High Level Waste Management Division

HLW System Plan Revision 2 (U)

Westinghouse Savannah River Company
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HIGH LEVEL WASTE SYSTEM PLAN
REVISION 2
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APPROVAL SHEET

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Executive Summary

Note: there is a complete listing of acronyms in Appendix O of this Plan.

State of the HLW System

The projected ability of the Tank Farm to support DWPF startup and continued operation has diminished somewhat since revision 1 of this Plan. The 13 month delay in DWPF startup, which actually helps the Tank Farm condition in the near term, was more than offset by the 9 month delay in ITP startup, the delay in the Evaporator startups and the reduction to Waste Removal funding. This Plan does, however, describe a viable operating strategy for the success of the HLW System and Mission, albeit with less contingency and operating flexibility than in the past.

HLWM has focused resources from within the division on five near term programs: the three evaporator restarts, DWPF melter heatup and completion of the ITP outage. The 1H Evaporator was restarted 12/28/93 after a 9 month shutdown for an extensive Conduct of Operations upgrade. The 2F and 2H Evaporators are scheduled to restart 3/94 and 4/94, respectively. The RHLWE startup remains 11/17/97.

The ESP Process Verification Test was started and is generating quality data on sludge settling, sludge suspension, equipment operation and quantification of mechanical heat input to the process.

ITP is currently developing a post-startup production plan aimed at supporting the earliest possible salt removal from Tank 41 and providing precipitate feed to DWPF by 2/96. Additional work in this area is needed.

The DWPF startup schedule has been rebaselined to correct deficiencies identified after the melter flooding occurrence. Late Wash startup is now concurrent with DWPF on 12/95 with the transition to radioactive operations scheduled for 2/96.

Waste removal from old-style tanks is projected to be well ahead of the FFA Plan and Schedule submitted to SCDHEC 11/93.

Funding for the M-Area Sludge Stabilization program is included in this Plan in support of the FFCA commitment. This program was not funded in the FY95 Five Year Plan.

The planning horizon in this Plan has been expanded from 6 years to the end of the waste processing campaign in 2018. System attainment will average about 45% for the campaign. Significant progress has been made in the development of facility and division technical baselines and process modeling which will improve the outyear planning process once implemented.

Potential System Planning Improvements

The are several areas that will be evaluated to potentially enable more efficient allocation of funding, improved balance between the various HLW System components, reduced cost and therefore increased overall System attainment. All aspects of the Waste Removal program are currently being evaluated for potential cost savings such as application of a graded approach to startup, reuse of equipment, equipment scope reductions, etc.

Several studies are underway that evaluate potential waste reduction from the generating facilities such as DWPF hot and cold recycle, RBOF and ESP washwater using technologies such as ion exchange, process changes, reuse of dilute waste streams, and evaporation. The various studies should be completed and implemented as appropriate to restore contingency to the same or greater level as described in revision 1 of this Plan.

The planned 5 week 1H Evaporator outage for NWTF tie-ins should be evaluated for potential downtime reduction. ITP production planning should be completed to accurately plan Saltstone vaults, the precipitate balance and chemical requirements. Evaluation of actions required to increase the ITP precipitate source term should be completed and implemented.

1.0 Introduction

A High Level Waste (HLW) System flowsheet is attached to this Plan as Appendix P. Reference to this flowsheet will enable the reader to better understand the text of the Plan.

Several significant changes to the scope of this Plan have been made versus the previous revision (rev. 1). The biggest change is the change in planning horizon from the Five Year Plan (currently FY94 through FY99) to the completion of waste removal from all waste tanks. All six sludge batches are described and HLW System attainment is shown for each batch and in total for the entire HLW program.

Discussion of alternate waste processing technologies has been added. This section (8.10) will stay abreast of new or alternate technologies as they apply to the operation of the HLW System. In this revision, alternate technologies to the In-Tank Precipitation (ITP) process and Defense Waste Processing Facility (DWPF) recycle reduction are discussed.

Progress has been made in the area of HLW Systems Engineering. The scope and schedule of the individual components are discussed as well as the long range plan in Section 5.1, HLW System Plan Management.

2.0 Mission Statement

The mission for the High Level Waste System is to:

- safely and acceptably store existing and future Department of Energy (DOE) high level waste,
- volume reduce stored high level waste by evaporation and cesium removal column operations,
- pretreat high level waste for further processing and disposition
- dispose of high level waste in permanent and interim facilities
- ensure that risks to the environment and to human health and safety posed by high level waste operations are either eliminated or reduced to prescribed, acceptable levels.

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

3.0 Purpose

The purpose of this HLW System Plan is to document the baseline for the currently planned HLW operations from the receipt of fresh waste through the operation of the DWPF and Saltstone. Also, this revision is particularly important because it supports the Federal Facilities Agreement (FFA) Plan and Schedule for the removal from service of all waste tanks and systems that do not meet the current requirements for secondary containment and/or leak detection. 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) 94 Annual Operating Plan (AOP) and the funding guidance recently provided by DOE in lieu of the FY95 Five Year Plan (FYP) to meet regulatory and DOE milestones. Several recent developments necessitated the need for this revision to the previous Plan (revision 1):

- facility startup schedule changes due to emergent work
- facility startup schedule changes due to technical issues
- the finalization of the FY94 AOP and attached Change Control Log
- the proposed FY94 Budget Amendment and Reprogramming
- the assumed FY95 decrement of $23,000,000
- changes regarding the previously planned Defense Programs (DP) to Environmental Management (EM) overheads shift, funding of GE-03 activities and resumption of funding pensions, and
- revising the outyear funding levels per the guidance of DOE to reflect a more realistic budget forecast for FY96 - 99

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 Consolidated Incinerator Facility 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
F/H Effluent Treatment Facility
F/H Interarea Line

Defense Waste

Defense Waste Processing Facility
Late Wash
Saltstone
Saltstone Vaults

Solid Waste

Consolidated Incinerator Facility

5.0 Operating Constraints

Operation of the High Level Waste System facilities is subject to a variety of regulatory and process constraints as summarized below.

5.1 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, evolution of Site Decontamination & Decommissioning (D&D) initiatives, etc., there is a significant degree of uncertainty inherent in this Plan and Integrated Schedule.

Westinghouse Savannah River Company (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 and administratively managed by the senior level HLW System Program Board, chaired by the Vice President & General Manager of the HLW Division. The Board is comprised of the HLW Division Level 2 managers of the key line program and support departments. 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 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 HLW Steering Committee provides the highest level of guidance and oversight of the HLW System. This Committee is formally charted and consists of members from DOE-Headquarters (HQ), DOE-Savannah River (SR), WSRC, the HLW Department and the HLW System Integration Manager. The committee meets every 4 to 6 weeks for a formal review of the status and plan for the HLW System.

The Plan assumes success in related funding activities including the FY94 Reprogramming. 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.). This is further discussed in Section 6.6 of this Plan.

In addition to the administrative management of the HLW System described above, a technical management program and matrixed organization was recently established on 9/30/93. This program consists of three components:

- the Integrated Technical Baseline
- the HLW System Plan, and
- the Integrated HLW Flowsheet Model

The Integrated Technical Baseline will describe the entire HLW System in terms of its overall mission. The Integrated Technical Baseline will control mission-level changes in HLW and will establish protocols for controlling changes to internal and external interfaces among the HLW facilities.

Once the Integrated Technical Baseline is implemented, changes to technical baselines for facilities within the HLW System will be reviewed to determine if they could impact the interfaces described in the Integrated Technical Baseline before the changes are implemented within the individual facilities. Thus, the Integrated Technical Baseline will be a tool for assuring that changes to facilities within the HLW System are consistent with the overall mission.

The HLW System Plan describes how we intend to operate the HLW System given the status of funding and existing Technical and Programmatic issues.

The Integrated HLW Flowsheet Model will describe the output of the HLW System given the HLW System Plan and Integrated Technical Baseline. The existing steady-state flowsheet will be replaced with a dynamic computer simulation that will facilitate improved short and long term decision analysis and strategic planning. Each facility will be modeled and key chemical constituents will be tracked using Speedup (R) software. Development of the model is currently underway and several individual facility modules are complete. The first phase of the Integrated HLW Flowsheet Model will be complete in FY94. Future upgrades are planned in FY95 to expand chemistry, energy balances and other process details.

5.2 Safety Documentation

Facility operations are conducted within the defined boundaries of the appropriate Safety Analysis Report or other appropriate safety documentation such as Operational Safety Requirements, Technical Standards, Process Hazards Reviews, etc. The highest level safety document for each facility is listed with current status and pertinent comments in Appendix B.

5.3 Environmental Permits and Regulatory Agreements

The primary environmental permits for each facility are listed in Appendix B with current status and comments. A discussion of the major regulatory agreements and associated issues follows.

- Land Disposal Restriction - Federal Facilities Compliance Agreement (LDR-FFCA): This agreement, made between DOE and the EPA Region IV, provides a period of time for DOE to implement a treatment plan for the generation, storage and treatment of prohibited mixed wastes at the Savannah River Site. Specific commitments regarding the management of the Site's high level liquid wastes are deferred to the FFA.

  An LDR-FFCA Bridging Amendment is currently being negotiated among DOE, Environmental Protection Agency (EPA) and SCDHEC. This Amendment, when adopted, will supersede the provisions of the original FFCA, and will position the Savannah River Site (SRS) to implement the Site Treatment Plan.

- Federal Facilities Agreement: The FFA was executed by DOE, EPA and the South Carolina Department of Health and Environmental Control (SCDHEC) and became effective on August 16, 1993. 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. The "F/H Area High Level Waste Removal Plan and Schedule" was submitted to the regulators as required on November 10, 1993.

  It is the intent of SRS to negotiate a one year "rolling window" of commitments based on the current year AOP, update the commitments as each new AOP is developed and to commit to only those activities directly related to Tanks 1 through 24. This approach was previewed to EPA and SCDHEC in October, 1993. At that time, the Regulators were not opposed to the SRS approach.

- Site Treatment Plan (STP): The Resource Conservation and Recovery Act (RCRA) requires the DOE to prepare plans describing the development of treatment capacities and technologies for each site generating or storing mixed waste. The information contained in the plans will allow DOE, Regulatory Agencies, the States and other stakeholders to efficiently plan mixed waste treatment and disposal by considering waste volumes and treatment capacities on a national scale. A tiered approach to the development of the STP provides an opportunity for early involvement of all stakeholders regarding technical and equity issues. A Conceptual Site Treatment Plan, which includes SRS's current inventory of high level waste and the high level waste treatment system, has been prepared. A Draft Site Treatment Plan, which will explore on-site and off-site treatment options in more detail, is scheduled to be completed in August, 1994. The Final Site Treatment Plan is scheduled to be completed in February, 1995.

5.4 DOE Orders and 90-2

There are two programs in place on site to address compliance with DOE Orders, codes and standards.

The DOE Order Compliance Program assesses each facility's status of compliance with applicable DOE Orders. Administrative compliance is measured by the adequacy of programs and procedures which implement DOE Order requirements. Field compliance is measured by the extent to which facility personnel execute those programs and procedures. The results of the assessments are recorded. Non-compliances are corrected or exemptions are requested.

The 90-2 Program, resulting from Defense Nuclear Facility Safety Board Recommendation 90-2, expands upon the DOE Order Compliance Program by incorporating those applicable national consensus codes and standards which are related to Environmental, Safety & Health concerns. Appropriate requirements are identified for each facility, and recorded in a Requirements Identification Document. Again, facility compliance is assessed and recorded. However, a policy for correcting non-compliances is still being developed and not all HLW facilities have been assessed.

5.5 Process Considerations

- 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 adequate secondary containment and leak detection capabilities. In the case of the Type IV Tanks, 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 waste from the storage tanks. Waste will be processed through the DWPF into a stable borosilicate glass waste form contained in stainless steel canisters. ITP, Extended Sludge Processing (ESP), Late Wash and DWPF are all new operations necessary to accomplish the mission of processing the waste into glass. The startup of these 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 testing to support radioactive operation beginning 12/95. Subsequently, this drives HLW operations as necessary to supply both the initial and continuous feed to the DWPF per the startup schedule.

- Tank Space Availability: Ensuring the availability of sufficient operating space in specific tanks at specific need dates is a key consideration in the development of an operating strategy. Due to a number of factors, the most important of which has been the extended outage of the evaporators and the delays in ITP startup, 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.

5.6 Waste Removal Sequencing Considerations

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

1) Maintain adequate emergency space per the Tank Farm SAR
2) Control tank chemistry including Radionuclide and fissile material inventory
3) Ensure blending of processed waste to meet the Saltstone and DWPF feed criteria
4) Enable continued operation of the three evaporators
5) Remove waste from tanks with a history of leakage
6) Remove waste from tanks which do not meet secondary containment and leak detection requirements
7) Provide continuous precipitate feed to DWPF starting 2/96, if possible
8) Maintain an acceptable precipitate balance in Tank 49
9) Support the startup and high capacity operation of the Replacement High Level Waste Evaporator (RHLWE)
10) Maintain continuity of radioactive waste feed to the DWPF
11) 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 salt 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, 25, 31, 38, and 47 must receive priority to support the key volume reduction 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 Planning Bases

6.1 Reference Date

The reference date of this Plan is December 3, 1993. Schedules, funding and operating plans were current as of that date.

6.2 Funding

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

1) the FY94 AOP with the attached Omnibus Change Control, the Budget Amendment as approved 11/93, and a successful Reprogramming action to fully fund DWPF and Late Wash,

2) funding guidance for the period FY95-99 as provided by DOE-HQ in general by DOE-HQ at the SRS year-end review and more specifically by DOE-SR,

3) program guidance regarding the RHLWE, DWPF and Late Wash by DOE, and

4) the assumption that the HLW and Solid Waste portions of the total SRS EM budget are "fenced", i.e., the split between the two programs will be per the percentage baseline established in the FY95 Office of Management and Budget (OMB) Passback

The intent of the guidance from DOE regarding the FY95-99 period is to provide the target values that are expected to be the basis of the FY96 FYP. The FY95 FYP is now considered by DOE to be obsolete in that it does not reflect the current forecast for flat or nearly flat outyear budget profiles. The FY95 FYP was therefore too optimistic. The FY96 FYP will use the programmatic guidance provided in this Plan.

The forecast provided by DOE is as follows:

- FY94 at $646 million
- FY95 at $678 million
- FY96 at $702 million (FY95 + 3.5%)
- FY97 at $726 million (FY96 + 3.5%)
- FY98 at $752 million (FY97 + 3.5%)
- FY99 - FY03 at a "reasonable" growth rate
- FY04 - at maximum System attainment

WSRC's interpretation of "reasonable" growth from FY99 - FY03 is a steady increase each year to reach the required funding level in FY04 that will support the maximum System attainment. The latter funding level has not yet been determined, however, the planning tools required to develop that level are being developed and will be complete by the next revision of this Plan which is expected immediately after the development of the FY96 FYP (about 5/94).

These funding values are consistent with, and in most cases exceed, the funding used to develop the FFA Waste Removal Plan & Schedule. The key waste removal dates shown in this Plan are earlier than their counterparts in the FFA. The FFA Plan and Schedule shows the completion of waste removal in FY28 while this Plan shows FY18. This is due to the extra conservatism that was used to quickly develop the FFA Plan and Schedule.

6.3 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.

The values shown in FY94 start with the end of FY93 actual manpower levels and incorporate the recent manpower scrubs by DOE-SR. The capability is assumed to fill a small portion of the vacancies with subcontract personnel and select new hires in the near term and existing onsite personnel from other divisions in the long term. Evaluations are underway to utilize the funding that was originally to be allocated to manpower for contracting work to offsite personnel. Examples of the latter are Saltstone Vaults and Waste Removal infrastructure such as control rooms and maintenance buildings.

6.4 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, ITP, 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).

The key milestones shown below are supported by the reduced outyear funding projection. Additional milestones are shown in Appendix I. Where the milestone is in question due to the reduced FYP funding forecast, this is so noted.

	rev. 0	rev. 1	rev. 2
• Start ESP Process Verification Test	4/93	7/93	7/93a
• Restart 1H Evaporator		9/93	12/93a
• Restart 2F Evaporator		11/93	3/94
• Restart 2H Evaporator		10/93	4/94
• Late Wash Bypass Complete	6/94	6/94	7/94
• Start up In-Tank Precipitation	4/93	3/94	12/94
• Start up New Waste Transfer Facility	1293	5/94	10/95*
• DWPF Radioactive Operations	6/94	11/94	12/95
• Start up Late Wash APP Modifications	10/95	10/95	12/95
• Start up Consolidated Incinerator Fac.	n/a	6/96	1/96
• Start up Replacement HLW Evap.	8/96	11/97	11/97
• Sludge batch#2 ready to feed	10/98	6/99	11/01
• Sludge batch#3 ready to feed	9/01	5/02	7/05

a = actual
* = need date

A detailed discussion for each startup, restart or operations milestone is given in Section 8 of this Plan. All FY94 milestones are shown in Appendix I. Due to the reduced funding guidance provided by DOE-HQ for the FY96-99 period, some of the outyear milestones are in question. The key outyear milestones are also listed in Appendix I. A complete list of milestones based on the new funding guidance will be compiled as part of the development of the FY96 FYP.

6.5 Operational Plan Summary

ESP batch#1 washing resumed under the guidance of the ITP/ESP Startup Test Group per the Process Verification Test (PVT) during July, 1993. The PVT calls for 2 washes in Tank 42 and 3 washes in Tank 51. Sludge batch#1 washing could potentially be complete as part of that test program depending on the sample analysis results with all of the slurry pumps operating in each tank and thus all sludge suspended. In all likelihood, the PVT will be stopped after the first wash in Tank 42 and the second in Tank 51 to repair the slurry pump seal leakage problems. If further washing is needed, then it will be completed after the joint ITP/ESP Operational Readiness Review (ORR). There is sufficient time in the schedule to accommodate this should it occur. After washing is complete, the sludge will be consolidated in Tank 51 and fully characterized before DWPF startup.

ITP is planned to start up 12/94. Tank 41 will be the first tank emptied via ITP although concentrated supernate from other tanks (i.e., Tanks 38 and 43) is being evaluated for inclusion in the first batch which will enable ITP to start up on a very low activity feed stream. It is planned to completely empty Tank 41 over a period of 30 months versus partially emptying the tank and returning it to salt receipt service. The long duration for emptying Tank 41 is due to the many small batches at the start of the salt removal campaign and the additional sampling requirements placed on Tank 41 due to the criticality concerns. Concurrent with feeding Tank 41 to ITP, concentrated supernate from Tanks 29, 38 and 43 are planned to be fed directly to ITP to augment the feed from Tank 41. The volume of concentrated supernate fed from each tank will be monitored very carefully as each of the alternate feed 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 at the end of the third ITP production cycle as opposed to at the end of each cycle because that will be the earliest date where there will be enough precipitate to wash. This is planned to occur 11/96 or about 9 months after DWPF/Late Wash startup. Development of a viable ITP production plan was underway at the time of this Plan to identify and adopt a plan that would support the earliest salt removal from Tank 41 and the earliest availability of precipitate feed for DWPF. The issue of ITP production planning is also discussed in Appendix H.

The second tank to be fed to ITP will be Tank 29. This tank is also planned to be emptied completely so that the cooling coils can be replaced. Evaluations are underway to determine if coil replacement can be descoped, however, it assumed in this Plan that the coils must be replaced. At this time, salt removal from Tank 29 will not be complete in time to support the RHLWE startup. The RHLWE will drop salt to Tank 30 for the first 8 months of operation. During this period, the RHLWE space gain is planned to be equal to the 1H Evaporator due to the small amount of salt receipt space remaining in Tank 30. By the end of 1998, Tank 29 will be available for salt receipt and the RHLWE operation will no longer be restricted.

Currently, the precipitate level in Tank 49 is administratively limited to 565,000 gallons (121") assuming an average radionuclide concentration of 39 Ci/gal. This is necessary to ensure that at least 3 days can be taken to re-establish ventilation after a seismic event to prevent reaching the lower flammability limit in the tank vapor space. This level will be attained by 1999. It is assumed that corrective actions will be defined and implemented prior to that time to enable the operating limit in Tank 49 to increase to the original OSR limit based on the equivalent precipitate inventory contained in both Tanks 48 and 49.

DWPF cold chemical runs are complete. Preparations are ongoing to support melter heatup. The Mercury Runs cold recycle will be handled in one of three ways: 1) trucked to Effluent Treatment facility (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. The preferred option is to truck the recycle to ETF and thus avoid adding to the Tank Farm evaporator load. SRTC is currently completing a technical evaluation of a filtration/Ion Exchange process that would enable this to occur.

Late Wash is planned to be complete in time to support a DWPF startup in 12/95. DWPF will start up with a spike test (FA18.01) and then transition to full sludge and precipitate operations (FA20.01) during the first several months of operation, assuming that ITP can provide the precipitate feed. In the past, a six month maintenance and Late Wash tie-in outage was assumed because of the schedule mismatch between Late Wash and DWPF. This is no longer the case. Funding and priorities have been reallocated to enable Late Wash to start up concurrently with DWPF.

Sludge batch#2 will be ready to feed 11/01 and will last until sludge batch#3 is ready 7/05. The attainment of DWPF during the period of batch#1 and #2 feed will average 35 and 41%, 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 55 to 66%.

6.6 Long Range Planning and Site Infrastucture

The SRS has always been a DP "owned" site. DP therefore pays for the operation and maintenance of common components of the Site infrastructure 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 HLW mission.

As described in the Executive Summary, the planning horizon has been increased from 7 years until the end of the HLW program which is projected to be 2018. In this Plan, it is assumed that the Site will continue to provide the necessary infrastructure to support the HLW Mission through 2018, such as:

- maintenance of roads and bridges,
- services such as power, steam, well and drinking water, etc.
- analytical capability as needed
- design and construction as needed
- spare parts and stores
- environmental, quality assurance and safety support
- solid, hazardous, mixed and radioactive waste storage and disposal

The Site Long Range Planning function is integrated into HLW planning in two ways: 1) the Site Long Range Planning Manager is a standing member of the HLW Steering Committee, and 2) the HLW Integration Manager is a member of the Site Long Range Planning Committee. The most critical long range issue at this time is analytical laboratory support. Several studies have been started, however, none have been satisfactorily completed. This issue is further described in Appendix H and is an area where this Plan must be strengthened in the future.

Appropriate references have been made in this Plan to the FY94 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 Plan described above. These streams are listed as issues in Appendix H.

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 HLW projects/programs to pay for Site overheads.

Significant shifts of Site overhead and responsibility for Site infrastructure were estimated and incorporated in the FY95 FYP, preplanning for the FY96 FYP and therefore in this Plan. Future revisions of this Plan will incorporate Site overhead and infrastructure planning as it is developed.

Roadmaps are also used for long range planning. 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 HLW 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 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.

7.0 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.

Tank Farm Geotechnical

The ongoing geotechnical program in the Tank Farm is revealing 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 near ITP will be systemic to the entire Tank Farm or major portions of the Tank Farm and that the ITP startup schedule will not be delayed due to the geotechnical program. It is further assumed that significant remediation will not be required which would compete with other HLW programs for available funding.

Evaporator Restart

The three existing Tank Farm evaporators were voluntarily shut down pending implementation of a Conduct of Operations (ConOps) improvement initiative. Each evaporator has a recovery program and schedule. 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 no 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 or future expectations. There is not adequate funding for many of the programs to meet all expectations and commitments. 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.

Funding for the HLW System

The scope to be achieved in FY94 is based on the FY94 AOP with Change Control Log, Budget Amendment and a successful reprogramming action. The scope and schedule for FY95 - FY99 is based on guidance from DOE in lieu of the FY95 FYP because it was determined by DOE-HQ that the FY95 FYP funding targets were too optimistic. Due to the revised funding guidance, a "top down" funding allocation was made which more accurately represents expected future funding, however, this approach does not have the same degree of rigorous planning as the FYP. 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 Appendix M.

Manpower

WSRC received direction in 11/93 that manpower could not increase to the levels planned in the FY94 AOP and that the workforce at the end of FY94 must be at or below the FY93 year end level. Manpower added on a temporary basis during the year must come from within WSRC with some exceptions allowed. WSRC has since shifted HLWM personnel to the highest near term priorities with the intent of backfilling vacancies with personnel from other divisions. The overall manpower plan is not complete. The issue is that there is no firm plan and schedule for those facilities that loaned people to the higher priority programs. The assumption is that a plan will be completed and implemented to enable the lower priority programs to recoup lost time and support DWPF startup in 12/95.

Planned ITP Operations in Support of the 2H Evaporator and Precipitate Feed for DWPF

As described in Section 6.5 of this Plan, there is not an approved production plan that supports the conflicting goals of emptying Tank 41 as soon as possible and providing precipitate feed for DWPF by 2/96. This is not to say that both goals can't be satisfied; only that the plan to do so is not complete. The issue is that Tank 41 salt removal must be completed to support continued operation of the 2H Eveporator. A secondary issue is availability of precipitate feed for DWPF. A sludge-only campaign has high life cycle costs (additional canisters) as well as high operating costs (over $100,000 of simulated precipitate per canister). This will be tracked as an issue in this Plan. The assumption is that an appropriate production plan will be developed and approved.

8.0 Integrated Schedule

8.1 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 Technical Baseline and 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 WSRC proposal has been developed and accepted by DOE-SR. A matrixed organization has been formed in the HLWM Engineering department to implement the proposal.

In general, the schedules for the highest priority programs, Evaporator Restart, ITP, DWPF and Late Wash, are firm and progressing on schedule. Other schedules are based on need dates: NWTF, ESP, Diversion Box & Pump Pit (DB & PP) Containment and RHLWE are currently behind schedule on operating funded activities as personnel have been loaned to the higher priority programs. The latter schedules can be recouped if manpower can be restored within a reasonable time frame. Comprehensive manpower planning is ongoing.

The Waste Removal schedule shown in this Plan contains the most unknowns, primarily due to the large number of key personnel loaned to the Evaporators and ITP. Efforts are underway to release work to Construction and other subcontractors to get the net amount of scope accomplished over the five year planning period. This approach will accelerate some portions of the Waste Removal program and delay others. Some of the delays cannot be recouped. Manpower planning and funding strategy continue to evolve as of the time of this Plan. This is further described in Section 8.7.

8.2 In-Tank Precipitation

The startup date used in this Plan is 12/94. The ITP startup schedule has been rebaselined since the previous revision of this Plan to incorporate resolution of the benzene stripper foaming problems, improvements to the crossflow filter backpulse and cleaning system, replacement of incompatible materials (gaskets, electrical connectors, etc.), replacement of electrical jumper connector pins and other emergent work identified during cold chemical testing. The FY94 AOP budget supports the planned 12/94 startup date. It is assumed in this Plan that the current manpower will be reallocated within the HLWM division as needed to support the 12/94 date. Also, it should be noted that the 12/94 date has no schedule contingency and assumes no further emergent work.

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 12/95 and then transition to sludge and precipitate feed within the first 2 months of operation, assuming that ITP can provide the precipitate feed. 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 configuration. The 2H 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 before Tank 38 fills with saltcake 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 12/94 startup date supports the production plan described above, again, assuming that the successful development of an ITP production plan that provides precipitate feed by 2/96.

Other feed streams are being evaluated for the initial batch of feedstock for ITP with the objective of starting up the plant with a very low activity feed. At the time of this report, concentrated supernate from Tanks 38 and 43 were under evaluation. Use of this feed is not expected to impact the overall schedule.

8.3 Extended Sludge Processing

ESP started the Process Verification Test 7/93 under the direction of the ITP/ESP Startup Test Group. A Test Plan is being 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 Tanks 42 and three washes in 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 PVT 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.

There are two key predecessor activities to the completion of the ESP PVT: the restart of the 2H Evaporator, and repair/replacement of the slurry pump seals. There is currently about 643,000 gallons of space in the 2H System. The ESP PVT will generate about 1,300,000 gallons of washwater. While some of this washwater can be stored in Tank 21, the 2H Evaporator must restart and gain space to support completion of the PVT.

The slurry pump seal leakage experienced in Tank 51 thus far in the PVT has been greater than expected. PVT data indicate actual leakage on the order of gallons per minute or tenths of a gallon per minute versus the expected cc's per minute. A task team has been formed to address this problem as the PVT proceeds. Thus far, the PVT has generated excellent sludge suspension, sludge settling and temperature data. In all likelihood, the PVT will be rescoped to one wash in Tank 42 and two washes in Tank 51. The PVT will then be stopped with the necessary data collection successfully completed. The final washes will likely occur after the joint ITP/ESP ORR and repair or replacement of the ESP slurry pump seals.

8.4 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 shut down by 1/1/98 as required by the Tank Farm Wastewater Operating Permit. The RHLWE is currently scheduled to start up 11/97. The evaporators play a crucial role in the HLW System. Because the evaporators were shut down in April and May, 1993 to enable Conduct of Operations improvements to be made, it is generally accepted that the evaporators and ITP will be the limiting factors in the near term governing the startup of the DWPF and therefore the HLW System. The long term need for the evaporators is to build contingency/flexibility into the Tank Farm operation and to support higher HLW System attainment.

The goal for the evaporators is to have the Tank Farm in a position where the Tank Farm can be deemed "ready to support DWPF startup" by 12/95. 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
- adequate tank space to receive the high volume ESP and DWPF waste streams during routine and non-routine Tank Farm operations with a high degree of confidence

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 as an evaporator pot failure or a ConOps or technical problem that shuts down all evaporators for an extended period of time.

The Tank Farm goal is to have a total of at least 3,000,000 gallons of available tank space at the time DWPF starts up, not including tank space that must be held in reserve as emergency spare tank capacity should a waste tank fail. 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 pot failures beyond those expected, 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 @ DWPF Startup
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 in the salt receipt tank prior to transfer back to the evaporator feed tank, 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 per batch while the other two ESP streams can be up to 900,000 gallons per batch. 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 corrected 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	historical space gain (gal/yr)	planned space gain (gal/yr)
1H Evaporator	40%	757,000	750,000
2H Evaporator	60%	1,595,000	1,250,000
2F Evaporator	60%	738,000	1,000,000
Total		3,090,000	3,000,000

The difference between the historical and planned space gain for each evaporator was qualitatively developed by the HLW System Integration Manager. The reasoning is as follows. The negative effects of the ever increasing age of the 1H facility plus the increased duration for routine and unplanned maintenance should be offset by the positive effects of the ConOps improvement program and the large backlog of unevaporated waste. Thus, the 1H Evaporator should be able to achieve its historical space gain. The 2H System is similar to the 1H accept that the high historical average for the 2H is due to the large amount of washwater generated by the ESP demonstration in 1983 and 1984 plus the high H Canyon production in the mid-1980's. 2H will not have the large volume of dilute waste that it has had in the past. The future ESP washwater will be evaporated in both the 2H and 2F Systems. Thus, the 2H will probably not be able to sustain its historical average. The 2F Evaporator has a very low historical average space gain primarily because of the lack of dilute waste and low waste receipts in recent years from F Canyon. This will change in the future because 2F will evaporate the current backlog of unevaporated F-Area HHW plus assist the 2H evaporator with the dilute DWPF recycle and ESP washwater streams. Thus, 2F is expected to exceed its historical average. The total space gain for the three evaporator systems is projected to be nearly the same as the historical average.

The historical average is an appropriate and somewhat aggressive planning basis 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 fresh waste versus the concentrated feed that is currently in the 2H and part of the 2F 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.

There are several points to note from the "Total Available Space" chart in Appendix J. Available tank space at the start of DWPF operations will be about 2,700,000 gallons and will decrease over the next few years 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 batch#2 washing
- operate the DWPF at less than the planned attainment for batch#1
- delay DWPF startup,
- evaluate and implement feeding the RBOF streams directly to a cesium removal column (CRC) as was done in the past (this could remove about 600,000 gallons per year from the evaporator load)
- establish a limit on allowable receipts from the RBOF facility that is less than the currently forecast 50,000 gallons per month
- evaluate and implement process changes in DWPF that reducerecycle
- evaluate and implement hardware changes in DWPF that reduce recycle
- evaluate the use of Tanks 17-20 for temporary storage of dilute waste streams,
- take actions to guarantee that a transfer route from H-Area to F-Area can be established within 24 hours such that F-Area can provide the emergency space for both Tank Farms,
- use Tanks 2-8 for F-Area emergency spare tank space in lieu of Type III Tanks, if possible

The first five actions could be taken but are undesirable. The next four actions are all being evaluated. As the evaluations are complete, WSRC will develop implementation recommendations. The last three actions do not look feasible at this time although the evaluations are not complete. Tanks 17-20 are in the most remote area of the Tank Farm relative to where the dilute waste streams are generated and the access piping to those tanks does not have adequate secondary containment. Preservation of a dedicated transfer route from H-Area to F-Area is probably not possible due to the large number of diversion boxes and pump tanks in each Tank Farm that are required (unless the space can be in Tanks 33 and 34 which are much more accessible). Tanks 2-8 have some potentially serious structural integrity concerns as well as inadequate secondary containment on the associated transfer piping.

Also evident on the "Total Available Space" chart 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.

In summary, the "Total Available Space" chart clearly shows 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 11/97.

8.4.1 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 24 months, it is crucial that the 1H system gets into a condition by 12/95 where it can support DWPF startup as well as the other missions described above. This condition is defined as follows:

- 1H is operating at or near planned space gain,
- ITP is started up and running at planned production rates,
- the design, construction and startup testing of Tank 29 salt removal equipment including control room scope as necessary to support the RHLWE 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 778,000 gallons of available tank space at the time of DWPF startup

The 1H Evaporator was restarted 12/93. 1H utility is planned to be 40% with a planned space gain of 62,500 gallons per month during this period. The 62,500 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 425,000 gallons to spare. This is approaching a "waterlog" condition.

Planning for this system is as follows:

425	space available 9/30/93 (kgal)
-497	H-HHW receipts 9/30/93-12/29/95
-400	planned transfer from 2H System
+1,250	space gain by evaporation 12/93-12/95
778	space available 12/29/95

The waste forecast incorporates two outages for this system that total 13 months: 5 months from 4/95 to 8/95 for tie in of NWTF to H-Area Diversion Box#5 (HDB-5), and 8 months from 4/97 to 11/97 for RHLWE tie-ins. The NWTF tie-ins are very close to the 1H Evaporator feed and vent lines, therefore, the evaporator must be down during the tie-ins. Five months are assumed which is conservative; the actual duration could be reduced with careful planning. The existing evaporator 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 NWTF tie-in and evaporator pot failure 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.

8.4.2 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 600,000 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 12/29/95. 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 before Tank 38 is filled with salt,
- 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 12/29/95 is based on the following. The planned restart date for 2H is 4/30/94. The planned utility is 60% with a space gain of 104,000 gallons per month. Planning for this system is as follows:

643	space available 9/30/93
-549	projected H-LHW 9/30/93 - 12/29/95
-1,500	RBOF receipts 9/30/93 - 12/29/95
-1,300	remainder of ESP washwater to complete batch#1 washing
-1,300	reserve for H-Area emergency spare
+600	concentrated waste transfer to Tank 40
+400	ESP washwater/concentrated supernate transfer to 1H
+1,000	ESP washwater to Tank 21
+0	tank space recovered by ITP prior to 12/29/95
+2,188	space gain by evaporation 4/94-12/95
182	space available 12/29/95

This system is burdened with maintaining emergency spare space, RBOF, H-LHW and handling the ESP washwater. A total of 2,000,000 gallons of transfers out of this system are required to avoid a waterlog condition.

8.4.3 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 F and H-Areas 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 3/31/94 in order to implement the ConOps initiative.

The primary role of the 2F Evaporator starting 3/31/94 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 10/95. 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 25 or 47 is empty and returned to salt receipt service, and

- available tank space of 1,350,000 gallons above the emergency spare requirement

2F utility is planned to be 60% with a space gain of 83,000 gallons per month during the planning period. Planning for this system is as follows:

1,346	tank space currently available 6/1/93 (kgal)
-1,300	reserve for emergency spare tank space
-714	F-LHW from 9/30/93 to 12/29/95
-91	F-HHW from 9/30/93 to 12/29/95
+1,833	space gain by evaporation 3/94 - 12/95
1,074	net space available 12/29/95

8.4.4 Replacement High Level Waste Evaporator

The RHLWE is currently in the design and construction phase. The planned startup date is 11/17/97. The Total Estimated Cost (TEC) portion of the project is proceeding on schedule. The OPC portion is currently behind schedule due to receiving $437,000 less Other Project Cost (OPC) funding in FY93 and the loan of OPC personnel in FY94 to higher priority programs. Because the comprehensive manpower plan was not complete at the time of this Plan, a firm schedule is not available to support the 11/17/97 date. The startup will not be delayed if personnel and funding is restored in late FY94 and FY95.

Planning exercises conducted during 10-11/93 indicated that there would not be adequate funding to support base operations, DWPF, Late Wash, Waste Removal and the RHLWE on their current schedules. There was a lot of discussion as to reducing RHLWE funding in FY95 to zero and thus delaying startup by 18 months. This is no longer the case. Additional planning and budget reviews now indicate that the project can be adequately funded to achieve the planned startup date.

The RHLWE is planned to operate at 80% utility and at a space gain of 270,000 gallons per month. This space gain value, unlike the others, is not based on historical averages as this is a new design and a 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.

As stated in Section 6.5 of this Plan, Tank 29 will not be ready for salt receipt by 11/17/97. It will be 8 months later. During this 8 month period, the RHLWE will be required to drop salt to Tank 30. Tank 30 will be nearly full, thus the operation will be inefficient. Also, the RHLWE will be a new facility in its first few months of operation. For these reasons, the planned space gain is assumed to be equal to the 1H Evaporator until tank 29 is ready for salt receipt. After that, the planned space gain will be as described in the paragraph above.

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 35% 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.

8.5 Waste Transfer Facilities

8.5.1 New Waste Transfer Facility

NWTF is required prior to DWPF radioactive startup which is currently planned for 12/95. The planned radioactive startup for the NWTF was 2/95 but has now been delayed until 10/95. Leading up to 10/95, the following is planned to occur: the DOE ORR and startup authorization process is completed by 5/95, the five month radioactive tie-ins of the NWTF to existing piping and diversion boxes is completed, post modification testing is completed, and WSRC/DOE review and approval of the modifications is completed. The 10/95 date is not based on a firm schedule as NWTF OPC personnel have been loaned to higher priority programs as described in section 6.4 above for the RHLWE. The OPC schedule can be recouped if personnel are returned to NWTF in mid-FY94.

In the past, the 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 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 DWPF simulant. 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 continue to be 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 and is managed within HLW and reported in the weekly HLW Plan of the Week meetings. 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. Five months of 1H Evaporator downtime have been scheduled for these tie-ins. This planned downtime could be reduced with detailed planning but this cannot be manned until personnel are returned to NWTF.

8.5.2 F/H Interarea Line

The F/H Interarea Line (IAL) connects the F-Area and H-Area Tank Farms. A description of the IAL is contained in Appendix A. All F-Area waste must be transferred through the IAL to be processed in ITP or ESP. Some of the dilute waste streams and all of the future HHW in the H-Area Tank Farm will be transferred to the F-Area Tank Farm via the IAL. The maintenance and operation of the IAL is therefore critical to the HLW Mission.

At this time, the capability does not exist to transfer waste from H-Area to F-Area or vice versa due to deficiencies in the process control instrumentation. When the NWTF starts up in 10/95, H-Area to F-Area transfers will be possible and are planned. These transfers will enable the 2F Evaporator to assist the H-Area Evaporators in the reduction of the HHW and ESP washwater backlogs. Also, the 2F Evaporator will have processed the backlog of available feed by 10/95. Delays in the NWTF startup beyond 10/95 will therefore result in decreased 2F Evaporator space gain.

F-Area to H-Area transfers cannot start until the process controls in F-Area are upgraded. This upgrade is not part of any existing project. It is assumed to be a future Division Managed Task. The scoping and engineering studies have been initiated, however, progress has been impeded by other higher priority programs such as manning the ITP outage and assisting with the Evaporator restarts. There is not a complete scope, schedule and estimate for this task at this time. This is an open issue and is listed as such in this Plan (see Appendix H.1).

There was a Line Item project to upgrade the IAL. The scope of this project was to install a containment building and remotely operated crane on the high point vent valve box (a small diversion box-type structure). The justification for this project was based upon improved contamination control, particularly alpha contamination, during maintenance. This project did not involve replacing the IAL or any significant piping modifications. A FY93 Reprogramming action effectively cancelled this project and reallocated the funding to Late Wash. The basis for cancelling the project was the infrequent need to perform maintenance in the high point vent valve box and the need to fund Late Wash.

8.6 Diversion Box & Pump Pit Containment

This project will install 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 OPC activities thus setting radioactive operations 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 time where 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.

8.7 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. The funding used to develop the waste removal schedule in this Plan is shown below as compared to the current projected waste removal allocation.

Year	Req'd to make schedule ($ x E6)	Current allocation to Waste Removal	cumulative delta
94	32.9	38.6	+ 5.7
95	54.5	38.9	- 9.9
96	51.7	42.9	- 18.7
97	58.3	62.2	- 14.8
98	58.6	74.8	+ 1.4
99	41.3	66.8	+26.9
00	42.4	68.2	+52.7

The table above shows that there is inadequate funding in FY95-97 to support the schedule and excess funding by the end of the planning period. This suggests that the waste removal program will fall behind schedule initially, recover by FY99-00 and then exceed the schedule thereafter. The waste removal program is currently being rebaselined in preparation for review by the Energy Systems Acquisition Advisory Board about mid-1994.

8.7.1 Salt Removal

Tank 41 will be the first salt tank fed to ITP. There are still outstanding criticality issues specific to Tank 41 due to the relatively concentration of fissile U and Pu. The concern is that insoluble fissiles can concentrate in low spots in the salt formation inside Tank 41. Previous sampling and analytical studies indicate that the majority of U is soluble and that initiation of salt dissolution can safely proceed. There has been limited progress in this area since rev 1 of this Plan. Additional salt samples have been taken from the top 12 inches from Tank 41 and analyzed. Further sampling was stopped due to lack of funding and increased emphasis on ITP startup. 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. While salt dissolution in Tank 41 can be safely initiated, it is still not known if all of the salt can be removed, the size of the batches or the rate of salt removal. Additional sampling and analyses are necessary to characterize the tank contents. 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. This will be accomplished through salt sampling followed by controlled dissolution batches based on sample results.

Salt removal from Tank 41 is scheduled to begin 4 months prior to ITP startup. This is necessary to ensure that there will be a full batch of salt solution (500,000 gallons) in Tank 48 at ITP startup. The initial salt removal from Tank 41 will be slow due to the lack of working capacity in the tank. As salt is removed, bigger and bigger salt removal batches can occur.

There will be alternate feeds to ITP during and after processing of Tank 41, 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, 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 chart in Appendix J entitled "Precipitate Volumes" shows the Tank 49 material balance and is based on the planned feed to ITP described in this section and based on the planned ready for hot operations date for Late Wash of 12/95 with precipitate feed introduced to DWPF in 11/96. 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 11/96 Late Wash startup is closer to the real "need" date

Tank 29 Salt Removal

Tank 29 is the second tank to be fed to ITP. All salt must be removed to permit the cooling coils to be replaced. 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 mechanical completion. At this time, Tank 29 salt removal will not be completed in time to support RHLWE startup and operation at high capacity. The planned space gain for the RHLWE is restricted to 1H Evaporator levels for the first 8 months of operation until Tank 29 is ready to receive salt. An evaluation will be made opposite Tank 41 experience other alternatives to explore potential cost and schedule savings. TEC activities are about 5% complete on this tank.

Tank 25 Salt Removal

Tank 25 will be the third tank fed to ITP. Tank 25 must be empty and returned to salt service before Tanks 27 and 46 are filled with salt. TEC activities are currently about 95% complete on Tank 25. Slurry pump run-in and installation and valve box modifications comprise the bulk of the remaining TEC scope.

Tank 31 Salt Removal

Tank 31 will be the fourth tank fed to ITP. 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. TEC activities are just beginning on this tank.

Tank 38 Salt Removal

Tank 38 will be the fifth tank fed to ITP. It must be emptied before Tank 41 is refilled. Design is just beginning in FY94 with the capital funding portion of Activity data Sheet (ADS) 314-LI.

Tank 47 Salt Removal

Tank 47 will be the sixth tank fed to ITP. The driver for salt removal from this tank is to enable sludge removal to begin as part of batch#3. 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. TEC work is scheduled to begin FY95.

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.

8.7.2 Sludge Removal

Sludge removal is performed in a manner that yields six discreet batches of sludge which will be individually segregated, characterized after pretreatment in ESP, and fed to DWPF. Sludge batch#1 is currently in process in ESP Tanks 42 and 51. Sludge removal to support sludge batch#2 is several years away as the three tanks that will constitute batch#2 are in the early stage of equipment design and construction. The six batches are shown in Appendix J.

At the time of this report, the limiting factor for HLW System attainment was the ability to fund waste removal operations on the sludge tanks. The System attainment for the duration of the waste processing campaign will average 45% with a high of 66% for batch#4. Additional planning and forecasting are underway that could improve these projections for batches#3, 4 and 5 as the projected funding during that time period is limited only by the capability of the System to effectively use it to accomplish the earliest completion of the waste processing program.

8.8 Defense Waste Processing

The DWPF startup schedule has been rebaselined since the last revision of this Plan to incorporate the changes resulting from the melter flooding occurrence. All known scope is included in the current schedule.

8.8.2 Vitrification

The date at which WSRC declares readiness is 11/15/93. The DOE ORR is scheduled to be complete within 30 days or by 12/16/95. Two weeks are scheduled to complete resolution of findings thus setting radioactive operations at 12/29/95. The plant will start with simulant spiked with radioactivity under the guidance of the test group and then transition to full radioactive operations with precipitate and sludge by 2/96, assuming that precipitate feed is available.

In the near term, the average attainment of DWPF, and therefore the HLW System, will be limited by the ability to provide the pretreated sludge feed. The consumption of batch#1 feed will occur from 2/96 until 11/01 for an average attainment of 35%. This is not to say that DWPF could not operate at a higher attainment and then shut down when the batch#1 sludge was completely consumed; only that the average attainment will be 35%.

In the long term, attainment will average 45%. The attainment for each sludge batch and for the entire campaign is shown below:

batch	start	finish	duration (months)	sludge volume (kgal)	attainment (%)
1	2/96	11/01	69	494	35
2	11/01	7/05	44	488	41
3	7/05	5/09	46	689	55
4	5/09	9/12	40	714	66
5	9/12	12/16	51	460	33
6	12/16	12/18	24	335	51
			274	3,180	45

8.8.2 Late Wash Facility

The Late Wash facility is scheduled to be started up concurrently with DWPF. In rev 0 of this Plan, WSRC had committed to a 10/96 startup and was evaluating a possible 10/95 readiness for startup. The FY94 Reprogramming will make it possible to achieve 12/95 if the Reprogramming is approved by 3/94, which it was. As was described in Section 8.2 and 8.7.1, the Tank Farm is currently developing a plan to have a sufficient quantity of precipitate available to prime the transfer pump in Tank 49 and then sustain feed at an average 35% attainment through FY01.

8.8.3 Saltstone Facility

Though currently operating, the Saltstone facility will require construction of additional vaults, capping of filled vault cells and construction of permanent roofs.

The required schedule for these repetitive projects is dependent upon the ITP production plan.

Currently, construction of Vaults#1 and 4 is complete and both vaults are in service. Vault#1 has 6 cells, 3 of which are filled and Vault#4 has 12 cells, 1 of which is filled (Vault#4 is the prototype for future vaults which will have 12 cells per vault). The current operating plan is as follows: as each cell is filled, a 1 foot thick isolation cap is installed and the Rolling Weather Protection Cover (RWPC) is moved to the next set of two cells. When all 12 cells are filled, the RWPC is dismantled and discarded. The future operating plan will be changed starting with Vault#4. The RWPC installed on Vault#4 will be dismantled as clean waste and a permanent roof will be installed. Design, procurement and construction will be initiated in FY94. This approach results in a significant cost savings.

8.9 Consolidated Incinerator Facility

The CIF is currently scheduled to be complete in mid-1995 after which a trial burn will be conducted. The FFCA commitment is for radioactive operations to begin by 2/2/96 with the CIF running about 1 month ahead of this schedule. The CIF will become an integral part of the HLW System at the time when the benzene storage tank at DWPF becomes full. Due to the low attainment in the early years of DWPF operation, there will be less Cesium/Potassium Tetraphenyl Borate fed to DWPF and therefore less benzene generated when compared to the long term average flowsheet. CIF is not expected to be required to support the HLW System until 2002, well after its forecasted startup date. For this reason, the CIF is treated in a summary fashion in this document.

There are CIF concerns that could impact the HLW System operation. Currently, the CIF is preparing an Environmental Impact Statement (EIS) in parallel with continuation of construction of the facility. The EIS is not a prerequisite for radioactive operations at this time. The concern is that the EIS could become a predecessor which could delay the startup. Another concern is the DOE moratorium on incinerators. While this does not apply to the CIF because the CIF was started before the moratorium, there is a concern that this could change over time.

8.10 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 HLW 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.

The ongoing WSRC budget scrub will recommend deferring some of the new starts because HLWM does not have the personnel to support them at this time and/or because the projected funding is needed for higher priority programs. Those projects essential to the safe operation, treatment and disposal of HLW were assumed to be supported and appropriate funding has been reserved in the five year planning period (see Appendix M).

Deferring new start projects consistent with a "just in time" philosophy has the effect of absorbing a significant amount of the reduced EM budget forecast for FY97-99 without severely impacting the HLW mission.

Also contained in the HLW New Facility Planning ADS is the funding for ongoing Ion Exchange studies. While the issue of Ion Exchange as a first generation ITP replacement has been closed, there are ongoing technical, project scoping and 1/2 scale Ion Exchange skid testing programs that are funded in FY94. SRS funding in the amount of $2,000,000 plus additional funding from the DOE Office of Technology and Development (OTD) in the amount of $1,500,000 has enabled the following to occur in FY94:

- Ion Exchange Skid Testing

  An existing 20 gpm skid, previously bought using OTD funding, will be connected to support services and tankage and used to conduct test runs with waste simulating conditions at Hanford, Oak Ridge and SRS. The objective of the test program will be to determine resin physical strength, resin stability, hydraulic degradation, fines removal, column pressure drop, decontamination factors, resin life, elution characteristics, filtration attributes and resin removal.

- Ion Exchange Engineering Cost Estimate

  The objective is to provide a bounding type cost estimate for a stand alone IX facility assuming that ITP starts up and operates for several years. The cost to complete this study is $633,000 with scheduled completion in 4/94. This effort was stopped during 12/93 per DOE-SR guidance. There are no plans to resume at this time.

- DWPF Recycle Reduction

  Studies are underway to develop a program suitable for release to a vendor that will couple GT-73 mercury removal resin with filtration to enable the DWPF mercury testing effluent to be processed at ETF in lieu of in the Tank Farm Evaporators. This will reduce the Tank Farm load by about 200,000 gallons of waste. Completion of this study is scheduled for 1/94.

  Additional studies are underway with the objective of reducing hot DWPF recycle. A task team has been formed and they have issued a draft study that identifies numerous potential reductions and breaks them down into three categories based on ease of implementation. The final study is scheduled to be released 1/94. At that time, additional work will be scheduled to evaluate the report and determine which options should be implemented, when and how to fund them.

- ESP Washwater Reduction

  The objective of this study is to reduce the amount of ESP washwater that must be evaporated. This could potentially be done in one of several ways such as treating washwater with an ion exchange process, reuse of washwater in ways not currently planned, changing the washing strategy where less water is needed or changing the washing strategy as it relates to DWPF. This subject has been studied several times in the past and is therefore not considered to hold much potential for additional savings. This study has started, however, completion is currently not scheduled due to higher priority programs and manpower limitations.

- RBOF Treatment

  The Tank Farm receives a waste stream from RBOF that is projected to average 50,000 gallons per month. This stream is evaporated by the 2H Evaporator. In the past, this stream was treated by a small Cesium Removal Column located in Tank 32. The treated effluent was then transferred to the ETF. This practice was stopped due to the excessive generation of spent zeolite resin. Improved resins are currently available that could potentially be adapted to this use. Currently, field walkdowns are in progress to determine the scope of resuming this practice. It is known that control and piping deficiencies will need to be corrected. This program is not adequately manned for rapid completion and therefore has no scheduled completion date, again, due to manpower limitations and other higher priority programs.

8.0 Contingency Analysis

8.1 Programmatic Contingency

Uncertainties are listed in Appendix H.1. 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

Technical uncertainties are listed in Appendix H.2 as above. The bulk of the technical uncertainties relate to the operation of the DWPF and ITP processes. The uncertainties are primarily emergent issues that were identified during cold chemical testing. There are few issues concerning the interaction between facilities such as the ability to meet the downstream facilities' feed specifications.

The batch nature of the entire HLW System is very forgiving in this regard as each batch can be reworked, washed further, chemically adjusted, etc., before feeding to the downstream facility. Trim chemicals can also be added at DWPF.

It is important to recognize that each step in the HLW System has been demonstrated with the actual radioactive waste that is to be processed. The scale of the SRS demonstrations was huge by industry standards. The scale of the successful Extended Sludge Processing, In-Tank Precipitation and Waste Removal demonstrations were larger than the entire waste removal and processing programs at some other DOE sites. ESP processed 125,000 gallons of settled sludge; ITP produced 500,000 gallons of filtrate and Waste Removal has been performed in over 10 tanks with millions of gallons of salt and sludge removed and pumped through the 2.2 mile long Inter-Area Line.

Although each process may not be the current state-of-the-art or the optimal process in today's environment, the technology is mature, has been thoroughly demonstrated and the HLW System is on the brink of starting up and largely eliminating the HLW environmental risk at SRS. The largest technical issue that remains is to market our program and educate those who would have us abandon 15 years of work for some relatively immature and undemonstrated process.

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 segregated 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 the F-Area Tank Farm. All of the tanks were built of carbon steel inside reinforced concrete containment vaults, 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 99,000,000 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 starting in 1994. 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 1.5 to 3.6 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 in 1997. 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 decontamination factors 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 16. Salt removal and sludge removal using mechanical agitation has also been demonstrated on Tanks 15, 17-22 and 24. Facilities have been designed using data and experience gained from these demonstrations. To date, 2.3 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 resettle 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 then 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 hot tie-ins in mid-1995 and hot operation in late 1995. 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.

F/H Interarea Line

The F/H IAL connects the F-Area and H-Area Tank Farms. The IAL is approximately two miles long with a high point at the middle and a low point at each end. The line segments terminate at the high point in a small diversion box-type structure that is used to flush and/or vent the transfer lines. Flushing capability is provided by a portable 10,000 gallon tank that is filled by truck. The line segments that terminate at the low point do so in FDB-2 and HDB-2. These diversion boxes can be jumpered such that any tank in either Tank Farm can be transferred to any tank in the other Tank Farm.

The IAL piping consists of two three inch diameter core pipes inside of individual four inch diameter jackets. The core pipes are constructed of stainless steel 304L while the jackets are carbon steel. The jackets are supported by concrete pedestals bearing on a concrete pad that runs the length of the IAL. There is also a protective concrete pad overlaying the IAL.

The IAL is currently out of service due to process control instrumentation deficiencies in F and H-Areas. When the NWTF starts up, the H-Area end of the IAL will be disconnected from HDB-2 and connected to HDB-8. At this time, H-Area to F-Area transfers will be possible using the NWTF control system. F-Area to H-Area transfers will not be possible until the F-Area control system is upgraded. This is currently planned to be handled as a Division Managed Task. This task has yet to be fully scoped, scheduled and cost estimated.

Once the IAL is fully operational, all F-Area waste will eventually be transferred to the H-Area ITP and ESP facilities for further processing. Also, H-Area HHW and future dilute waste from DWPF (recycle) and ESP (spent washwater) will be transferred to F-Area as feed for the 2F Evaporator.

At one time, there was a Line Item project to upgrade the IAL. The scope of this project was to install a containment building and remotely operated crane on the high point vent valve box. The justification for this project was based upon improved contamination control, particularly alpha contamination, during maintenance. This project did not involve replacing the IAL or any significant piping modifications. A FY93 Reprogramming action effectively cancelled this project and reallocated the funding to Late Wash. The basis for cancelling the project was the infrequent need to perform maintenance in the high point vent valve box and the need to fund Late Wash.

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 a period of time when this project could effect the other operations listed above. This 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 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 in each processing tank supply the agitation for washing. Washwater 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, both Type IV tanks, will be used for staging this washwater.

In-Tank Precipitation

Salt will be removed from the waste tanks and processed via ITP. ITP conducts a precipitation/adsorption reaction with sodium tetraphenylborate and sodium titanate 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/furnace slag 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-F, selected liquid regeneration wastes from the resin regeneration facility in H Area, and water collected in the 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 pH adjustment, 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.

The ETF has been used to support DWPF Cold Chemical Runs. Water and cold chemicals used in the DWPF Cold Chemical Runs test program after melter heatup have been trucked to the ETF because this stream could not go to Horse Creek Valley. 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 aggressive program underway to make the necessary piping and process changes to enable the ETF to process the mercury runs recycle.

Defense Waste Processing

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, located at the former 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 crossflow 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 is designed to process 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 $\leq$ 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 ground borosilicate glass and then heating the mixture in an electric melter to 1130 degrees centigrade. The molten mixture is then poured into ten foot tall by two foot diameter stainless steel canisters and allowed to harden. The outer surface of each canister is then decontaminated to Department of Transportation 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.

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 trace 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.

Appendix B.1 - HLW System Safety Documentation

Process	Safety Documents	Comments
F and H Tank Farm	1, 7, 8, 9, 13, 14, 18, 19, 20, 21, 22, 23	
Evaporators	1, 7, 8, 9, 13, 14, 18, 19, 20, 21, 22, 23	
Replacement High Level Waste Evaporator	1, 7, 8, 9, 13, 14, 18, 19, 20, 21, 22, 23	Additional RHLWE-specific safety documentation will be developed.
Sludge Waste Removal	1, 7, 8, 9, 13, 14, 17, 18, 19, 20, 21, 22, 23	
Salt Waste Removal	1, 7, 8, 9, 13, 14, 18, 23, 24, 25, 26	
Extended Sludge Processing	1, 6, 7, 8, 11, 13, 14, 18, 22, 23, 26	
In-Tank Precipitation	1, 6, 7, 8, 9, 10, 13, 14, 16, 17, 18, 23, 24, 25	
Defense Waste Processing Facility	2, 3, 12	DWPF safety documentation will transition from the CCR Safety Envelope to a complete SAR as facility startup testing proceeds.
Saltstone	4, 15	A JCO is in effect until the SAR is approved by DOE.
F/H Effluent Treatment Facility	27, 28	

Appendix B.1 - HLW System Safety Documentation

Process	Safety Documents	Comments
Transfer Facilities (New Waste Transfer Facility, Diversion Boxes, Inter-Area Lines, Pump Pit Facilities)	1, 7, 8, 9, 13, 14, 18, 19, 20, 21, 22, 23, 30	
Consolidated Incineration Facility	5	An SAR is in the review and approval cycle.

Appendix B.1 - HLW System Safety Documentation

Note: The following list contains the primary nuclear safety documents associated with the High Level Waste System. It is not intended to be an all-inclusive list.

Safety Analysis Reports

1. DPSTSA 200-10, SUP18, August 1988
   Safety Analysis - 200 Area Savannah River Plant Separations Area
   Operations/Liquid Radioactive Waste Handling Facilities

2. DPSTSA 200-10, SUP-20
   Safety Analysis, 200 S-Area, Savannah River Site, Defense Waste Processing Facility, Operations

3. WSRC-RP-92-975, Rev. 1, December 21, 1992
   Defense Waste Processing Facility, Cold Chemical Runs Safety Envelope

4. WSRC-SA-3, DOE Review Draft, September 1992
   Safety Analysis Report, Z-Area, Savannah River Site, Saltstone Facility

5. WSRC-SA-17 (Draft), December 1993
   Safety Analysis Report, Savannah River Site, Consolidated Incinerator Facility

Addenda to Safety Analysis Reports

6. WSRC-SA-15, Rev. 3, August 1993 (WSRC Approved)
   Addendum - 1, Additional Analysis for DWPF Feed Preparation by In-Tank Precipitation
   (Addendum to DPSTSA 200-10, SUP 18)

SAR Addendum Database

7. WER-WME-921136, Rev. 6, October 1993
   Tank Farm SAR Addendum Database (Error Corrections List)

Appendix B.1 - HLW System Safety Documentation

Operational Safety Requirements

8. DPW-86-103, Rev. 1, February 1989
   Operational Safety Requirements for Waste Management Operations

9. WSRC-RP-92-1044, Rev. 0, September 1993 (WSRC Approved)
   Interim Operational Safety Requirements for F and H-Area High Level Radioactive Waste Tank Farms

10. WSRC-RP-90-1124, Rev. 3, June 1993 (WSRC Approved)
    Operational Safety Requirements In-Tank Precipitation Process

11. WSRC-RP-93-224, Rev. 1, August 1993 (WSRC Approved)
    Operational Safety Requirements Extended Sludge Processing

12. WSRC-RP-92-838, Rev. 1
    Cold Chemical Runs Operational Safety Requirements

Basis for Interim Operations/Justification for Continued Operation

13. WSRC-RP-92-964, Rev. 0, April 1993
    Savannah River Site Liquid Radioactive Waste Handling Facilities - Justification for Continued Operation

14. SR-HLE-93-1736, September 1993
    Justification for Continued Operations - Attachment to HLW-930743
    Expires April 26, 1994

15. WSRC-RP-92-444, March 31, 1992
    Justification for Continued Operation of the SRS Saltstone Facilities (Z-Area)

Appendix B.1 - HLW System Safety Documentation

Test Authorizations

16. WSRC-OX-89-001, Rev. 4
    Tank 50H to Saltstone Transfer

17. WSRC-TA-91-0005-11, Rev. 1
    Tank 48/49 Nitrogen/Ventilation System Testing

Technical Standards

18. DPSTS-241, Rev. 2, February 1992
    Technical Standard - Waste Tank Farms

Safety Evaluations and Other Documents

19. SR-HLE-93-341, February 1993
    USQD - Potential Inadequacy in the Authorization Basis for Criticality Safety in the Waste Evaporators

20. WSRC-TR-93-081, February 1993
    Evaluation of Potential Accumulation of Uranium and/or Plutonium in the HLW Evaporator System

21. SR-HLE-93-557, March 1993
    USQD - Potential Inadequacy in the Authorization Basis for Criticality Safety Involving Evaporation of ESP Batch One Wash Water

22. WSRC-TR-93-115, February 1993
    Nuclear Safety of Extended Sludge Processing on Tank 42 and 51 Sludge (DWPF Sludge Feed Batch One)

23. SR-HLE-93-1736, September 1993
    USQD - Hydrogen Deflagration in HLW Tank 241-F & H

Appendix B.1 - HLW System Safety Documentation

Safety Evaluations and Other Documents (continued)

24. WSRC-TR-93-171, March 1993
Nuclear Criticality Safety Bounding Analysis for the In-Tank Precipitation (ITP) Process

25. WSRC-TR-92-427, October 1993
Safety Evaluation of the ITP Filter/Stripper Test Run and Quiet Time Run Using Simulant Solution (U)

26. WSRC-TR-93-207, April 1993
Safety Evaluation of the ESP Sludge Washing Baseline Runs

27. WSRC-TR-93-031, Rev. 1, April 1993
Hazards Assessment Document Effluent Treatment Facility Balance of Plant

28. SRL-NPS-920001, Rev. 1, January 1993
Safety Envelop Evaluation of ETF Alarm Failure Incident

29. PHR 200-H-33, Rev. 2, October 1990
Periodic Process Hazards Review

30. WSRC-RP-92-1396, (Draft) (Upon WSRC Approval)
Safety Evaluation for the New Waste Transfer Facility

Appendix B.2 - HLW System Environmental Documentation

Process	Environmental Documents	Comments
F and H Tank Farm	1, 2, 5, 9, 16, 17, 21, 22, 23, 31, 32	
Evaporators	1, 2, 5, 9, 16, 17, 21, 22, 23, 31, 32	
Replacement High Level Waste Evaporator	1, 2, 5, 9, 25	
Sludge Waste Removal	1, 2, 5, 9, 16, 17, 21, 22, 23, 31, 32	
Salt Waste Removal	1, 2, 5, 9, 16, 17, 21, 22, 23, 31, 32	
Extended Sludge Processing	1, 2, 5, 9, 16, 17, 22, 31	
In-Tank Precipitation	1, 2, 5, 9, 16, 18, 21, 22, 31	
Defense Waste Processing Facility	3, 4, 7, 8, 10, 14, 19, 21, 27, 34	
Saltstone	3, 7, 11, 14, 20, 21, 28, 30, 35	
F/H Effluent Treatment Facility	1, 2, 12, 13, 21, 26, 33	
Transfer Facilities (New Waste Transfer Facility, Diversion Boxes, Inter-Area Lines, Pump Pit Facilities)	NWTF: 1, 2, 9, 21, 24 All Others: 1, 2, 5, 7, 9, 16, 17, 21, 22, 23, 31, 32	
Consolidated Incineration Facility	1, 6, 7, 14, 15, 21, 29	

Appendix B.2 - HLW System Environmental Documentation

Note: The following list contains the primary environmental documents associated with the High Level Waste System. It is not intended to be an all-inclusive list.

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, effective August 16, 1993.

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, March 13, 1991.

Resource Conservation and Recovery Act:

7. RCRA Part A Permit #SC1890008989 for Savannah River Plant, June 30, 1987.

8. RCRA Part B Permit Application for the Organic Waste Storage Tank, Volume VI, Interim Status.

Appendix B.2 - HLW System Environmental Documentation

South Carolina Department of Health and Environmental Control Industrial Wastewater Permit

9. SCDHEC Permit #17,424-IW for F/H Area Tank Farms, March 3, 1993.

10. Permit #16783: Vitrification Facility, August 14, 1992.

11. Permit #12683: Saltstone Facility, July 18, 1988.

12. Permit #12870 and Addendums: Effluent Treatment Facility, September 30, 1988.

National Emission Standard for Hazardous Air Pollutants

13. A033677, NESHAP Approval for Construction of the Effluent treatment Facility, March 17, 1988.

14. EPA NESHAP Approval for Construction of ITP and DWPF, April 25, 1988.

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

15. Permit #0080-0041-H-CG for the Consolidated Incinerator Facility, November 25, 1992.

16. Permit to Operate Seven (7) Diesel Generators at Waste Management Facilities in H-Area - Permit #0080-0041, May 18, 1993..

17. Permit to Operate Five (5) Diesel Generators at Waste Management Facilities in F-Area - Permit #00800-0045, February 20, 1990.

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, (DWPF Canyon Exhaust Stack), August 1993.

20. Air Quality Control Permit #0080-0080 and Addendums, (Z-Area Standby Diesel), October 9, 1989.

Appendix B. 2 - HLW System Environmental Documentation

National Pollution Discharge and Elimination System

21. NPDES Permit for Savannah River Site; Permit # SC000175, September 24, 1986.

South Carolina Department of Health and Environmental Control Domestic Water Permit

22. Permit SC#405556: H-Area Facilities, April21, 1988.
23. Permit SC#405566: F-Area Facilities, May 3, 1988.
24. Permit SC#401118: New Waste Transfer Facility, April 18, 1988.
25. Permit SC#LS91007: Replacement High Level Waste Evaporator, May 2, 1991.
26. Permit SC#LS-233-W: Effluent Treatment Facility.
27. Permit SC#402186 and Addendums: Defense Waste Processing Facility, Domestic Water Distribution, Tank and Treatment, June 30, 1989.
28. Permit SC#400737: Saltstone, Domestic Water Lines and Tank, May 26, 1988.
29. Permit Pending for CIF.

South Carolina Department of Health and Environmental Control Landfill Permit

30. Saltstone Solid Waste Disposal Site, #IWP-217, approved 10/17/89.

Appendix B. 2 - HLW System Environmental Documentation

South Carolina Department of Health and Environmental Control Sanitary Water Permit

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

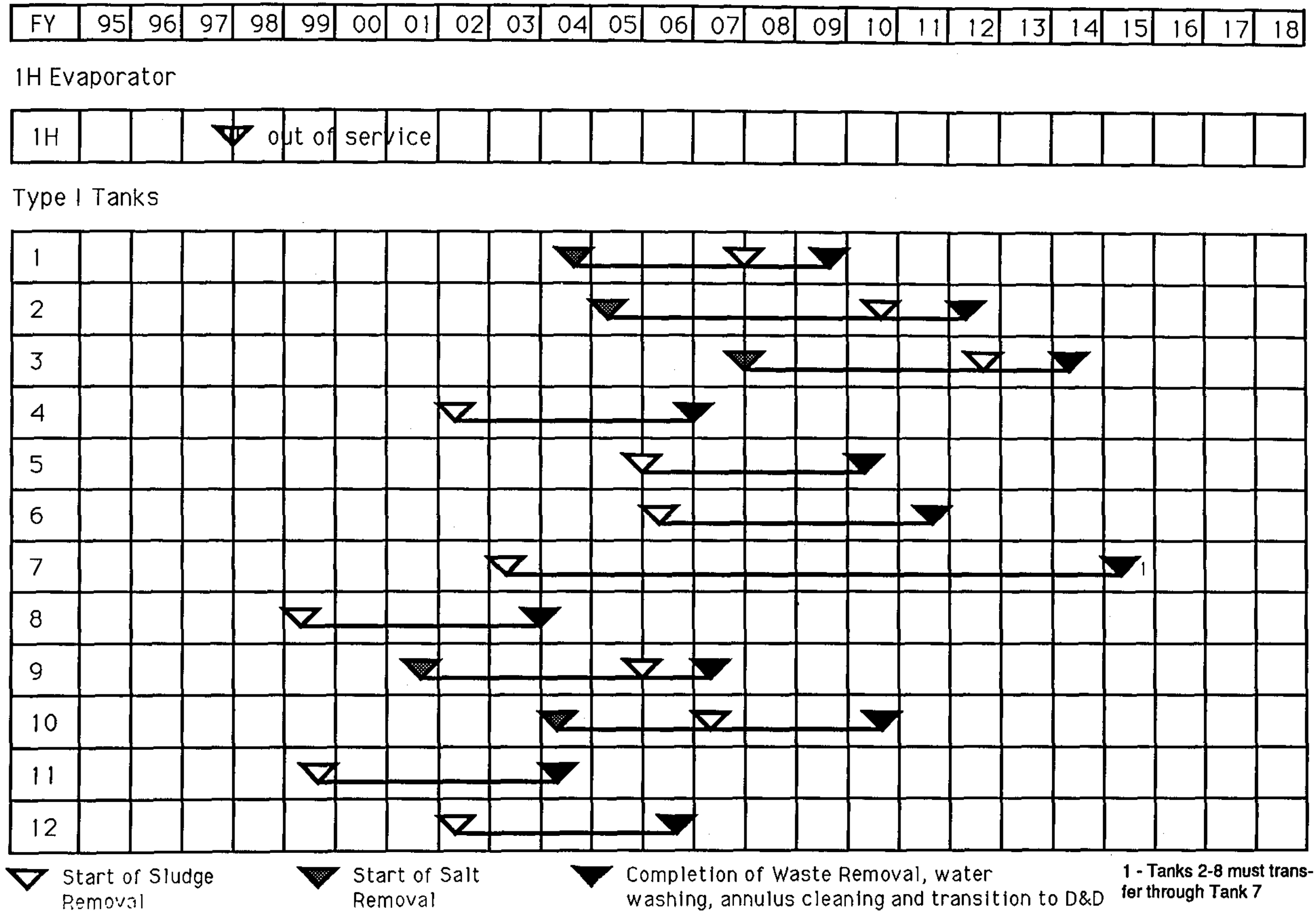
32. Permit #9326 and Addendum: F-Area Facilities.

33. Permit #9998 and Addendum: Effluent Treatment Facility.

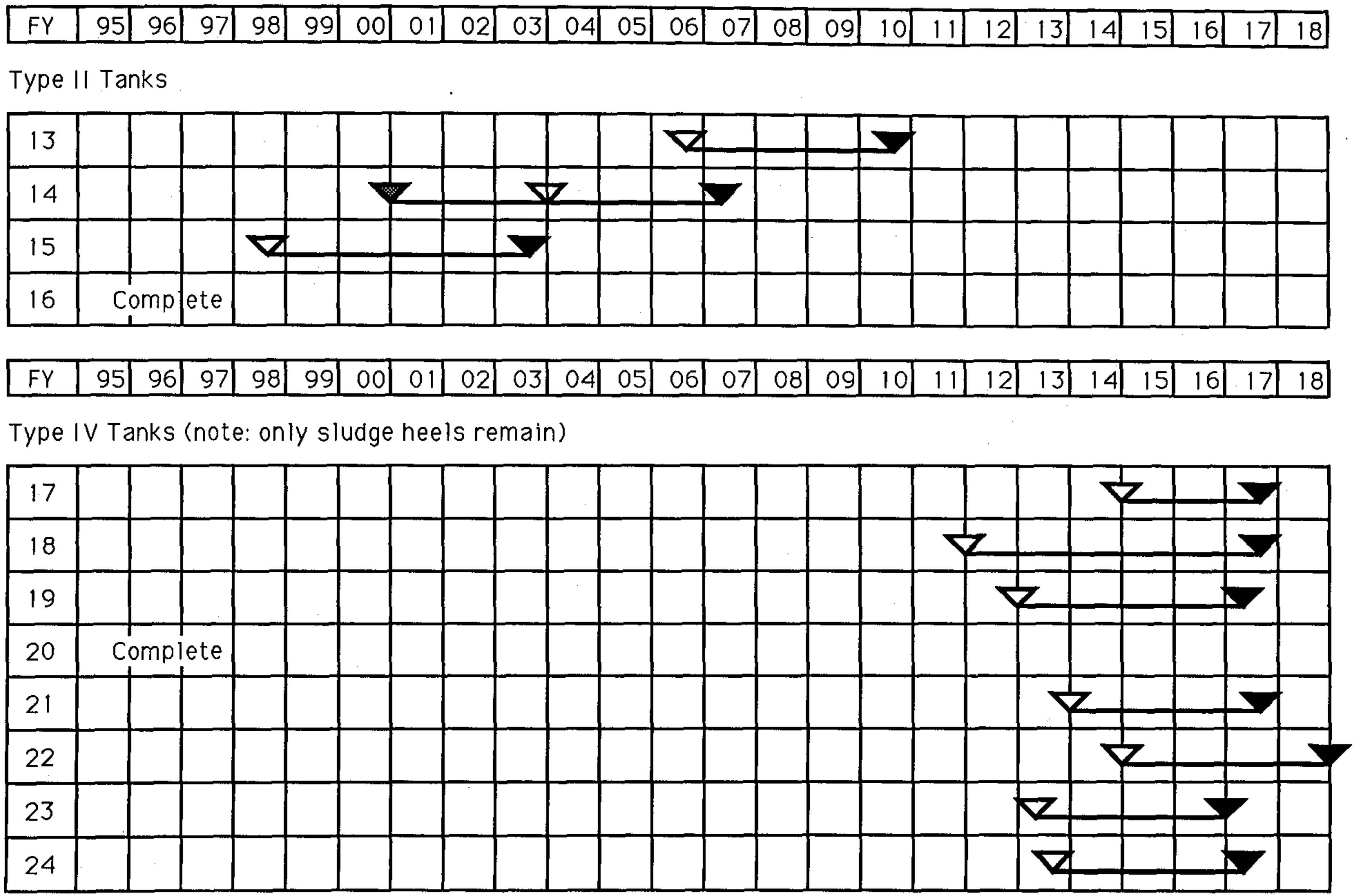
34. Permit #9888 and Addendum: Defense Waste Processing Facility.

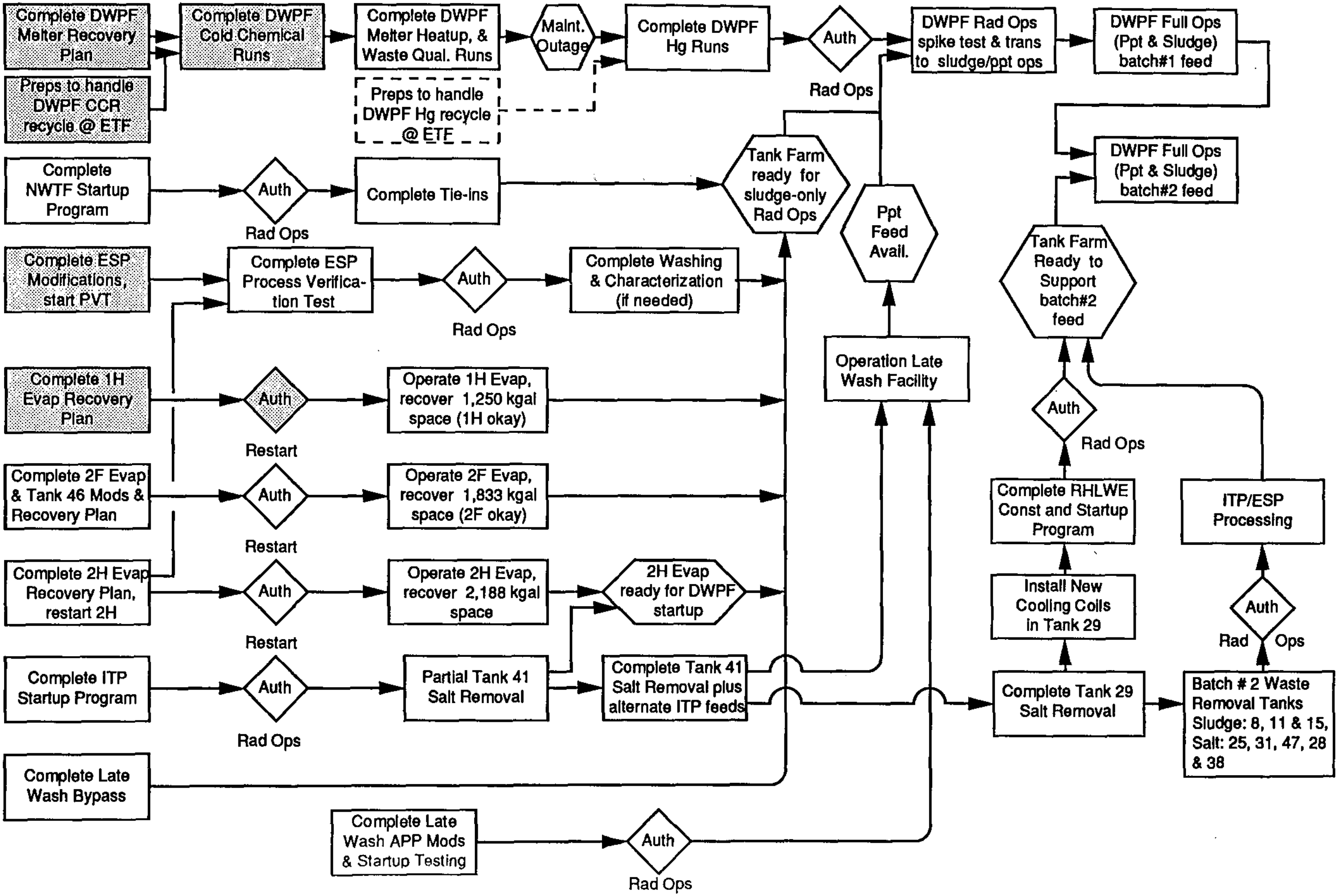
35. Permit #13717: Saltstone.

Appendix C Type I, II and IV Tank Waste Removal Schedule



Appendix C - Type I, II and IV Tank Waste Removal Schedule




Complete DWPF Melter Recovery Plan
Complete DWPF Cold Chemical Runs
Complete DWPF Melter Heatup, & Waste Qual. Runs
Maint. Outage
Complete DWPF Hg Runs
Auth
Rad Ops
DWPF Rad Ops spike test & trans to sludge/ppt ops
DWPF Full Ops (Ppt & Sludge) batch#1 feed
Preps to handle DWPF CCR recycle @ ETF
Preps to handle DWPF Hg recycle @ ETF
Complete NWTF Startup Program
Auth
Rad Ops
Complete Tie-ins
Tank Farm ready for sludge-only Rad Ops
Ppt Feed Avail.
DWPF Full Ops (Ppt & Sludge) batch#2 feed
Complete ESP Modifications, start PVT
Complete ESP Process Verification Test
Auth
Rad Ops
Complete Washing & Characterization (if needed)
Tank Farm Ready to Support batch#2 feed
Operation Late Wash Facility
Complete 1H Evap Recovery Plan
Auth
Restart
Operate 1H Evap, recover 1,250 kgal space (1H okay)
Auth
Rad Ops
Complete 2F Evap & Tank 46 Mods & Recovery Plan
Auth
Restart
Operate 2F Evap, recover 1,833 kgal space (2F okay)
Complete RHLWE Const and Startup Program
ITP/ESP Processing
Complete 2H Evap Recovery Plan, restart 2H
Auth
Restart
Operate 2H Evap, recover 2,188 kgal space
2H Evap ready for DWPF startup
Install New Cooling Coils in Tank 29
Auth
Rad Ops
Complete ITP Startup Program
Auth
Rad Ops
Partial Tank 41 Salt Removal
Complete Tank 41 Salt Removal plus alternate ITP feeds
Complete Tank 29 Salt Removal
Batch # 2 Waste Removal Tanks Sludge: 8, 11 & 15, Salt: 25, 31, 47, 28 & 38
Complete Late Wash Bypass
Complete Late Wash APP Mods & Startup Testing
Auth
Rad Ops

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 7. Evaporator capacity	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	1. Run ITP to remove salt or concentrated supernate from Evaporator salt receipt tanks 2. Restart 2F and 2H Evaporators as scheduled 3. Operate evaporators at planned space gain 3. Maintain adequate capacity in the ETF	1. Startup and operation of ITP 2. Available manpower. 3. No major upset scenarios in Tank Farms/Canyons that would consume ETF capacity 4. ETF capable of handling evaporator overheads
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

Appendix E - Process Logic Interactive Matrix

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 achieve 12/94 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

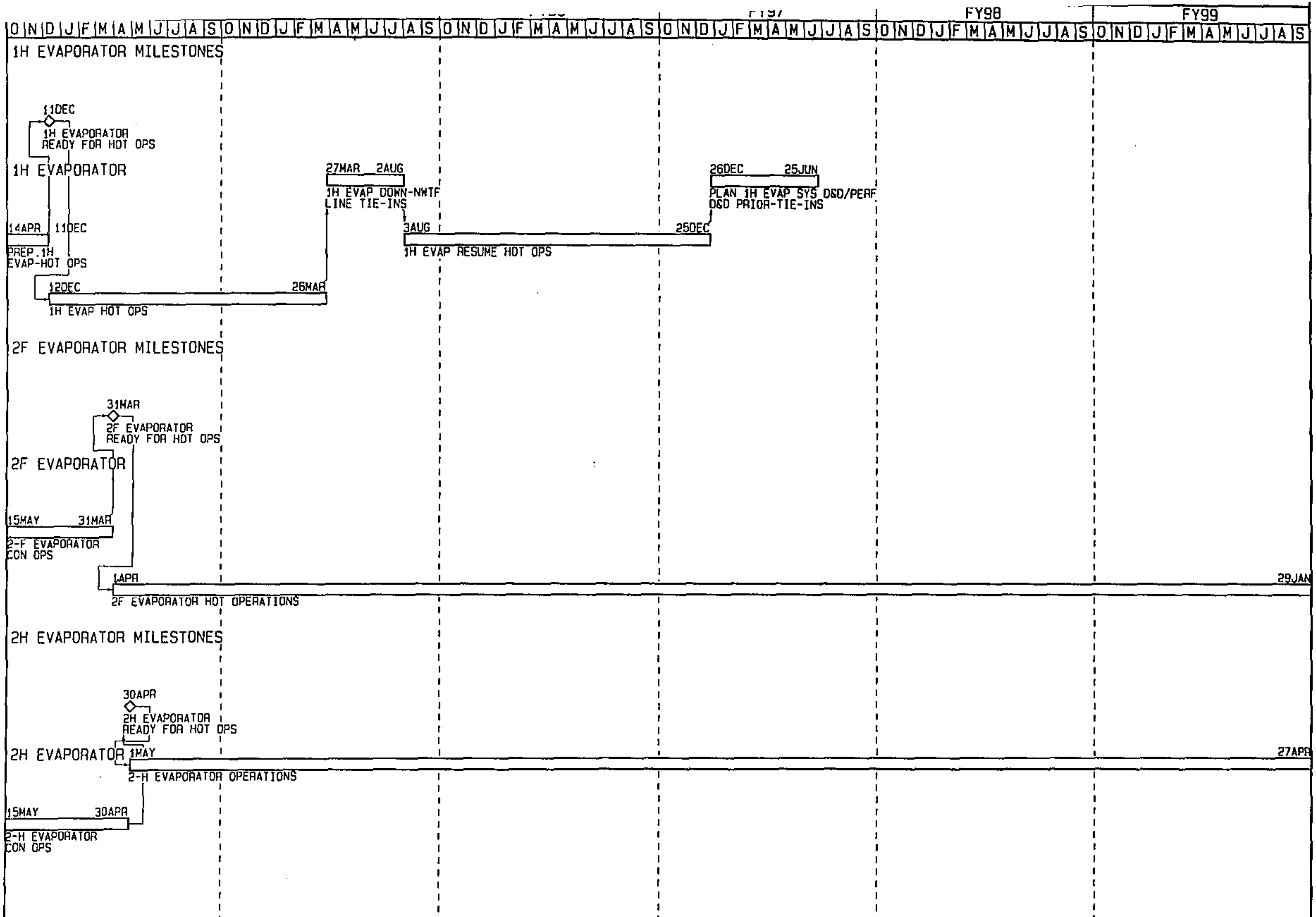
Appendix E - Process Logic Interactive Matrix

Process	Limiter	Solution	Dependent Upon
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
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 receive 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.

Appendix E - Process Logic Interactive Matrix

Process	Limiter	Solution	Dependent Upon
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 System Integrated Schedule



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Date	Revision	Checked	Approved
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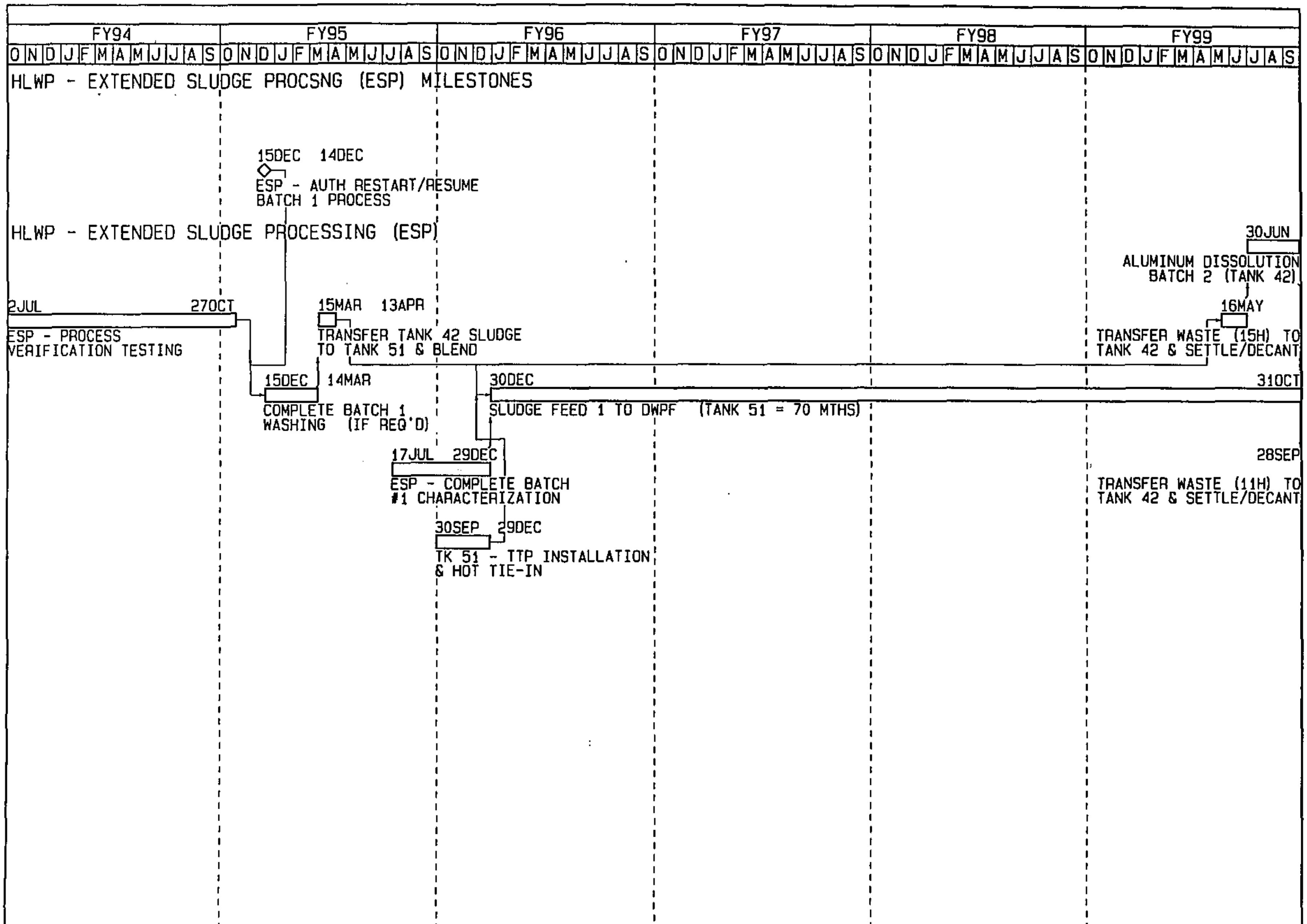

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Project Finish 6APR19

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

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

HLW SYSTEM PLAN REV 2 - DRAFT

Date	Revision	Checked	Approved
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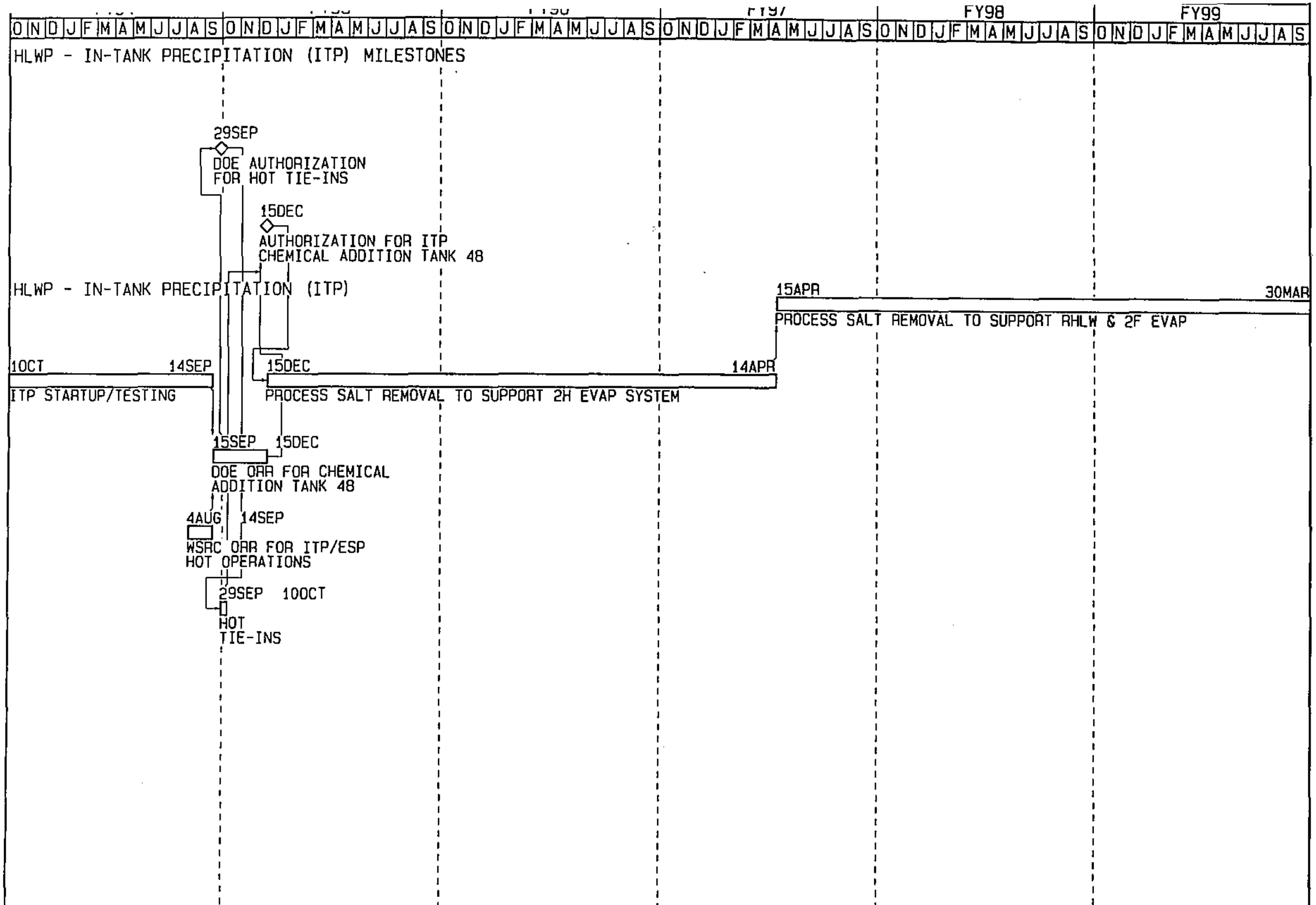

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Project Finish	6APR19

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Start Finish
Activity Bar/Early Dates
Critical Activity
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Milestone/Flag Activity

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WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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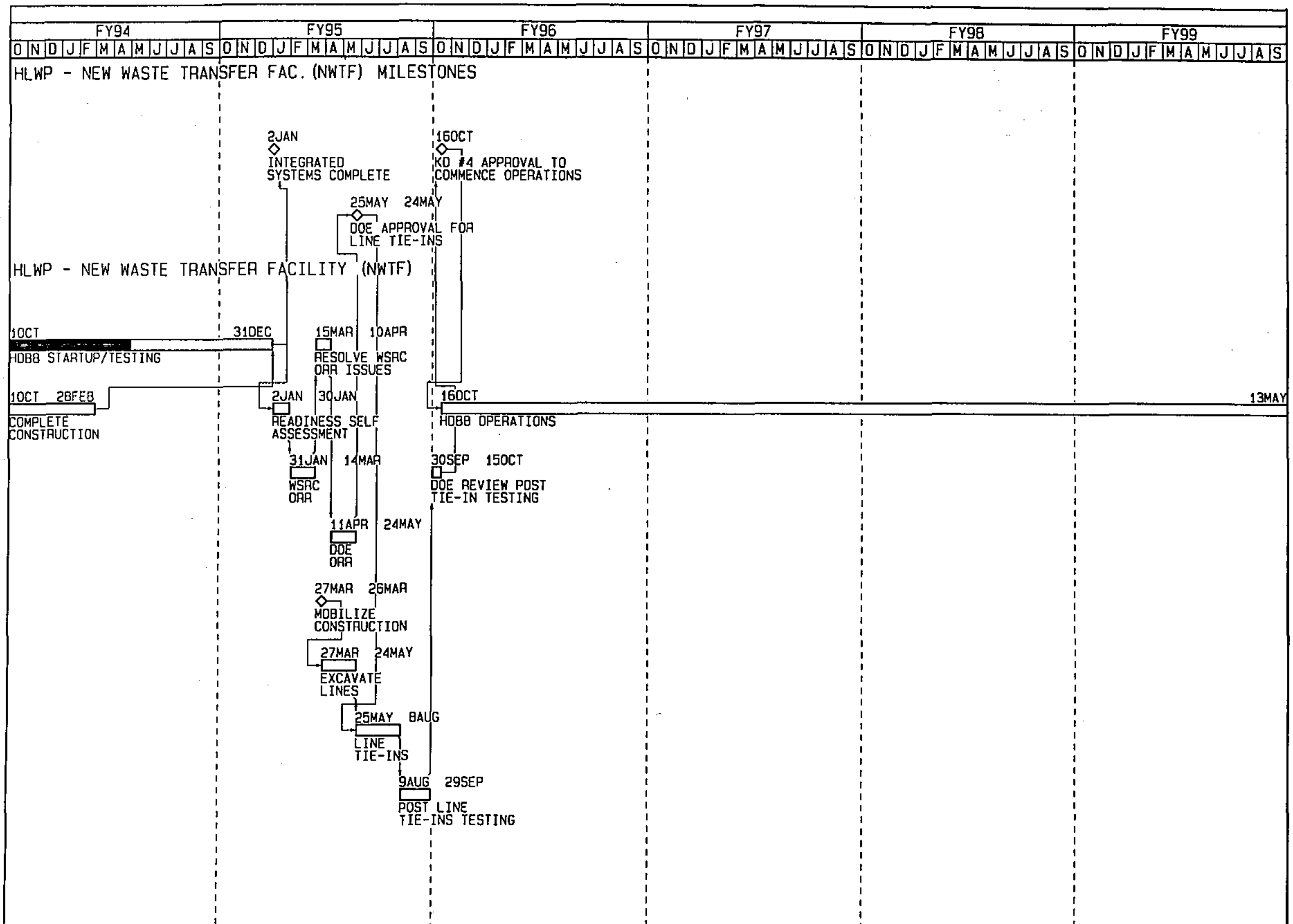

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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Sheet 1 of 1

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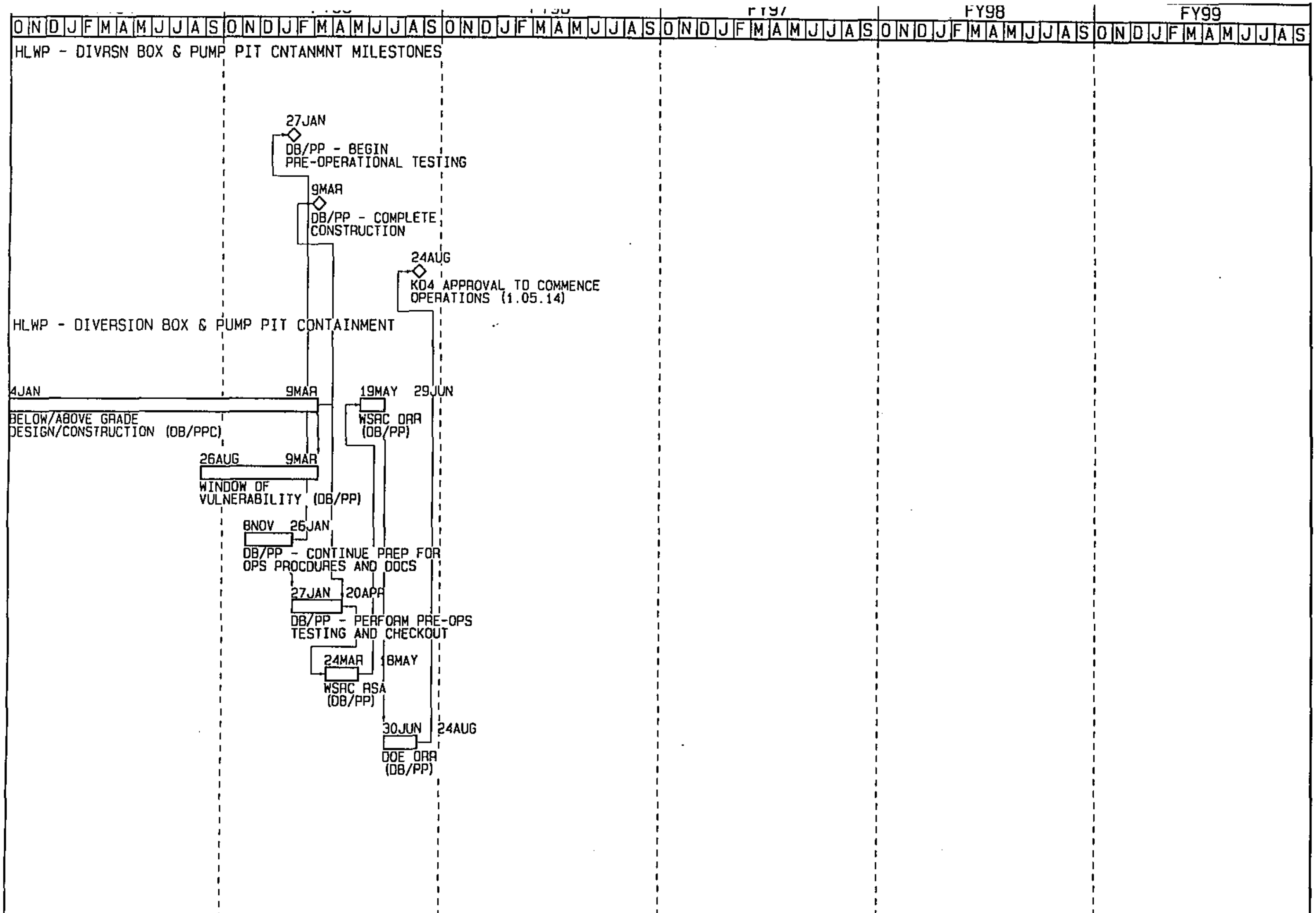

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Activity Bar/Early Dates
Critical Activity
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Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
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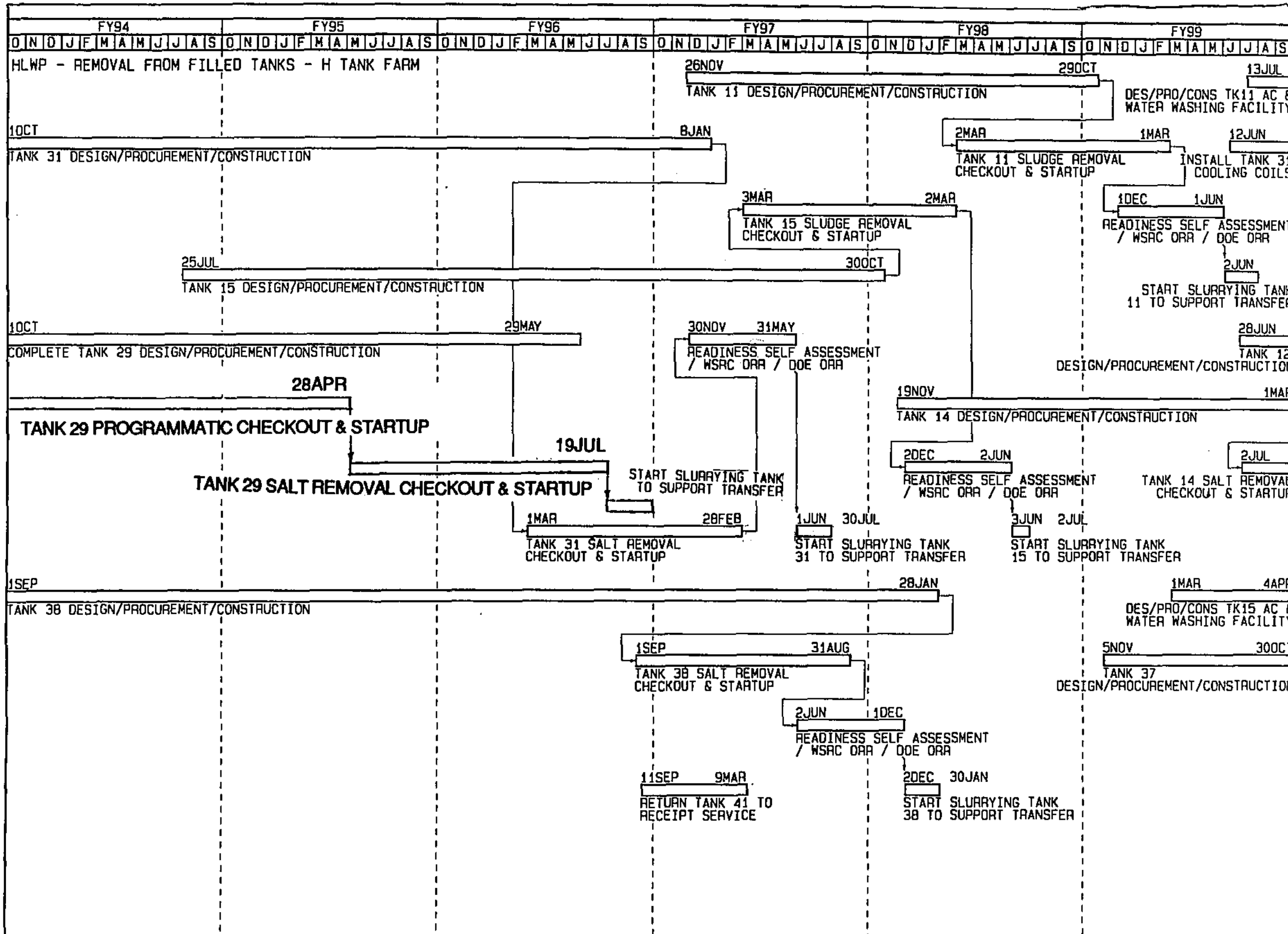

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Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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Sheet 1 of 1

HLW SYSTEM PLAN REV 2 - DRAFT

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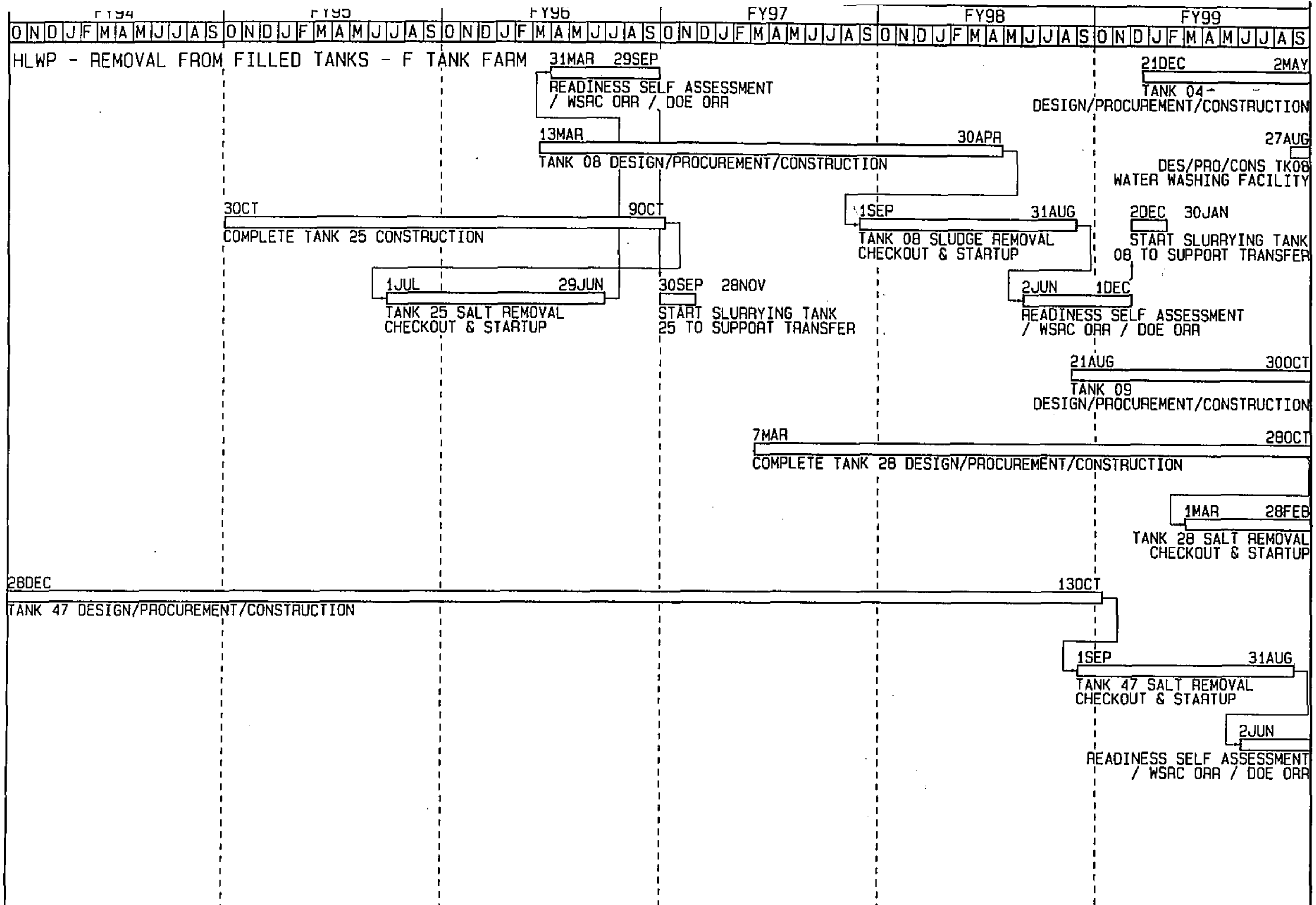

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Activity Bar/Early Dates
Critical Activity
Progress Bar
Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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Sheet 1 of 1

HLW SYSTEM PLAN REV 2 - DRAFT

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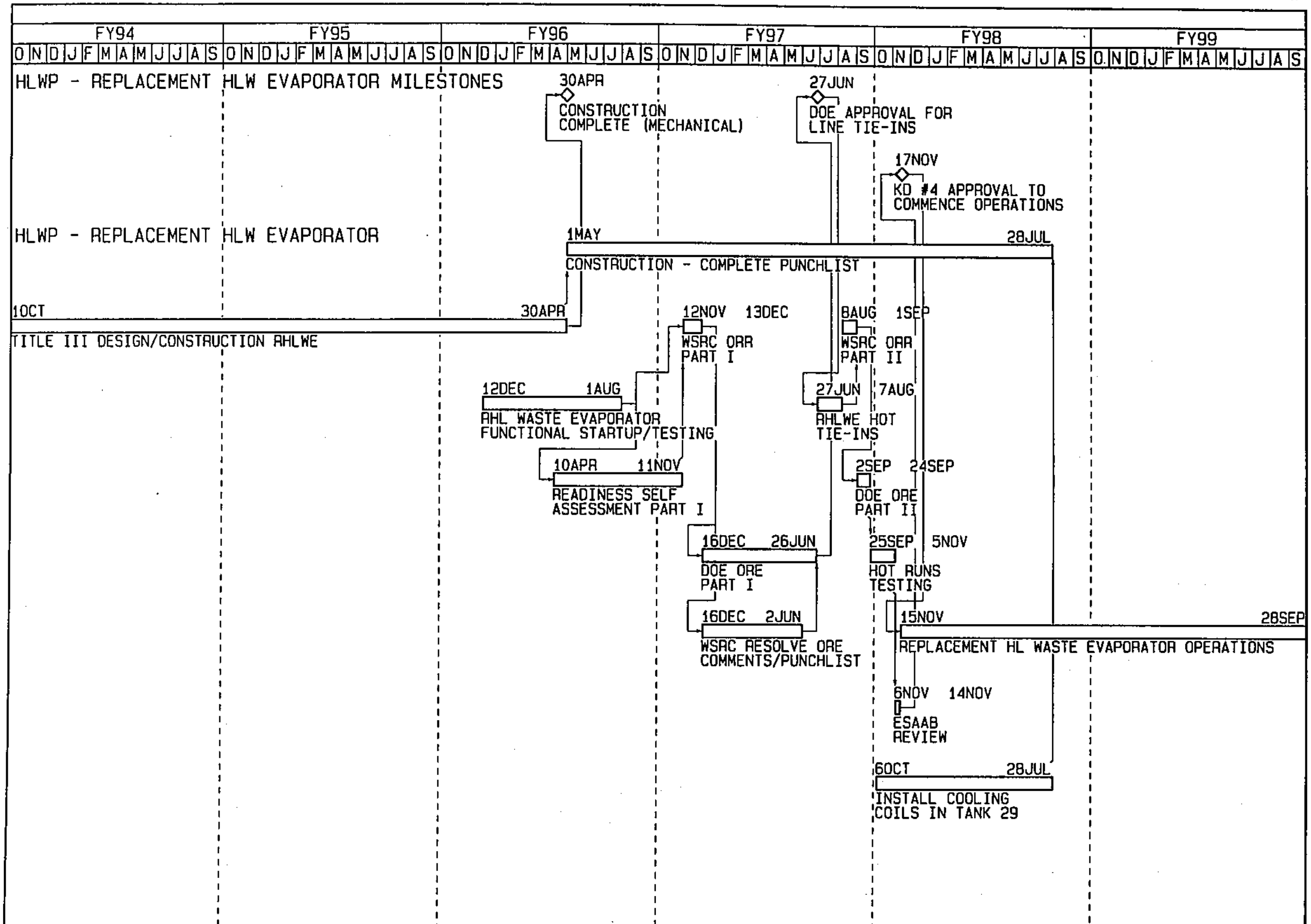

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Critical Activity
Progress Bar
Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

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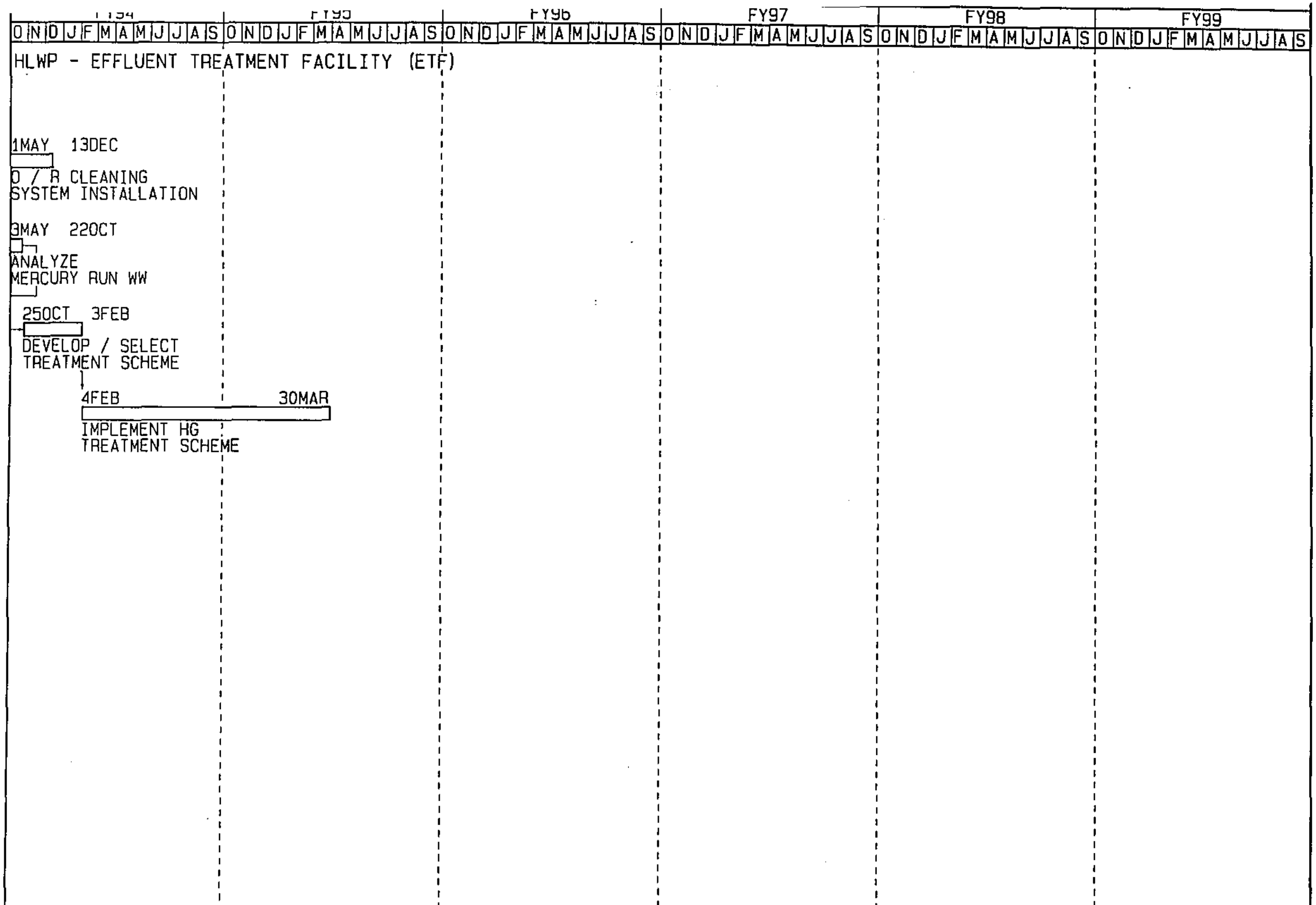

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Progress Bar
Milestone/Flag Activity

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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Sheet 1 of 1

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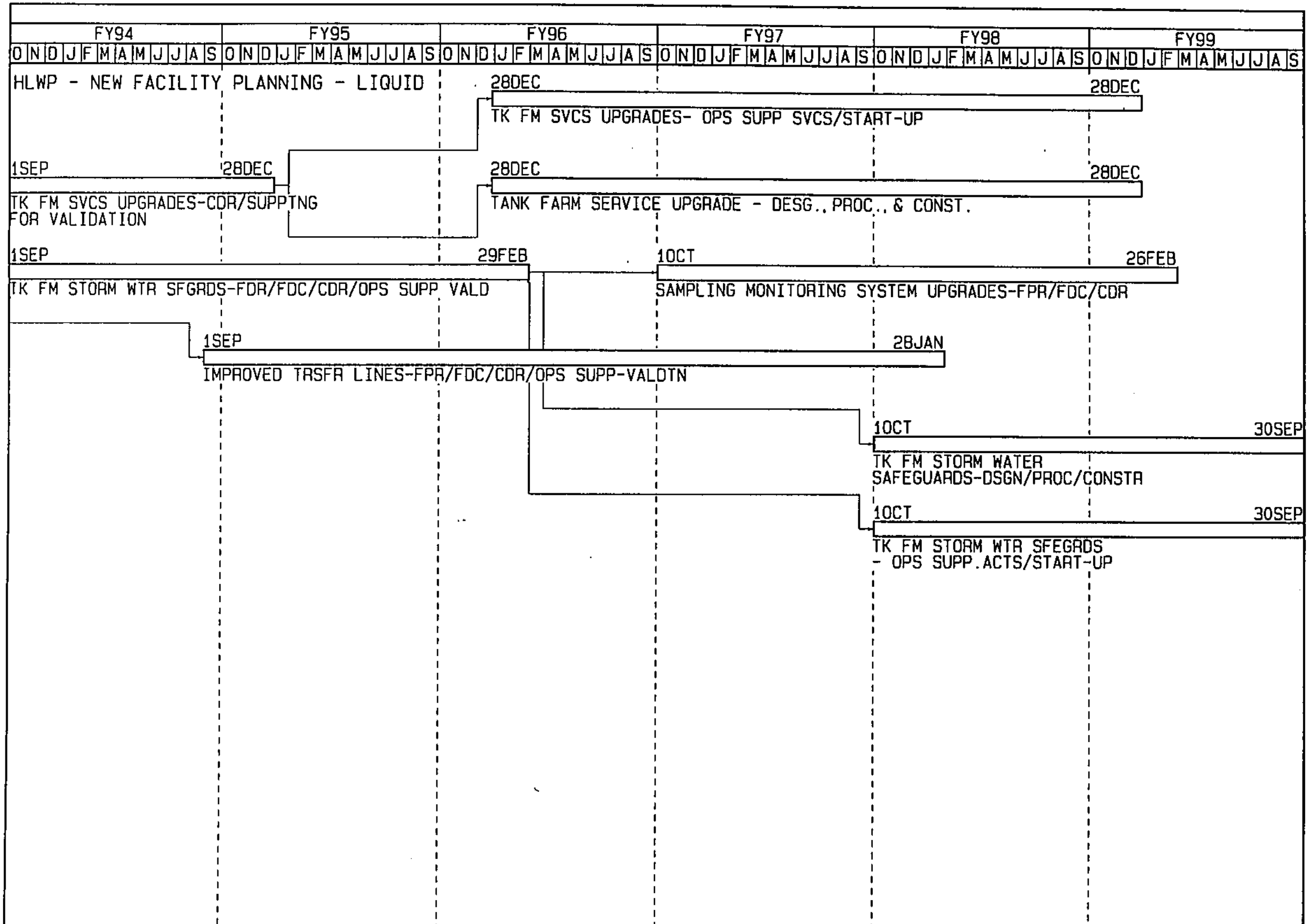

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Project Finish 6APR19

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

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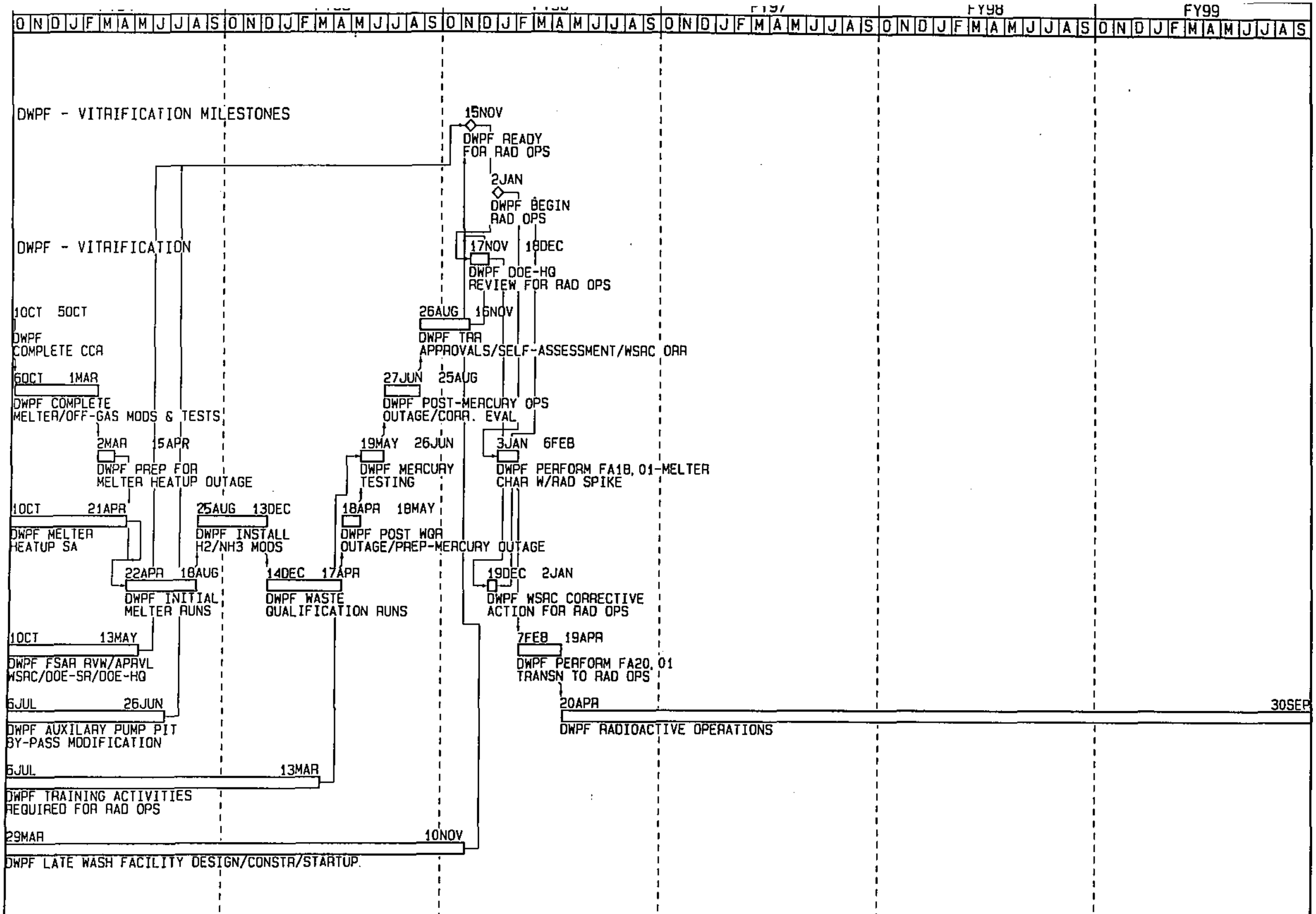

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Activity Bar/Early Dates
Critical Activity
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WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

Sheet 1 of 1

HLW SYSTEM PLAN REV 2 - DRAFT

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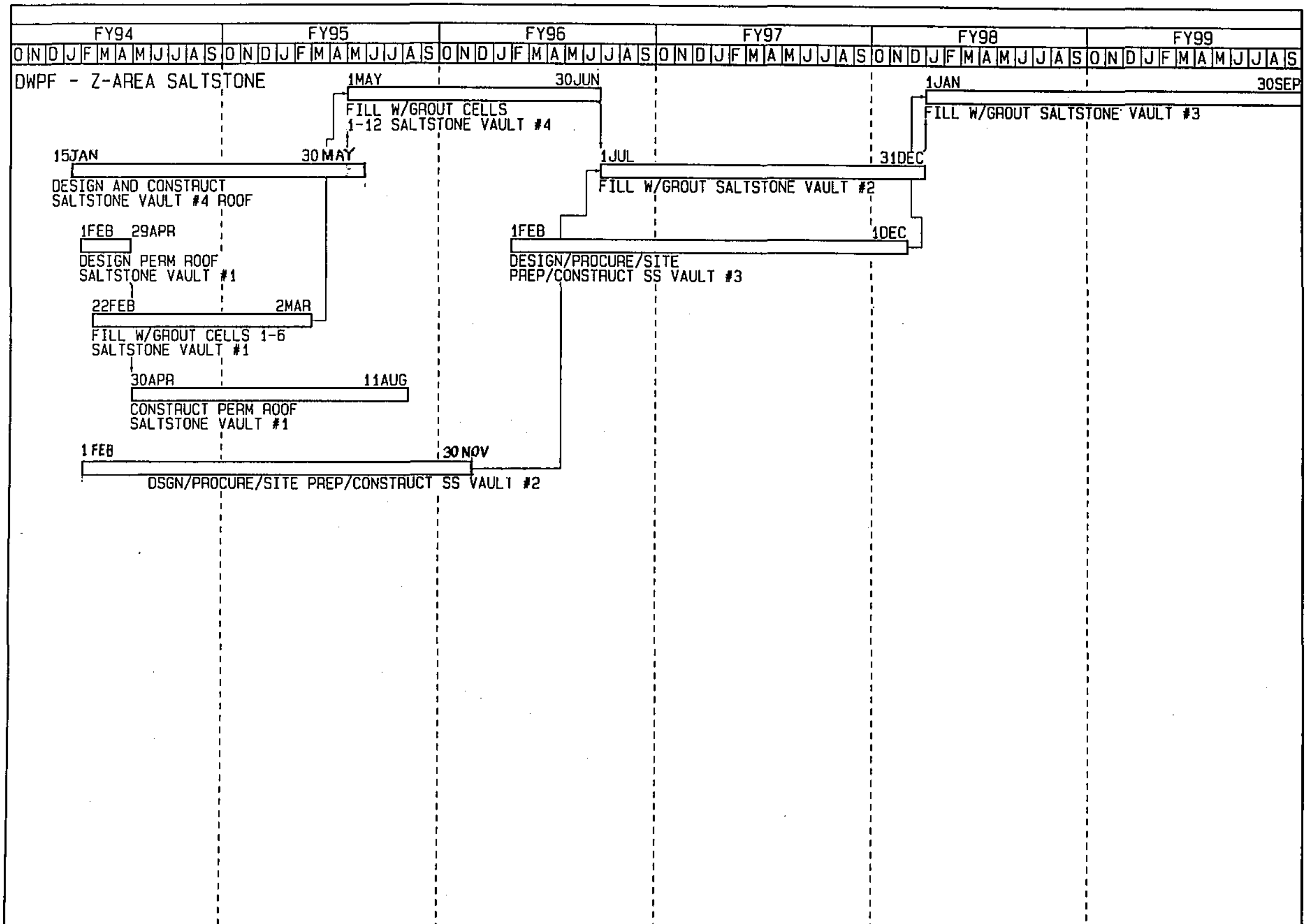

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Data Date 1SEP93
Project Start 1OCT90
Project Finish 6APR19

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

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
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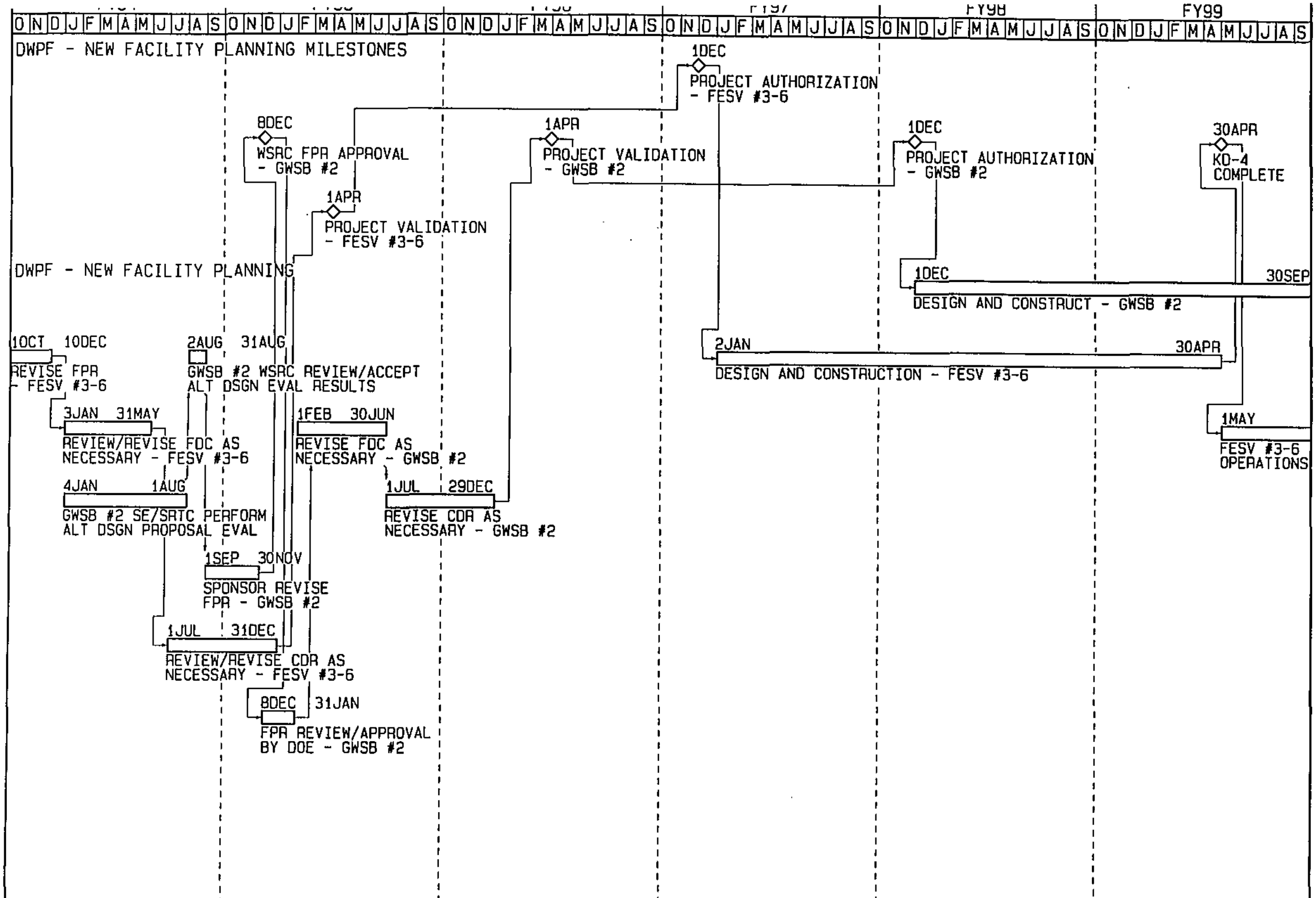

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Project Finish	6APR19

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

Sheet 1 of 1

WESTINGHOUSE SAVANNAH RIVER COMPANY
INTEGRATED WASTE PROCESSING
AND REMOVAL SCHEDULE

HLW SYSTEM PLAN REV 2 - DRAFT

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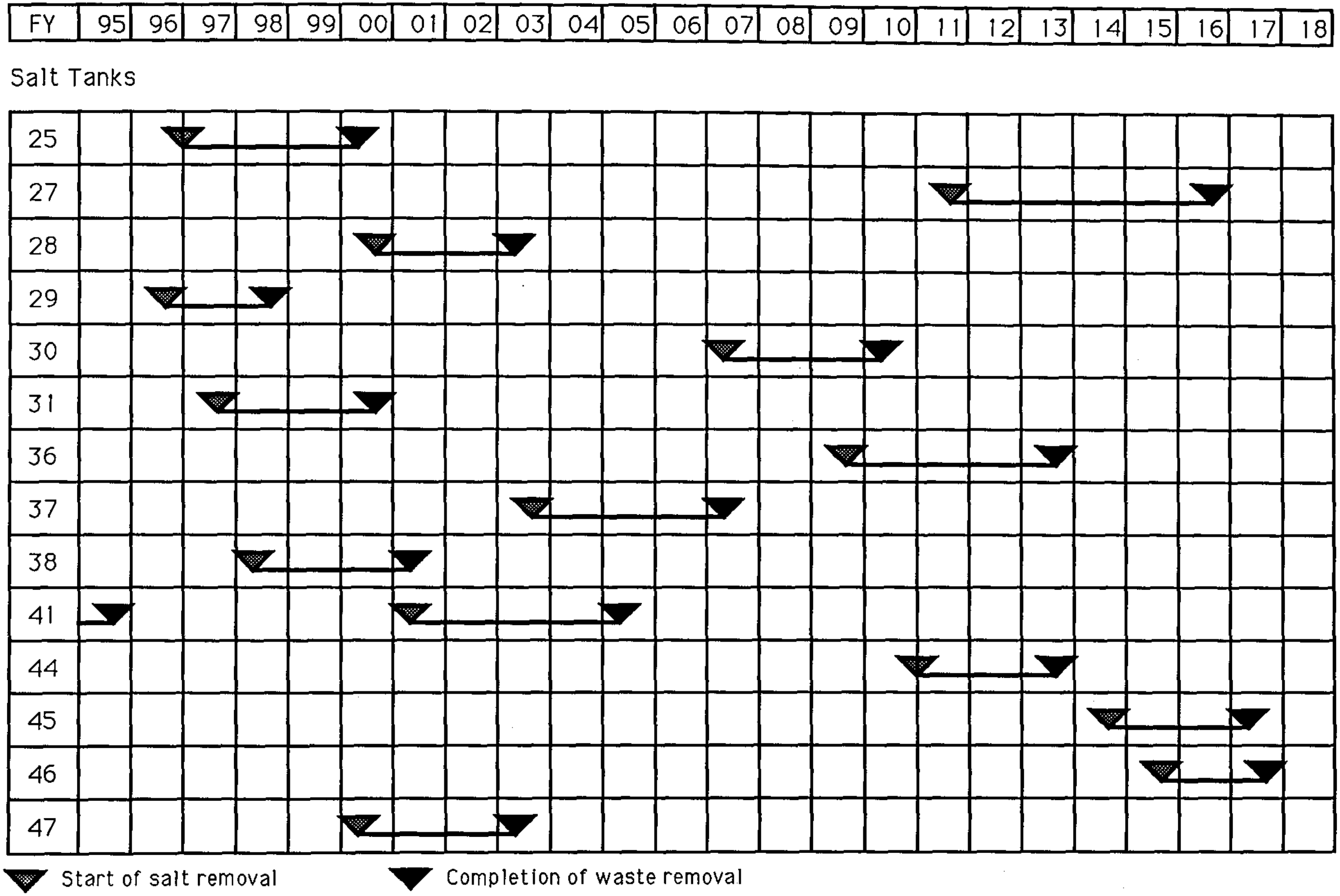
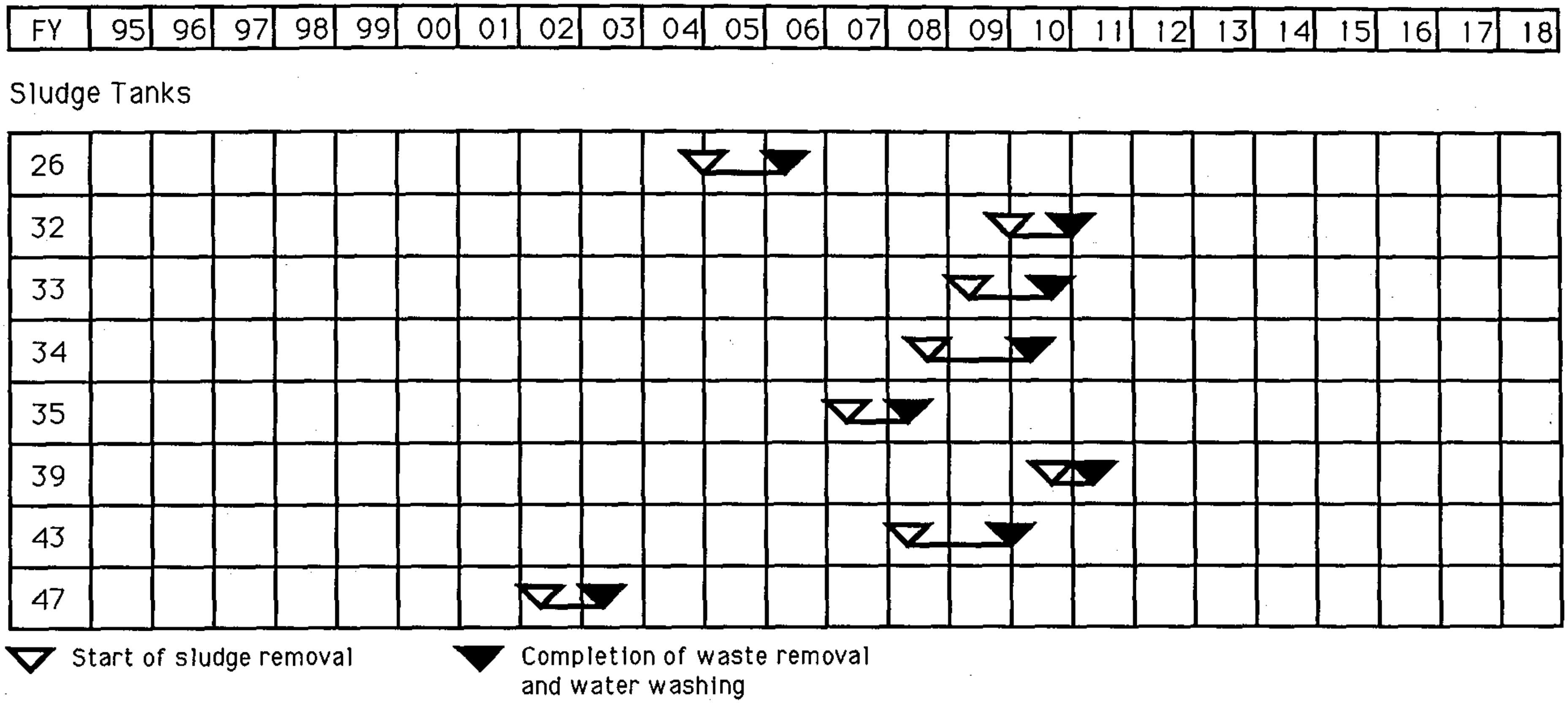
12/8/93		[signature]	

Appendix G - Type III Tank Waste Removal Schedule



Appendix G - Type III Tank Waste Removal Schedule



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.
• Manpower levels are being limited without a commensurate reduction in the work scope defined in the AOP.	• Critical vacancies will be filled with a small number of new hires and subcontracts. Non-critical activities can be deferred until FY95.	• Overtime will be used to complete work on schedule until additional manpower is allocated.
• Funding and processing uncertainties may impact the site's ability to meet waste removal commitments as required by the FFA.	• The Regulators will accept FFA commitments for waste removal activities, without commitments for interim waste processing milestones.	* 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 candid updates to the Regulators via quarterly meetings.
• FFA Regulators may require interim waste processing milestones as precursors to proposed waste removal commitments.	• The Regulators will accept FFA commitments for waste removal activities, without commitments for interim waste processing milestones.	* 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 candid updates to the Regulators via quarterly meetings.
• 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. • HLW System Integration Manager will track issue through to implementation. • Evaluate extending life of Tank 38 by direct feeding concentrated supernate to ITP from Tanks 38 and 43. • Form salt in Tank 40.

Appendix H.1 - Programmatic Uncertainties

Issue	Assumption	Contingency/Action
• The site may not be able to handle the increased analytical requirements resulting from the startup of ITP, ESP, DWPF, and Late Wash.	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 the 772-F lab, etc. (See WSRC-RP-92-9210.)
• The Reduction in Force (RIF) resulted in a much greater than expected loss of key personnel at HLW facilities, particularly ITP. The ITP startup date may be jeopardized.	• ITP vacancies will be filled with experienced, qualified personnel, and some lost time can be recouped. The ITP startup schedule has also been rebaselined.	• Overtime will be used to complete the scope of work. • The recently established Site Personnel Committee can reallocate personnel to
• Long term program planning is hampered by uncertain funding levels for the outyears.	• Adequate funding will be available to support programs as needed.	• The Canyon mission could be stopped or delayed. • DWPF startup could be delayed. • Washing of sludge batch#2 could be delayed. • Support projects (Saltstone vaults, Failed Equipment Storage Vaults, Glass Waste Storage Building #2, etc.) could be delayed.
• The ITP startup date and processing rates are uncertain.	• ITP will start up 12/94 and will be able to achieve their planned production rate.	• DWPF startup could be delayed to allow ITP time to "catch up."
• An anticipated OPC shortfall of $7M in CIF may push out the startup schedule.	• Funding will be made up in FY96.	• Losses in FY95 can be made up by restoring the funding in FY96.
• Disposal of the CIF secondary aqueous waste stream is not fully developed.	• The stream can be solidified in the CIF's ashcrete system.	• A vendor could be hired is necessary.
• CIF startup may be impacted if the Hazardous Waste/Mixed Waste Disposal Vaults are not ready to accept the solidified CIF ashcrete wastes.	• The Regulator will allow the CIF operation to proceed while the ashcrete is stored at a temporary storage location.	• CIF personnel are working to find suitable temporary storage.

Appendix H.1 - Programmatic Uncertainties

Issue	Assumption	Contingency/Action
• The CIF is needed in the 2002 timeframe to treat DWPF benzene. The CIF may be delayed by the Programmatic EIS now in progress.	• Successfully managing the project and schedule will make it less vulnerable to delays or cancellation.	• There is approximately 5 years of float between the CIF's scheduled 1/96 startup and the date when the CIF is required to support the DWPF (assuming 35% initial attainment for DWPF).
• SRTC sample accountability restrictions may impact field facility sample analysis schedules.	• Sample analysis requirements can be met without negatively impacting facility schedules.	• Facilities will support SRTC program upgrades and limitations. • Identify other site laboratory capabilities as backup.
• 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 940,000 gallons/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 affected parties.
• Safety classification of equipment may affect DWPF program costs and schedule.	• There will be no impact to DWPF cost or schedule.	• The DWPF schedule may be delayed, or additional funds may be needed.
• The Programmatic EIS could impact the constuction schedule or planned operation of HLW facilities.	• The Programmatic EIS will proceed in parallel with current HLW activities and thus not impact current plans.	• Delays caused by the Programmatic EIS will be accomodated as described in this section for the individual facilities (ITP, DWPF, Evaporators, etc.)
• The aging 1H Evaporator and the 2F and 2H Evaporators may not be able to achieve the planned space gain thus jeopardizing the HLW Mission	• Planned space gain will be achieved because of the large volume of unevaporated waste currently in the Tank Farm and the future dilute waste streams from ESP and DWPF	• Implement recommendations from the recently completed DWPF Recycle Reduction Study • Complete the ESP Washwater Reduction Study and implement recommendations as appropriate • Continuously improve evaporator operations and forecasting based on current operating data (assuming restarts as scheduled).
• Compliance requirements and schedules for the 90-2 program are not defined.	• Facility startup schedules will not be adversely impacted by non-compliance in the 90-2 program.	• Compliance assessments are being conducted and will be documented. • Maintain open lines of communication with DOE.

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, accept negative impacts. • If all else fails, investigate using Tank 40 for salt receipt, accept negative impacts.
• ITP deflagration Probabilistic 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.	• Complete the ESP PVT, 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 HLW Flowsheet Model by 19/30/94, use the Model to optimize waste removal activities, and plan all batches until the end of the sludge removal campaign.

Appendix H.2 - Technical Uncertainties

Issue	Assumption	Contingency
• A dynamic model of the HLW System may be needed for facility startups.	• A technical baseline/flowsheet will be developed, peer reviewed, and accepted by intervenes.	• Delay startups until the Integrated Flowsheet is finished. • Do a better job of coordinating existing efforts to yield 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.
• Formalized production plans for ITP and ESP have not been completed. The processing rates have been effected by temperature concerns, criticality and other process changes. Schedules and planning for other facilities could be effected.	• Adequate contingency has been applied to the now obsolete ITP/ESP flowsheets to accommodate process changes. PVT results will be included in production plans.	• Facility flowsheets need to be rebaselined and then production plans created.
• ITP DCS neutering and hardwired alarms program can be made reliable.	• 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.
• ESP pump seal leaks are adding undesired amounts of water to ESP Sludge Batch #1.	• Water already added will not affect Batch 1 processing. Problem can be resolved without impacting subsequent processing schedules.	• Delay ESP batch#1 washing until the excessive leakage problem is corrected. • Complete as much of the ESP PVT as possible, then fix the leakage problem, then complete batch#1 washing.
• Durametallic bottom seals in Tank 42 and 51 pumps add too much water to maintain long term characterization of sludge batches	• The Burgmann bottom seals or some other seal will be identified as a long term solution. All pumps will be refitted without effecting key System milestones.	• Develop a sealless pump. • Delay DWPF startup until the excessive leakage problem is corrected.

Appendix H.2 - Technical Uncertainties

Issue	Assumption	Contingency
• The Waste Removal program scope is limited to water washing the tank interior and annulus for each old-style tank to be retired. Additional cleaning, possibly chemical cleaning, may be required prior to turning the tank over to the ERWM Division.	• Water washing will be adequate. If further cleaning is required, then an ERWM cost funded project will provide the facilities and operations.	• Chemical cleaning has been successfully demonstrated using dilute oxalic acid in Tank 16.
• The precipitate inventory in Tank 49 is limited to 565,000 gallons based on an average precipitate concentration of 39 Ci/gal. HLW System attainment is restricted by this limit.	• Actions will be identified and implemented to enable the Tank 49 level to return to the original OSR.	• Operate the HLW System at reduced attainment during the periods of high precipitate generation.

Appendix I - DOE Milestones

Defense Waste

ADS	Title	Due
21-AA	DWPF Program Management	
	• Complete response and modification of Waste Form Compliance Plan per DOE-RW comments	1/30/94
	• Complete implementation, including evaluation of FA-13 melter run, of Waste Qualification activities	9/30/94
22-AA	DWPF Vitrification	
	• Start melter simulator training	10/18/93c
	• Transmit Change Control package to support Reprogramming	11/26/93c
	• Complete melter vacuum protection mods	12/15/93c
	• Submit and present responses to DOE comments on Gen'l section and chapters 1,7,13,14, of the SAR	12/15/93c
	• DWPF CCR Issue resolution/path forward including cost & schedule	1/14/94
	• Transmit SAR chapters 9 & 11 to DOE	1/15/94
	• Start construction of APP mods	1/17/94
	• Issue revised DWPF Startup Plan and criteria to address melter milestones to DOE-SR	1/21/94
	• Submit responses to DOE comments on chapters 3, 6, 8, and 10 of the SAR	1/30/94
	• Publish Qualification standards for DWPF Vit Ops personnel	1/31/94
	• Administer Qualification Standard-based comprehensive diagnostic written assessment exams to Ops personnel and provide result of the assessment	1/31/94
	• Start melter offgas Ops testing	2/2/94
	• Start melter preparation outage	3/1/94
	• Start revised training implementation	3/31/94
	• WSRC ready for melter testing (low power)	4/11/94
	• Develop system alignment checklist and system operability requirements and deviation sheets for systems requiring status control	4/30/94
	• Develop local control station panel alarm status sheets	4/30/94
	• Complete DWPF safety class study	5/13/94
	• Start process and decontamination frit slurry system operation with frit or provide workaround to DOE by 4/30/94	5/20/94

Appendix I - DOE Milestones

ADS	Title	Due
	• Provide training for control of equipment and equipment status	5/30/94
	• Evaluate safety classification study and recommend path forward	6/1/94
	• Start melter operation	6/4/94
	• Complete APP Late Wash Bypass Mods	6/26/94
	• Start NH/H2 mods outage	8/25/94
	• Start radioactive operations	12/29/95
23-AA	•Z-Area Saltstone	
	• Commence Saltstone Demo Run	4/1/94
	• Complete revised Title II design for Vault#2	5/2/94
	• Submit Vault#2 purchase order to DOE for approval	9/30/94
	• Submit Vault#4 Permanent Roof purchase order to DOE for approval	9/30/94
24-GP	DWPF General Plant Projects	
	• none	
25-LI	DWPF New facility Planning	
	• none	
26-LI	DWPF Line Item 81-T-105	
	• none	

Appendix I - DOE Milestones

High Level Waste

ADS	Title	Due
31-AA	HLW Program Management	
	• Submit Waste Removal Plan & Schedule to SCDHEC	11/15/93c
	• Issue HLWM Certification Plan for Low Level & Mixed Waste	12/31/93c
	• Transmit rev. 2 HLW System Plan to DOE with liquid waste activities as required for continued operation of DWPF	1/14/94
	• Implement Work Control Implementation Plan	3/30/94
	• Issue approved HLW liquid waste acceptance criteria	4/30/94
	• Define authorization basis for accidents to be included in the 5480.23 Tank Farm SAR	4/30/94
	• Complete "pipeline" training course and assign operators to the field	5/31/94
	• Complete Shift Manager and STE training courses	5/31/94
	• Provide first working HLW System flowsheet model	6/30/94
	• Return Tank Farms to fiv-shift ops to support cycle training	6/30/94
32-AA	H-Tank Farm	
	• Issue WSRC request for DOE approval for 1H Evap restart	12/13/93c
	• Issue WSRC request for DOE approval for 2H Evap restart	4/23/94
	• Recover 350,000 gallons of tank space via 1H Evaporator	9/30/94
	• Recover 250,000 gallons of tank space via 2H Evaporator	9/30/94
33-AA	F-Tank Farm	
	• Issue WSRC request for DOE approval for 2F Evap restart	3/24/94
	• Recover 350,000 gallons of tank space via 2F Evaporator	9/30/94
34-AA	ITP/ESP	
	• Start modification outage	12/14/93c
	• Transmit Startup Plan to DOE-SR	12/31/93c
	• Submit rebaselined schedule/cost Change Control proposal	12/31/93c
	• Complete ITP training	2/28/94

Appendix I - DOE Milestones

ADS	Title	Due
	• Complete modification outage	4/1/94
	• Start Tank 42 Process Verification Test	4/19/94
	• Issue WSRC approved OSR's	6/13/94
	• Issue WSRC approved SAR addendum	6/13/94
	• Start integrated solids testing	7/9/94
	• Conduct ITP ORR EP exercise	7/21/94
	• Start operator quiet time	7/27/94
	• Issue WSRC approved geotechnical basis & JCO	7/31/94
	• Issue seismic evaluation of tanks	7/31/94
	• Issue Engineering evaluation of ESP Process Verification Test results	8/26/94
38-LI	HLW New Facility Planning	
	• Provide summary report on reduction options for DWPF recycle	12/31/93c
	• Provide summary report on reduction options for the ESP washwater	1/31/94
	• Complete Tank Farm Services Upgrade CDR and WSRC approved Project Plan	1/31/94
	• Issue WSRC approved rebaselined schedule	5/1/94
39-LI	New Waste Transfer Facility	
	• Complete startup testing	5/10/94n
	• Start hot tie-ins	5/30/94n
	• Full hot operations	10/29/95n
310-LI	Replacement HLW Evaporator	
	• Complete evaporator building structural concrete	12/31/93c
	• Complete main enclosure building structural steel	3/31/94
	• Complete Title II Design Activities	4/30/94
	• Start radioactive operations	11/17/97
311-LI	Diversion Box & Pump Pit Containment	
	• Complete HPP-5&6 restoration	2/26/94
	• Begin Pre-Operational Testing	3/1/95
	• Construction Complete	3/30/95
	• Project Completion	6/30/95

Appendix I - DOE Milestones

ADS	Title	Due
314-LI	HLW Removal from Filled Waste Tanks	
	• Begin S-3025 Title I design within 1 month of KD#1	tbd
	• Begin Tank 29 DCP conversion 1 month after approval of BCP-023	tbd
	• Develop revised cost and schedule baseline including BCP	tbd
	• Prepare draft ESAAB package	tbd
	• Submit waste removal schedule required by the FFA	11/12/93c
	• Transmit to DOE the Tank 29 resource loaded startup schedule	12/1/93c
	• Transmit WSRC recommendation for alternate startup approach	1/31/94
	• Complete all D&R activities on Tank 29 risers	5/30/94
	• Complete Tanks 21 & 22 pump containment mods	9/30/94
	• Complete Tanks 21 & 22 bearing water mods	9/30/94
	• Complete D&R of Tanks 21 & 22 risers	9/30/94

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

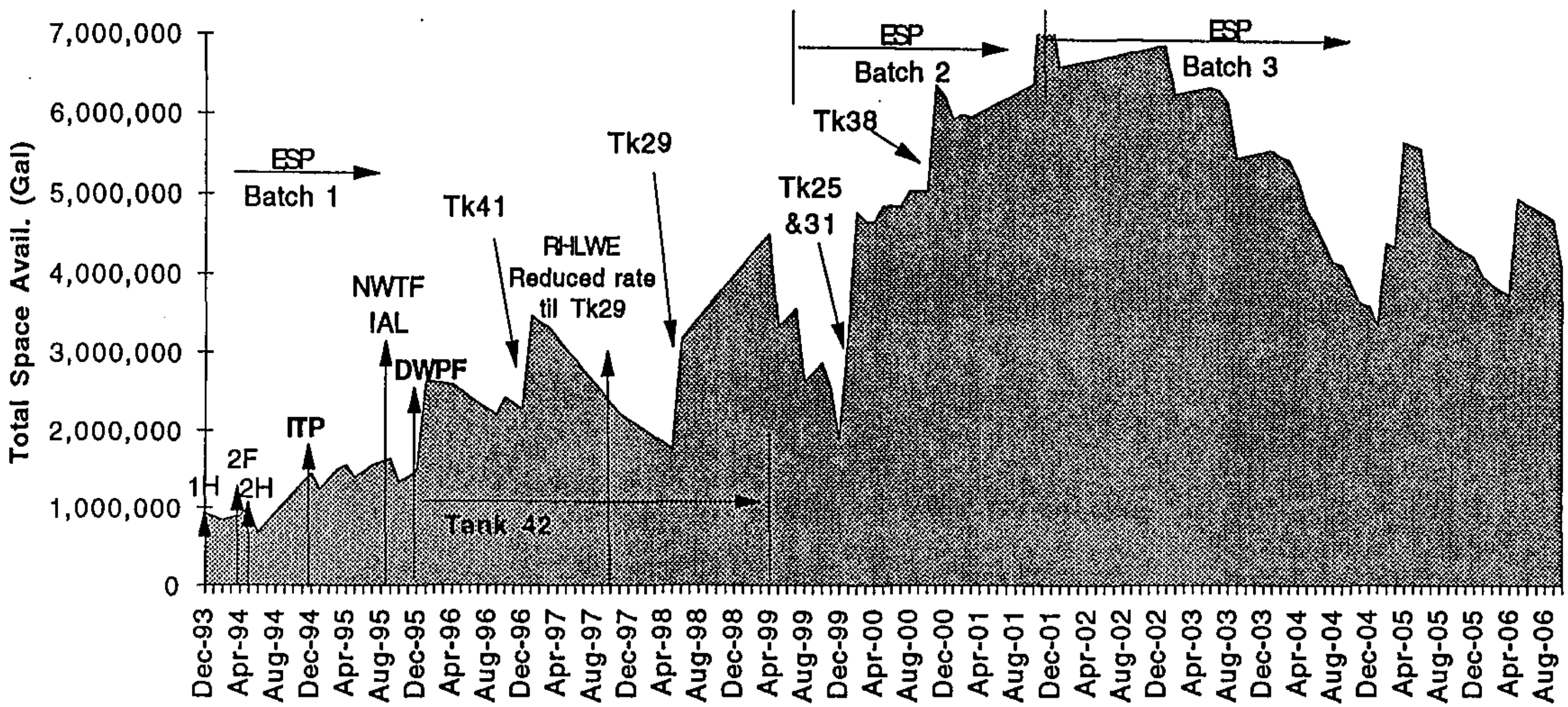
Notes:
c = complete
n = need date, no current supporting schedule
tbd = to be determined

	TRANSFER	TYPE I & II						2 F EVAP SYSTEM							1 H / RHLW EVAP SYSTEM						2H EVAP SYSTEM			TOTAL
	START	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	VOL
CYCLE	DATE	1	2	3	9	10	14	25	27	28	44	45	46	47	29	30	31	32	36	37	38	41	43	CAKE
	Prev. Fill							12/86						8/87	1/84		1/84		12/88	5/89				
	ITP-3/31/95												XXXX			XXXX					XXXX			0
1	9/94												XXXX			XXXX					XXXX	500		500
2	10/95												XXXX		Supernate	XXXX					Supernate	500	Supernate	500
3	8/96												XXXX		248	XXXX		Supernate			150	231	150	779
4	1/97												XXXX		500	XXXX		0			XXXX	RTS		500
5	7/97	Tk 14 - batch 4 - Nov/Dec '06						Supernate/Salt					XXXX		500	XXXX					XXXX	XXXX		500
6	12/97							333	Supernate				XXXX		COIL	XXXX	Supernate/Salt					XXXX		333
7	5/98	Tk 9 & 10 - batch 5 - May/Oct '10						0	0				XXXX		XXXX	XXXX	333					XXXX		333
8	11/98	Allow time for sludge to settle						167					XXXX		XXXX		333					XXXX		500
9	3/99	MCC limits area to 2 tanks operating at same time						167					XXXX		XXXX		333					XXXX		500
10	9/99	Tk 7F batch 3 sludge removal - Sep/Oct '03						333					XXXX		XXXX		COIL				167	XXXX		500
11	2/00	Tk 7F batch 4 - Jan '07 - Jul '07						XXXX					XXXX		XXXX						500	XXXX		500
12	7/00	Process tks 1,2 & 3 between above 7F batch dates						XXXX		167					XXXX						333	XXXX		500
13	1/01							XXXX		500					XXXX						0	XXXX		500
14	6/01							XXXX		333				167	XXXX							XXXX		500
15	11/01							XXXX						500	XXXX						XXXX			500
16	8/02						156	XXXX						193	XXXX						XXXX	167		516
17	1/03				250			XXXX		XXXX				Need			XXXX				XXXX	250		500
18	1/04				167					XXXX				Oct '01			XXXX				XXXX	333		500
19	10/04				119					XXXX							XXXX			130	XXXX	250		499
20	4/05									XXXX							XXXX			500	XXXX			500
21	9/05					213				XXXX							XXXX			290	XXXX	XXXX		503
22	4/06	400	50							XXXX							XXXX			53	XXXX	XXXX		503
23	6/07		333							XXXX						167				XXXX		XXXX		500
24	10/08		153											XXXX		347				XXXX		XXXX		500
25	8/09			231										XXXX		287				XXXX		XXXX		518
26	8/10			305										XXXX		50			167	XXXX		XXXX		522
27	9/11	DATES AT TOP OF EACH COLUMN									167			XXXX		COIL?			333	XXXX		XXXX		500
28	4/12	INDICATE DATE THAT TANK									167			XXXX					333	XXXX		XXXX		500
29	9/12	FILLED WITH SALT									333			XXXX		CNVRT			261	XXXX		XXXX		594
30	2/13								167		333			XXXX		for			CNVRT	XXXX		XXXX		500
31	10/13	XXXX INDICATES THE CURRENT							333		XXXX				167	21H			HHW	XXXX		XXXX		500
32	4/14	CONCENTRATE RECEIVER							167		XXXX				333				RECPT	XXXX		XXXX		500
33	8/14								167		XXXX				333				(TK 35)	XXXX		2 H Evap Shut Down		500
34	3/15	NUMBERS REPRESENT SALT							167		XXXX	167			167				CNVRT	XXXX		for Batch 5 Sludge		501
35	8/15	REMOVED IN 1000 GALLONS									XXXX	333	167		XXXX				FOR 22H			Tank 43 in '09		500
36	3/16										XXXX	333	167		XXXX							XXXX		500
37	11/16	SHADED AREAS REPRESENT									XXXX	167	333		XXXX							XXXX		500
38	5/17	TANKS THAT ARE FULL								167	XXXX		333		XXXX							XXXX		500
39	11/17									333	XXXX				XXXX		167					XXXX		500
40	6/18									333	XXXX				XXXX		167					XXXX		500
	TOTALS	400	536	536	536	213	156	1000	1001	1833	1000	1000	1000	860	2248	851	1333	0	1094	973	1150	2231	150	20,101
		TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	TANK	VOL
		1	2	3	9	10	14	25	27	28	44	45	46	47	29	30	31	32	36	37	38	41	43	CAKE
		2081	2081	2081	2081	2081	2081	3291	UF	3291	3025	UF	UF	2860	3291	UF	2860		3025	3025	3025	UF		

Appendix J.2 - Sludge Batches

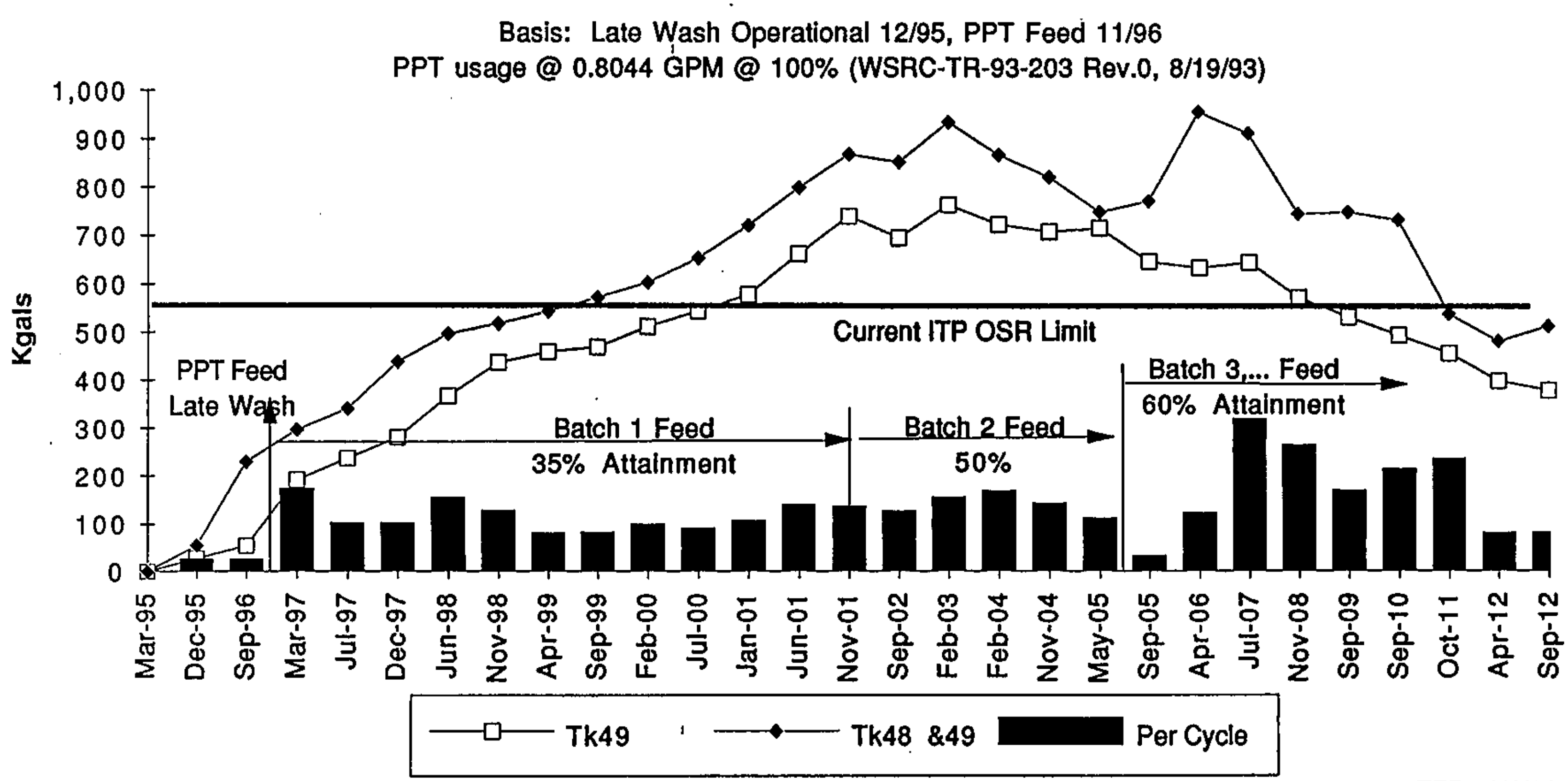
Batch	Tank	Volume (kgal)	Available Volume	Notes
1	15	126	91	Al dissolution (actual)
	18	376	376	
	21	182	182	
	22	30	30	
			-147	remaining heels in Tanks 42 & 51
		644	**497**	
2		173	173	sludge already in Tank 40
	8	164	164	
	11	140	70	Al dissolution 2:1
	15	312	156	Al dissolution 2:1
			-88	remaining heel in Tank 40
		789	**475**	
3	4	127	127	
	7	206	206	
	12	215	108	Al dissolution 2:1
	14	27	13	Al dissolution 2:1
	47	248	248	Sludge remaining after salt removal
		823	**702**	
4	5	34	34	
	6	25	25	
	9	4	4	Sludge remaining after salt removal
	10	4	4	Sludge remaining after salt removal
	13	251	188	Al dissolution 4:3
	26	298	298	2F Evap. shut down during sludge removal
	35	52	26	Al dissolution 2:1
		668	**579**	
5	1	7	7	Sludge remaining after salt removal
	2	4	4	Sludge remaining after salt removal
	3	4	4	Sludge remaining after salt removal
	32	157	79	Al diss. 2:1, RHLWE down during sludge rem.
	33	42	42	
	34	45	45	
	39	101	50	Al dissolution 2:1
	43	199	199	2H Evap. shut down during sludge removal
		__	88	Tank 51 heel removed at end of batch feed
		559	**518**	
6	17	2	2	residual heel from 1985-6 sludge rem. campaign
	18	42	42	residual heel from 1985-6 sludge rem. campaign
	19	20	20	residual heel from 1985-6 salt rem. campaign
	21	14	14	residual heel from 1985-6 sludge rem. campaign
	22	60	60	residual heel from 1985-6 sludge rem. campaign
	23	43	43	
	24	4	4	residual heel from 1985-6 salt rem. campaign
		__	147	Tanks 42 & 40 heels removed at end of batch feed
		185	**332**	

Appendix J.3 - Tank Farm Available Space



1/10/94, TEP

Appendix J.4 - Tank 49 Precipitate Balance



TEP, 1/4/94

ADS #	Title	FY94*	FY95	FY96	FY97	FY98	FY99	FY00
21-AA	DWPF Program Management	56	56	56	56	56	56	56
22-AA	Vitrification	880	880	845	805	780	755	755
23-AA	Saltstone Z-Area	51	51	62	62	62	62	62
24-GP	General Plant Projects	0	0	0	0	0	0	0
25-LI	DWPF New Facility Planning	0	0	0	1	1	1	1
26-LI	DWPF Line Item	0	0	0	0	0	0	0
31-AA	HLW Program Management	164	158	138	128	128	128	128
32-AA	H-Tank Farm	376	391	449	459	459	411	411
33-AA	F-Tank Farm	287	287	287	307	307	307	307
34-AA	In-Tank Precipitation/Extended Sludge Prc	300	260	260	260	260	260	260
35-AA	Effluent Treatment Facility	162	162	162	162	162	162	162
37-GP	HLW General Plant Projects	0	0	0	0	0	0	0
38-LI	HLW New Facility Planning	4	9	9	9	9	9	9
39-LI	New Waste Transfer Facility	29	48	0	0	0	0	0
310-LI	Replacement High Level Waste Evaporator	28	28	68	68	8	8	8
311-LI	Diversion Box & Pump Pit Containment	1	1	1	0	0	0	0
312-LI	Hazardous LLW Processing Tanks	0	0	0	0	0	0	0
313-LI	Inter-Area Line Upgrade	0	0	0	0	0	0	0
314-LI	Waste Removal	75	87	95	95	95	95	95
	Total High Level Waste	**2,413**	**2,418**	**2,432**	**2,412**	**2,327**	**2,254**	**2,254**

Notes: *The 11/93 total actual manpower is 2,295.
* The FY94 is the WSRC manpower level required to achieve the schedules shown in this Plan.
* DOE had not approved FY94 -FY00 manpower levels at the time of this Plan.

Appendix L - HLW 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. maintenance of facilities to ensure 1a and 1b

2. "In Progress" projects/programs to handle waste safely
    - 2a. Evaporator restarts
    - 2b. In-Tank Precipitation (ITP startup/Tank 41 salt removal)
    - 2c. Saltstone operation and vault capping

3. High Level Waste System to support DWPF startup
    - 3a. DWPF Vitrification and Late Wash startup
    - 3b. ESP restart and batch#1 processing
    - 3c. Waste Removal as required to maintain evaporator operation
    - 3d. New Waste Transfer Facility startup
    - 3e. Replacement High Level Waste Evaporator
    - 3f. Waste Removal as required to feed DWPF

4. Other Regulatory Driven Programs
    - 4a. L-ETF Operation
    - 4b. M-Area Waste Disposal (Sludge Stabilization)

5. Continuity of Operations, Improvement Programs and New Projects

ADS #	Title	FY94	FY95	FY96	FY97	FY98	FY99	FY00
21-AA	DWPF Program Management	20,658	25,191	26,073	26,985	27,930	28,907	29,919
22-AA	Vitrification	156,990	166,464	170,497	166,505	180,359	190,988	192,916
23-AA	Saltstone Z-Area	14,156	19,809	22,787	27,445	24,662	31,655	30,463
24-GP	General Plant Projects	0	1,000	3,000	3,105	3,214	3,326	3,443
25-LI	DWPF New Facility Planning	0	208	215	4,700	13,435	15,671	15,609
26-LI	DWPF Line Item	63,510	45,000	0	0	0	0	
31-AA	HLW Program Management	37,590	54,773	57,190	59,192	61,263	63,408	65,627
32-AA	H-Tank Farm	61,516	67,795	86,792	82,206	85,996	87,905	88,325
33-AA	F-Tank Farm	42,563	42,953	45,439	47,029	48,675	50,379	52,142
34-AA	In-Tank Precipitation/Extended Sludge Prc	75,613	57,628	63,260	67,422	66,159	68,475	70,871
35-AA	Effluent Treatment Facility	20,687	22,624	23,657	24,485	25,342	26,229	27,147
37-GP	HLW General Plant Projects	244	1,266	4,275	4,425	4,580	4,740	4,906
38-LI	HLW New Facility Planning	2,369	1,998	6,000	18,156	21,498	28,280	40,905
39-LI	New Waste Transfer Facility	5,512	0	0	0	0	0	0
310-LI	Replacement High Level Waste Evaporator	15,376	25,181	31,000	20,000	5,000	0	0
311-LI	Diversion Box & Pump Pit Containment	2,199	0	0	0	0	0	0
312-LI	Hazardous LLW Processing Tanks	0	0	0	0	0	0	0
313-LI	Inter-Area Line Upgrade	0	0	0	0	0	0	0
314-LI	Waste Removal	38,646	38,940	42,900	62,222	74,800	66,769	68,234
14-AA	Defense Programs (Reactor Materials)	1,354	1,200	1,200	900	400	0	0
36-AA	L-Effluent Treatment Facility	8,793	9,400	17,500	8,000	2,200	500	0
	Total High Level Waste	567,776	581,430	601,785	622,777	645,513	667,232	690,507
12-AA	DOE Program Support	10,925	13,500	12,950	12,425	10,380	10,350	10,797
3031-1	DOE Program Direction	6,633	7,117	7,455	7,775	8,124	8,475	8,841
	Solid Waste	79,056	96,570	99,945	103,514	106,198	110,789	114,744
	Total EM-30	646,832	678,000	701,730	726,291	751,711	778,021	805,251

Appendix N - HLW Projects

Defense Waste

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-1780 81-T-105	26-LI Capital	Defense Waste Processing Facility	$1,246,974	• FFCA, • Waste Removal 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	25-LI Capital	Glass Waste Storage Building #2	$93,000	• FFCA • Waste Removal FFA	GWSB #2 is scheduled as a FY98 line item. Current HLW System attainment projections indicate that GWSB#1 will not be full until 2009. This project will be deferred to at least FY00.
S-2048	25-LI Capital	Failed Equipment Storage Vaults #3-6	$4,500	• FFCA • Waste Removal FFA	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 FY00, it is projected that two melters will have failed and a third vault will be needed for storage. Required due date is FY99.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-3898	23-AA Op Ex	New Saltstone Vaults #2-5	#2 $18,824 #3 $20,108 #4 & #5 TBD	LDR-FFCA SCDHEC Permits #12,683 #IWP-217 DOE EIS-0082 Record of Decision FR23801, 6/1/82	Outyears (FY95-FY98) Vault#2 need date 2/98 Vault#3 need date 10/99 Vaults must be funded and constructed on schedule to support full scale Saltstone operations.
S-4620	25-LI Capital	Site Fire Protection Project- DWPF Fire Protection Improvements	$10,564	• FFCA • Waste Removal FFA	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	25-LI Capital	Salt Cell Benzene Abatement	$15,000	• FFCA • Waste Removal FFA • Clean Air Act of 1990	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.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
W-2094	25-LI Capital	Failed Equipment Storage Vaults #7-10	$5,500	• FFCA • Waste Removal FFA	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 FY08, it is projected that six melters will have failed and these vaults will be needed for storage in FY07.
W-2500	25-LI Capital	Distributed Control System Replacement	$18,000	• FFCA • Waste Removal FFA	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 #	ADS	Project Title	TEC (K)	Driver	Scope
S-1588	34-AA Op Ex	ITP Safety and Environmental Enhancements	$37,190	• FFCA • Waste Removal 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.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-2081	314-LI Op Ex	Waste Removal and Extended Sludge Processing	$328,000	• FFCA • Waste Removal FFA	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	311-LI Capital	Diversion Box and Pump Pit Containment	$24,100	• FFCA	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.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-2860	314-LI Op Ex	Type III Tanks Salt Removal, Phase II	$121,000	• FFCA • Waste Removal FFA	Provide facilities to dissolve salt contained in two Type III storage tanks (31 & 47) and to transfer the solution to ITP for processing as DWPF feed. In addition, it provides control systems upgrades to 17 Type III tanks, new control room facilities 241-2H, and the Centralized Support facility 241-4H.
S-3025 (part of 93-D-187)	314-LI Capital	Waste Removal Facilities, Phase III	$112,500	• FFCA • Waste Removal FFA	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.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-3122 85-D-159	39-LI Capital	New Waste Transfer Facility	$54,870	• FFCA • Waste Removal FFA	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	314-LI Op Ex	Type III Tanks Salt Removal, Phase I	$41,200	• FFCA • Waste Removal FFA	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.

Appendix N - HLW Projects

Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-3781	34-AA Op Ex	In-Tank Precipitation	$55,270	• FFCA • Waste Removal 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.
S-4062 89-D-174	310-LI Capital	Replacement High Level Waste Evaporator	$118,200	• Improve HLW System attainment	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	38-LI Capital	ITP Benzene Abatement	$14,000	• FFCA • Waste Removal FFA • Clean Air Act of 1990	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 emissions must be reduced by 95%. This proposed FY98 project will achieve this reduction by installing treatment equipment on three emission points in the ITP facility.

Appendix N - HLW Projects

Solid Waste

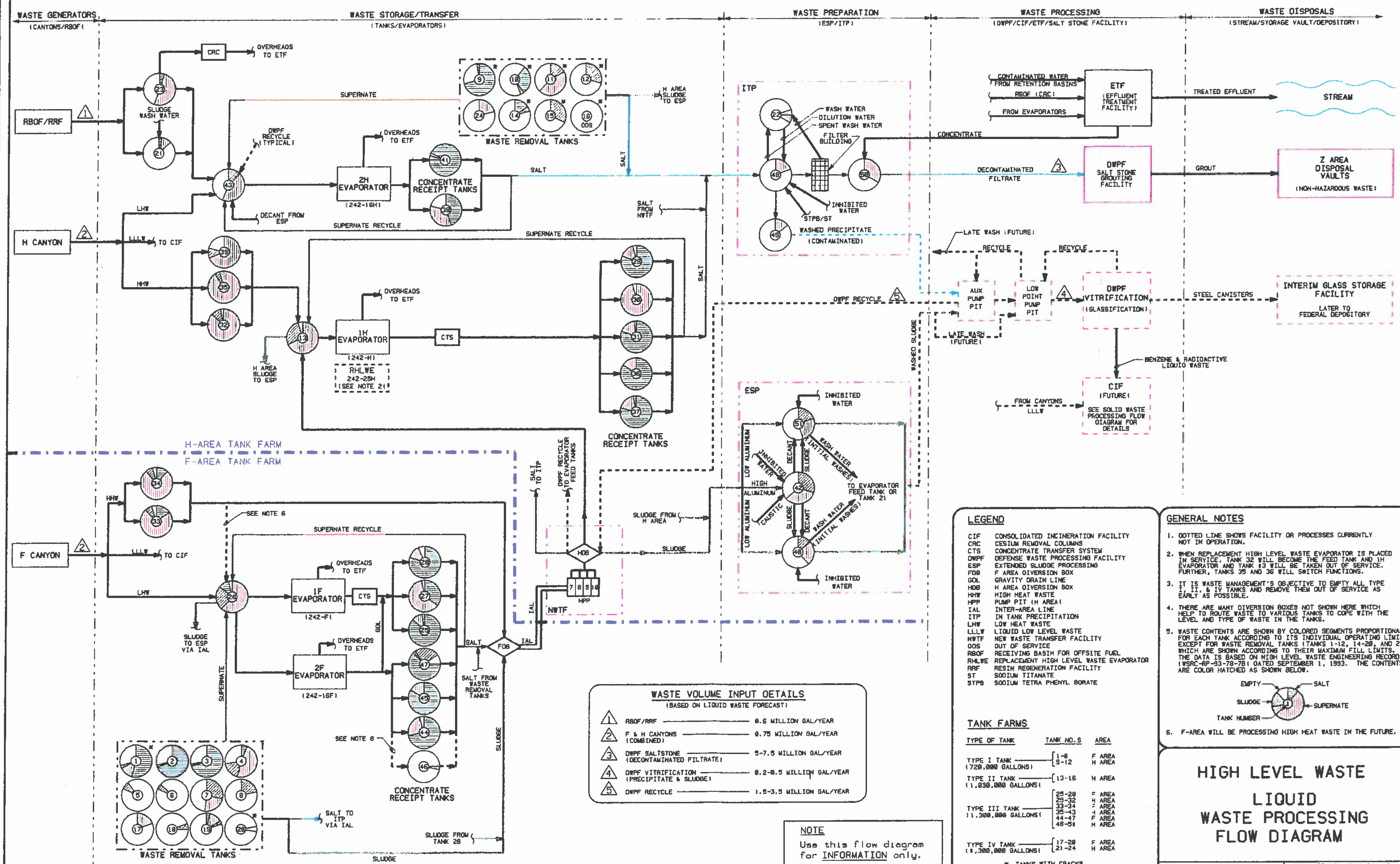
Project #	ADS	Project Title	TEC (K)	Driver	Scope
S-2787 83-D-148	45-LI Capital	Consolidated Incineration Facility	$99,034	• FFCA • Waste Removal FFA	Provide a facility to incinerate hazardous, low-level radioactive, and mixed waste. The Defense Waste Processing Facility is dependent on the facility to treat its waste benzene stream.

Appendix O - Acronyms

ABC	Activity Based Cost
ADS	Activity Data Sheet
AOP	Annual Operating Plan
APP	Auxiliary Pump Pit
CCR	Cold Chemical Runs
CDR	Conceptual Design Report
CIF	Consolidated Incinerator Facility
ConOps	Conduct of Operations
CRC	Cesium Removal Column
CTS	Concentrate Transfer System
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
FTE	Full Time Equivalent
FY	Fiscal Year
FYP	Five Year Plan ITP In-Tank Precipitation
GWSB	Glass Waste Storage Building
H & V	Heating & Ventilation
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
LDR	Land Disposal Restriction
LHW	Low Heat Waste
LI	Line Item

Appendix O - Acronyms

LPPP	Low Point Pump Pit
LW	Late Wash
N/A	Not Applicable
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFP	New Facility Planning
NWTF	New Waste Transfer Facility
OMB	Office of Management and Budget
OPC	Other Project Costs
ORR	Operational Readiness Review
OSR	Operational Safety Requirement
OTD	Office of Technology Development
PRA	Probabilistic Risk Assessment
PVT	Process verification Test
RBOF	Receiving Basin for Offsite Fuels
RCRA	Resource Conservation and Recovery Act
RHLWE	Replacement High Level Waste Evaporator
RSA	Readiness Self-Assessment
RWPC	Rolling Weather Protection Cover
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 Titanate
STP	Site Treatment Plan
STPB	Sodium Tetraphenyl Borate
SW	Solid Waste
TBD	To Be Determined
TEC	Total Estimated Cost
TPC	Total Project Cost
USQD	Unresolved Safety Question Determination
WSRC	Westinghouse Savannah River Company
WW	Wastewater



WASTE VOLUME INPUT DETAILS

(BASED ON LIQUID WASTE FORECAST)

1	RBOF/RRF	0.6 MILLION GAL/YEAR
2	F & H CANYONS (COMBINED)	0.75 MILLION GAL/YEAR
3	DWPF SALTSTONE (DECONTAMINATED FILTRATE)	5-7.5 MILLION GAL/YEAR
4	DWPF VITRIFICATION (PRECIPITATE & SLUDGE)	0.2-0.5 MILLION GAL/YEAR
5	DWPF RECYCLE	1.5-3.5 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 #3 WILL BE TAKEN OUT OF SERVICE. FURTHER, TANKS 35 AND 36 WILL SWITCH FUNCTIONS.
3. IT IS WASTE MANAGEMENT'S OBJECTIVE TO EMPTY ALL TYPE I, II, & IV TANKS AND REMOVE THEM OUT OF SERVICE AS EARLY AS POSSIBLE.
4. THERE ARE MANY DIVERSION BOXES NOT SHOWN HERE WHICH HELP TO ROUTE WASTE TO VARIOUS TANKS TO COPE WITH THE LEVEL AND TYPE OF WASTE IN THE TANKS.
5. WASTE CONTENTS ARE SHOWN BY COLORED SEGMENTS PROPORTIONAL FOR EACH TANK ACCORDING TO ITS INDIVIDUAL OPERATING LIMIT, EXCEPT FOR WASTE REMOVAL TANKS (TANKS 1-12, 14-20, AND 24) WHICH ARE SHOWN ACCORDING TO THEIR MAXIMUM FILL LIMITS. THE DATA IS BASED ON HIGH LEVEL WASTE ENGINEERING RECORD (WSRC-RP-93-78-78) DATED SEPTEMBER 1, 1993. THE CONTENTS ARE COLOR HATCHED AS SHOWN BELOW.

   EMPTY — SALT — SLUDGE — SUPERNATE — TANK NUMBER

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

HIGH LEVEL WASTE LIQUID WASTE PROCESSING FLOW DIAGRAM

DATE: OCTOBER 20, 1993

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DRAWN BY: KAREN A. BARLEY

HLW-OVP-94-0005, HLW System Plan, Revision 2 (U), January 14, 1994

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