and mixed waste. The Defense Waste Processing Facility is dependent on the facility to treat its waste benzene stream.
S-2943 89-D-141	SR-47-LI	M-Area waste Disposal	$25,000	1-RCRA 2-FFCA	This facility will be a "sister" facility to Z-Area. It is designed to handle the CIF offgas blowdown stream by solidifying it into a cement matrix and disposing of it in concrete vaults.
S-2944 89-D-175	SR-48-LI	Hazardous Waste/Mixed Waste Disposal Facility	$165,000	1-RCRA 2-FFCA	Provide 1) a Resource Conservation Recovery Act (RCRA) - permitted Treatment Building for the stabilization of hazardous and mixed waste (Phase II) and 2) two RCRA-permitted disposal vaults for the disposal of treated waste (Phase I).
S-4779 98-SR-162	SR-44-LI	Hazardous Waste/Mixed Waste Disposal Facility Vault Expansion	$34,000	1-RCRA 2-FFCA	This project provides additional vaults to the base facility described above. CIF ash, as well as several other waste streams, will be processed and/or disposed of in this facility.

Appendix O - Acronyms

ABC	Activity Based Cost
ADS	Activity Data Sheet
AOP	Annual Operating Plan
APP	Auxilliary Pump Pit
CCR	Cold Chemical Runs
CDR	Conceptual Design Report
CIF	Consolidated Incinerator Facility
ConOps	Conduct of Operations
DB&PP	Diversion Box & Pump Pit
D&D	Decontaminate & Decommission
DCS	Distributed Control System
DOE	Department of Energy
DP	Defense Programs
DW	Defense Waste
DWPF	Defense Waste Processing Facility
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
ESP	Extended Sludge Processing
ETF	Effluent Treatment Facility
FESV	Failed Equipment Storage Vault
FFA	Federal Facilities Agreement
FFCA	Federal Facilities Compliance Agreement
FY	Fiscal Year
FYP	Five Year PlanITP In-Tank Precipitation
GWSB	Glass Waste Storage Building
HDB	H-Area Diversion Box
HHW	High Heat Waste
HLW	High Level Waste
HLWM	High Level Waste Management
HQ	Headquarters - usually as a suffix to DOE
IAL	Inter-Area Line
IG	Inspector General
INPO	Institute of Nuclear Power Operations
ITP	In-Tank Precipitation
JCO	Justification for Continued Operation
LCO	Limiting Condition of Operation
LHW	Low Heat Waste
LI	Line Item
LPPP	Low Point Pump Pit
LW	Late Wash
N/A	Not Applicable
NESHAP	National Emmissions Standards for Hazardous Air Pollutants
NFP	New Facility Planning
NWTF	New Waste Transfer Facility

OMB	Office of Management and Budget
OPC	Other Project Costs
ORE	Operational Readiness Evaluation
ORR	Operational Readiness Review
OSR	Operational Safety Requirement
PRA	Probabilistic Risk Assessment
RCRA	Resource Conservation and Recovery Act
RHLWE	Replacement High Level Waste Evaporator
RSA	Readiness Self-Assessment
SAD	Safety Assessment Document
SAR	Safety Analysis Report
SCDHEC	South Carolina Department of Health and Environmental Control
SR	Savannah River - usually as a suffix to DOE
SRS	Savannah River Site
SRTC	Savannah River Technology Center
ST	Sodium Titinate
STPB	Sodium Tetraphenyl Borate
SW	Solid Waste
TBD	To Be Determined
TEC	Total Estimated Cost
TPC	Total Project Cost
WSRC	Westinghouse Savannah River Company
WW	Wastewater





'UT DETAILS

TE FORECAST)

— 0.6 MILLION GAL/YEAR

— 1 MILLION GAL/YEAR

— 5-7.5 MILLION GAL/YEAR

— 0.2-0.5 MILLION GAL/YEAR

— 1.5-3.5 MILLION GAL/YEAR

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

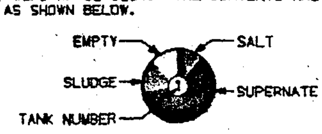
TANK FARMS

TYPE OF TANK	TANK NO.S	AREA
TYPE I TANK (720,000 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 IS 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 DATE IS DECEMBER 31, 1992, BASED ON LIQUID WASTE FORECAST WSRC-RP-92-1384. THE CONTENTS ARE COLOR HATCHED AS SHOWN BELOW.



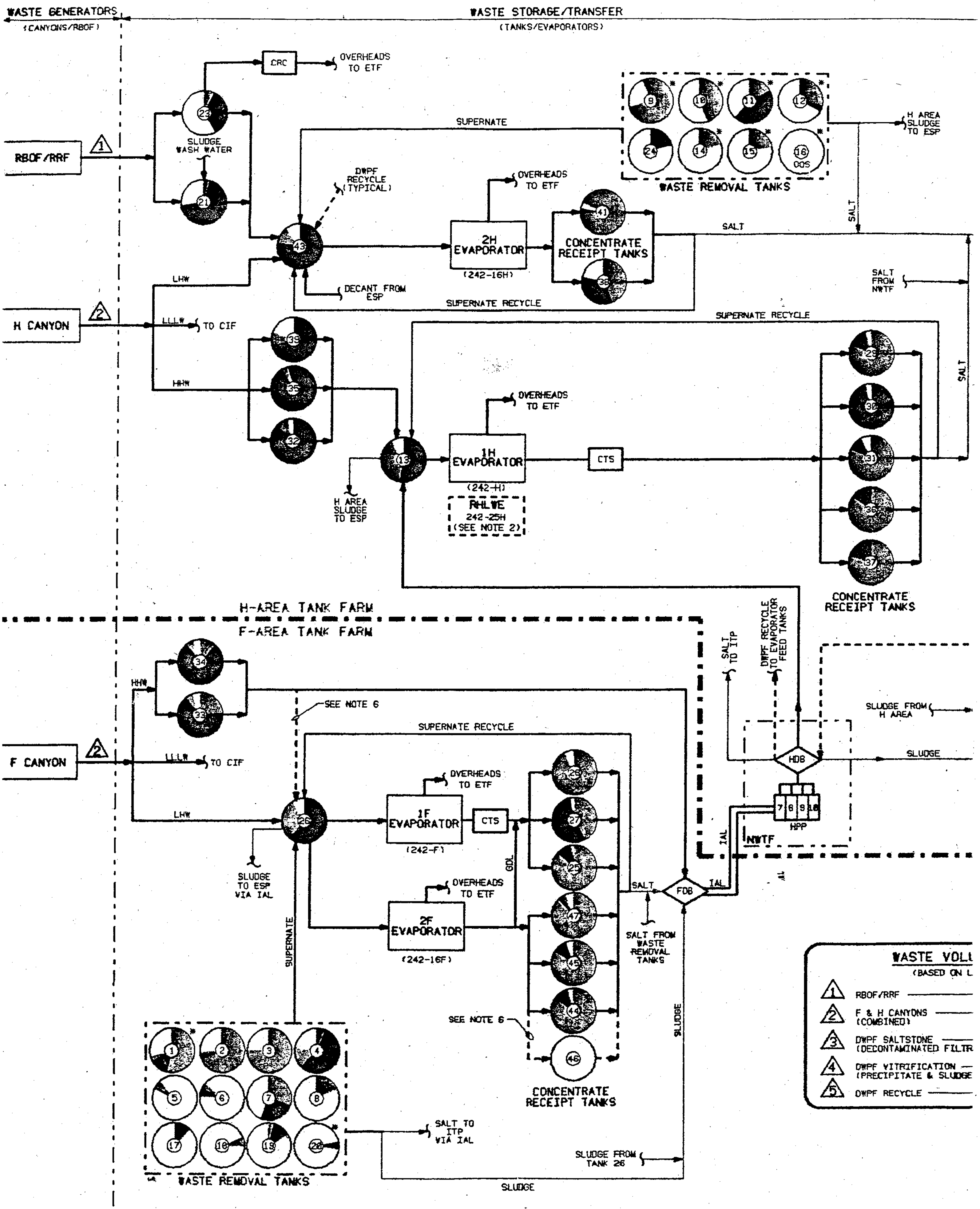
6. F-AREA WILL BE PROCESSING HIGH HEAT WASTE IN THE FUTURE.

LIQUID WASTE PROCESSING FLOW DIAGRAM

DATE: JANUARY 4, 1993

PREPARED BY: ASOKA K. PILLAI

DRAWN BY: KAREN A. BARLEY


WASTE GENERATORS
(CANYONS/RBOF)
WASTE STORAGE/TRANSFER
(TANKS/EVAPORATORS)
CRC
OVERHEADS TO ETF
SLUDGE WASH WATER
RBOF/RRF
SUPERNATE
DWPF RECYCLE (TYPICAL)
2H EVAPORATOR
(242-16H)
CONCENTRATE RECEIPT TANKS
WASTE REMOVAL TANKS
H AREA SLUDGE TO ESP
SALT
16 OOS
LHW
DECANT FROM ESP
SUPERNATE RECYCLE
H CANYON
LLLW
TO CIF
HHW
SALT FROM NWTF
1H EVAPORATOR
(242-H)
CTS
RHLWE
242-25H
(SEE NOTE 2)
H AREA SLUDGE TO ESP
H-AREA TANK FARM
F-AREA TANK FARM
SEE NOTE 6
SALT TO ITP
DWPF RECYCLE TO EVAPORATOR FEED TANKS
SLUDGE FROM H AREA
SLUDGE
HDB
HPP
NWTF
IAL
F CANYON
1F EVAPORATOR
(242-F)
2F EVAPORATOR
(242-16F)
GDL
SLUDGE TO ESP VIA IAL
FDB
SALT FROM WASTE REMOVAL TANKS
WASTE VOLU
(BASED ON L
RBOF/RRF
F & H CANYONS (COMBINED)
DWPF SALTSTONE (DECONTAMINATED FILTR
DWPF VITRIFICATION (PRECIPITATE & SLUDGE
DWPF RECYCLE
SALT TO ITP VIA IAL
SLUDGE FROM TANK 26
SLUDGE