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ENGINEERING DATA TRANSMITTAL

Page 1 of 1

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Low-Level Waste Project	R. A. Kirkbride 372-2115	NA
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16. KEY

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17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
		R A Kirkbride		4/19/96	
1	1	Cog.Eng. R. A. Kirkbride			H5-27
1	1	Cog. Mgr. D J. Washenfelder		4/23/96	H5-27
		QA			
		Safety			
		Env.			

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN

18. R. A. Kirkbride R A Kirkbride 4/19/96
Signature of EDT Originator — Date

19. K. A. Gasper K A Gasper 4/23/96
Authorized Representative for Receiving Organization — Date

20. D. J. Washenfelder D J Washenfelder 4/23/96
Cognizant Manager — Date

21. DOE APPROVAL (if required) Ctrl. No.
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[ ] Approved w/comments
[ ] Disapproved w/comments

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BD-7400-172-1

Technical Work Plan for the Privatization Waste Characterization Data Quality Objective Process

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U.S. Department of Energy Contract DE-AC06-87RL10930

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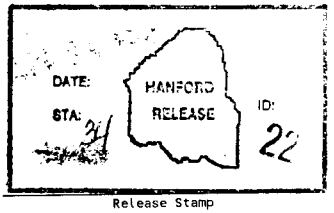
Key Words: data quality objective, work plan, TWRS

Abstract: This work plan addresses the activities necessary to complete the data quality objectives process for the purpose of providing sufficient characterization information to successfully stage, pretreat, and immobilize low-activity waste per the requirements and specifications identified in the Tank Waste Remediation System Privatization Request for Proposal. The scope of this task is to complete the data quality objectives process, the results of which will provide a technical basis for sampling and characterization needs related to privatization of pretreatment and low-activity waste immobilization.



Release Stamp

Release Approval Date

Approved for Public Release

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DOE	U.S. Department of Energy
DQO	Data Quality Objectives
FY	Fiscal year
GAO	U.S. General Accounting Office
LAW	Low-activity waste
M&I	Management and Integration
PNNL	Pacific Northwest National Laboratory
RCR	Review comment record
RFP	Request for Proposal
RL	U.S. Department of Energy-Richland Operations Office
TWRS	Tank Waste Remediation System
WHC	Westinghouse Hanford Company

TECHNICAL WORK PLAN FOR THE PRIVATIZATION WASTE CHARACTERIZATION DATA QUALITY OBJECTIVE PROCESS

1.0 INTRODUCTION

Radioactive waste has been stored in large underground storage tanks at the Hanford Site since 1944. Approximately 212,000 m^3 of waste containing approximately 240,000,000 kg of processed chemicals and 177 MCi of radionuclides are currently being stored in 177 tanks. In 1991, the Tank Waste Remediation System (TWRS) Program was established to manage, retrieve, treat, immobilize, and dispose of these wastes in a safe, environmentally sound, and cost-effective manner.

In pursuit of a new contracting strategy, the U.S. Department of Energy (DOE) issued the TWRS Privatization Request for Proposal (RFP) (DOE 1996) in February 1996. Under the privatization approach, a company or a consortium of companies from the private sector would finance, design, build, and operate pretreatment and immobilization facilities, and deliver the finished product to the DOE for a fee. Phase I of the TWRS Privatization strategy is a proof-of-concept/commercial demonstration-scale effort whose objectives are: to demonstrate the technical and business viability of using privatized facilities to treat Hanford Site tank waste; to define and maintain required levels of radiological, nuclear, process, and occupational safety; to maintain environmental protection and compliance; and to substantially reduce the life-cycle costs and time required to treat Hanford Site tank waste. Phase II of the TWRS privatization strategy is a full-scale production phase where the facilities are configured so that the remaining waste can be processed by the year 2018.

In fiscal year (FY) 1995, the TWRS Privatization Support Project Waste Characterization subtask collected and assessed available waste characterization information for the purpose of defining contractual commitments for the TWRS Privatization Request for Proposal. In addition, characterization information was required to address DOE and vendor inquires and to support related feasibility studies. A conclusion of this assessment was that characterization activities being conducted to meet existing programmatic needs would not adequately satisfy the needs of TWRS Privatization; that an incremental amount of additional analyses of the waste samples being collected would be required; and that this should be integrated with the ongoing characterization program as much as possible and as soon as possible to minimize cost and schedule impacts to the DOE. The immediate need for characterization to support the privatization effort was also identified in a report prepared by the U.S. General Accounting Office (GAO), "[the DOE] will be responsible for providing the characterization information necessary to proceed with remediating the tank wastes. DOE's current strategy of proceeding with limited characterization information may increase the risk that facilities may not perform as needed and/or may need costly modifications to perform efficiently" (GAO 1996).

The data quality objective (DQO) process was initiated in FY 1995 at the request of the TWRS Characterization DOE Richland Operations Office (RL), for the purpose of documenting a technical basis for the collection and analysis of waste samples relevant to the privatization of pretreatment and low-activity waste (LAW) immobilization. In a joint effort by Westinghouse Hanford Company (WHC), Argonne National Laboratory, and Pacific Northwest National Laboratory (PNNL) a draft document, *Data Requirements for TWRS Privatization Waste Characterization* (Wiemers et al. 1995), was prepared and issued for review on October 17, 1995. Comments were received from approximately 15 reviewers, representing WHC TWRS Characterization and Disposal Programs, WHC and PNNL analytical laboratories, WHC Quality Assurance, and DOE RL. Funding was not identified at the beginning of FY 1996 to complete the DQO process.

Funding for the work described in this work plan was allocated via a change request (Rosenberry 1996). This work plan describes the strategy for completing the DQO process as directed in the Letter of Instruction issued to PNNL by WHC on March 29, 1996 (Washenfelder 1996).

2.0 SCOPE AND OBJECTIVES

This work plan addresses the activities necessary to complete the DQO process for the purpose of providing sufficient characterization information to successfully stage, pretreat, and immobilize LAW per the requirements and specifications identified in TWRS Privatization RFP. Documentation required to initiate sampling and analysis consistent with the results of the TWRS Privatization DQO process is expected to be issued by May 31, 1996.

2.1 SCOPE

The scope of this task is to complete the DQO process, the results of which will provide a technical basis for sampling and characterization needs related to privatization of pretreatment and LAW immobilization. Initiation of this task will include identification and collection of outstanding technical review comments on the draft document, *Data Requirements for TWRS Privatization Waste Characterization* (Wiemers et al. 1995), in parallel with disposition of existing comments. This starting point is equivalent to activity 9, Document Preparation for External Review, and Activity 10, External Review, as described in the privatization waste *Data Quality Objectives Procedure* (Banning 1996).

Two documents will be issued: the final *Data Requirements for TWRS Privatization Waste Characterization* and an associated technical basis document. The former will complete the TWRS Characterization RL requirements for collection and analysis of waste samples. The technical basis document will provide a description of the source information used during the DQO process to define the requirements. Both of these documents are expected to be updated as the pretreatment and LAW immobilization contractor and site Management and Integration (M&I) characterization needs become better defined.

In parallel with preparation of these deliverables, integration of privatization sampling and characterization needs with the TWRS Characterization Program, WHC Retrieval, WHC analytical services, and other organizations as identified will be pursued to ensure a comprehensive DQO effort and a successful transition to the sampling/analysis stages of the process.

2.2 OBJECTIVES

The objective of this work is to complete the DQO process and document the results in a format that provides TWRS Characterization sufficient information such that the following objectives are accomplished:

- Provide the appropriate quantity and quality of information when it is needed, to minimize risk for the DOE and M&I contractor. The availability of information must be consistent with the RFP schedule, requirements, and specifications.

- Minimize cost and schedule impact through timely integration with ongoing sampling events and tank farm operations.

- Define a clear decision logic and basis for selection of sampling and characterization activities, with flexibility to adapt in a timely manner to newly defined customer needs.

- Identify the stakeholders, provide an opportunity for them to participate as early as possible, and clearly define roles and responsibilities.

3.0 TASK DESCRIPTIONS AND DELIVERABLES

The scope addressed in this work plan is divided into three tasks: (1) complete DQO process, (2) prepare and issue a technical basis document, and (3) integrate sampling and analysis needs. The proposed activities and associated deliverables required to complete these tasks are defined in this section. A summary of the deliverables and completion dates is given in Figure 1.

3.1 COMPLETE DATA QUALITY OBJECTIVE PROCESS

The activities and associated deliverables required to complete the DQO process that was initiated in FY 1995 for TWRS Privatization are identified in this section.

3.1.1 Revisit Stakeholder List and Revise as Necessary

An important first step in any DQO process is to identify stakeholders, provide an opportunity for early participation, and define roles and responsibilities. This step will be revisited through a limited number of meetings with staff representing PNNL, WHC and RL from the TWRS Disposal, Characterization and Privatization programs. The proposed roles and responsibility matrix is shown in Table 1.

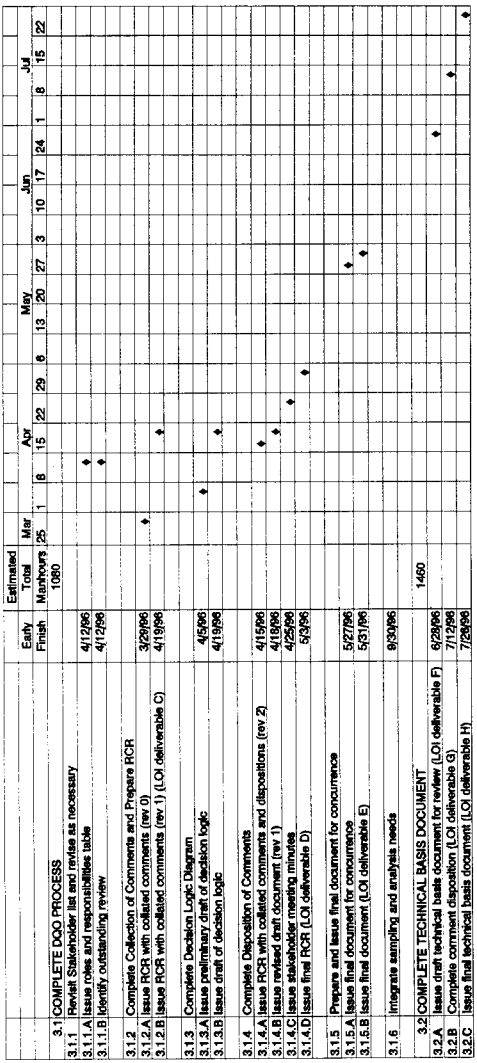
Deliverable(s): List of roles and responsibilities (3.1.1.A)
Identification of outstanding requests for review of the draft document (3.1.1.B).

3.1.2 Complete Collection of Comments and Prepare Collated Review Comment Record

Additional technical reviewers that may be identified during the initial start up meetings will be asked to provide comments on the draft document. Comments received to date will be collated on a Review Comment Record (RCR) form and distributed to the reviewers and stakeholders for their review. A revision to the RCR will be issued to incorporate more recent comments if received by date requested. Comments received after the requested date will be considered for inclusion in the stakeholder's meeting on a best level of effort basis.

Deliverable(s): RCR with collated comments (rev 0) (3.1.2.A)
RCR with collated comments (rev 1) (3.1.2.B).

Figure 1. Summary of Task Deliverables and Schedule.



		Early Finish	Estimated Total Manhours	Mar 25	1	8	Apr 15	22	29	8	May 13	20	27	3	Jun 10	17	24	1	Jul 8	15	22
3.1	COMPLETE DQO PROCESS		1080																		
3.1.1	Revisit Stakeholder list and revise as necessary																				
3.1.1.A	Issue roles and responsibilities table	4/12/96					♦														
3.1.1.B	Identify outstanding review	4/12/96					♦														
3.1.2	Complete Collection of Comments and Prepare RCR																				
3.1.2.A	Issue RCR with collated comments (rev 0)	3/29/96		♦																	
3.1.2.B	Issue RCR with collated comments (rev 1) (LOI deliverable C)	4/19/96						♦													
3.1.3	Complete Decision Logic Diagram																				
3.1.3.A	Issue preliminary draft of decision logic	4/5/96			♦																
3.1.3.B	Issue draft of decision logic	4/19/96					♦														
3.1.4	Complete Disposition of Comments																				
3.1.4.A	Issue RCR with collated comments and dispositions (rev 2)	4/15/96					♦														
3.1.4.B	Issue revised draft document (rev 1)	4/18/96					♦														
3.1.4.C	Issue stakeholder meeting minutes	4/25/96						♦													
3.1.4.D	Issue final RCR (LOI deliverable D)	5/3/96							♦												
3.1.5	Prepare and issue final document for concurrence												♦								
3.1.5.A	Issue final document for concurrence	5/27/96											♦								
3.1.5.B	Issue final document (LOI deliverable E)	5/31/96												♦							
3.1.6	Integrate sampling and analysis needs	6/30/96																			
3.2	COMPLETE TECHNICAL BASIS DOCUMENT		1460																		
3.2.A	Issue draft technical basis document for review (LOI deliverable F)	6/28/96															♦				
3.2.B	Complete comment disposition (LOI deliverable G)	7/12/96																	♦		
3.2.C	Issue final technical basis document (LOI deliverable H)	7/26/96																			♦

Table 1. Roles and Responsibility Matrix for the Tank Waste Remediation System Privatization Data Quality Objective Process.

Organization	Team member	Phone/Fax/MSIN	Roles/Responsibilities
TWRS Characterization (WHC)	Dave Banning	372-2728/373-6955/R2-12	DQO facilitation support
	John Hunt	373-1013/373-6955/R2-12	Transition from draft preparation
	Susan Eberlein	376-5029/373-6955/R2-12	Review/concurrence
TWRS Disposal (WHC)	Randy Kirkbride	372-2115/376-8652/H5-27	Provide status to RL
	Ken Gasper	373-2641/376-8652/H5-27	Review/concurrence
TWRS Privatization (PNNL)	Karyn Wiemers	376-4565/373-0733/K6-51	Project management and technical lead
	Langdon Holton	372-6227/375-4422/K9-73	Interface
	Paul Kearns	376-0854/373-0733/K6-51	Review/concurrence
TWRS Privatization (RL)	Ruthie Simmons-Green	373-9419/373-0628/K6-51	Represent Rob Gilbert
	Rob Gilbert	376-2310/373-0628/K6-51	Review/concurrence
	Bill Taylor	372-3864/373-0628/K6-51	Interface
TWRS Characterization (RL)	Greg Joyce	372-1838/376-4290/S7-73	RL Characterization Support
	Wen Liou	373-9879/376-2002/S7-54	Represent Jim F. Thompson
	Jim F. Thompson	373-9757/376-2002/S7-54	Review/concurrence
Washington State Department of Ecology	Alex Stone	736-3018/736-3030/B5-18	Review
Environmental Quality Management	Mitzi Miller	375-3268 ext 362	Facilitator
	Larry Jackson	375-3268 ext 372	Facilitator support

DQO = Data Quality Objectives
PNNL = Pacific Northwest National Laboratory
RL = U.S. Department of Energy-Richland Operations Office
TWRS = Tank Waste Remediation System
WHC = Westinghouse Hanford Company.

3.1.3 Complete Decision Logic Diagram

Specifications and schedules defined in the RFP and tank waste selection and sequencing identified in the *Preliminary Low-Level Waste Feed Staging Plan* (Certa 1996) and the *Assumptions for the Operational Waste Volume Projection* (Appendix A) provide a basis for development of a decision logic, which did not exist at the time the draft document was issued. A decision logic will be developed to replace Section 6.0 and part of Section 7.0 of the draft document. A preliminary draft of the "high-level" decision logic will be distributed for internal review. A final draft, with second order decisions, will be provided for review before the stakeholder meeting identified in activity 3.1.4.

Deliverable(s): Preliminary draft of decision logic (3.1.3.A)
Final draft of decision logic (3.1.3.B).

3.1.4 Complete Disposition of Comments

The comments will be sorted by topic and distributed to technical staff for disposition. The dispositions will be collated on the RCR (Rev. 2) and distributed to reviewers, dipositioners, and other stakeholders for their review. A draft (Rev. 1) of the document, *Data Requirements for TWRS Privatization Waste Characterization* (Wiemers et al. 1995), will be prepared with incorporation of comment resolution. The revised draft will be distributed to stakeholders for review.

A stakeholders meeting will be convened for the purpose of discussing outstanding concerns relative to resolution of comments and the draft decision logic (refer to activity 3.1.3). A final RCR will be prepared and issued to the stakeholders.

Deliverable(s): RCR with collated comments and dispositions (Rev. 2) (3.1.4.A)
Revised draft document (rev 1) incorporating comment resolution (3.1.4.B)
Stakeholder meeting minutes (3.1.4.C)
Final RCR (3.1.4.D).

3.1.5 Prepare and Issue Final Document for Concurrence

A final document, which is consistent with the RCR dispositions/resolutions, will be prepared and routed for concurrence signatures as identified on the roles and responsibilities table.

Deliverable(s): Final document for concurrence (3.1.5.A)
Final document (3.1.5.B).

3.1.6 Integrate Sampling and Analysis Needs

Parallel projects/tasks considered as key interfaces for the integration of sampling and analysis needs include those listed in Table 2. A lead contact is identified for each task.

Table 2. Key Interfaces for Integration of Sampling and Analysis Needs.

Organization	Tasks	Lead contact
TWRS Characterization	Characterization technical basis	D. L. Banning
	Baseline sampling schedule	G. A. Stanton
Tank Farm Operation	Operational waste volume projection	J. A. Voodg
TWRS Disposal	Feed staging plan	P. J. Certa
	Standard inventory estimate	M. J. Kupfer
TWRS Privatization	Contractor request/inquiries	S. E. Wagner
	Regulatory issues	M. E. Lerchen

TWRS = Tank Waste Remediation System.

Deliverable(s): This task will be conducted on a level of effort basis; no hard deliverables are identified. The primary focus will be review of draft documents from the organizations/tasks identified in Table 2, request for review of deliverables described in this work plan or participation in meetings, and frequent exchange in regards to current policies, other programmatic requirements, etc.

3.2 COMPLETE TECHNICAL BASIS DOCUMENT

The primary purpose of the technical basis document is to briefly elaborate on the bases used to identify the information needs and process limits addressed during the DQO process and summarized in the *Data Requirements for TWRS Privatization Waste Characterization* (Weimers et al. 1995, Tables 8-1 through 8-4). The technical basis document will substantiate the technical baseline for the sampling and characterization decisions to be made and provide a framework upon which new requests or discoveries can be considered and addressed.

Deliverable(s): Draft technical basis document (3.2.A)
Comment disposition (3.2.B)
Final technical basis document (3.2.C).

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4.0 REFERENCES

Banning, D. L., 1996, *Data Quality Objectives Procedure,* WHC-IP-1216, Westinghouse Hanford Company, Richland, Washington.

Certa, P. J., C. M. McConville, L. W. Shelton, and E. J. Slaathaug, 1996, *Preliminary Low-Level Waste Feed Staging Plan*, WHC-SM-WM-RPT-210, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

DOE, 1996, *TWRS Privatization Request for Proposal,* DE-RP06-96RL13308 U.S. Department of Energy-Richland Operations Office, Richland, Washington.

GAO, 1996, *Nuclear Waste, Management and Technical Problems Continue to Delay Characterizing Hanford's Tank Waste*, Letter report to the Secretary of Energy, GAO/RCED-96-56, U.S. General Accounting Office, Washington, D.C.

Rosenberry, M. W., 1996, *Addition of LAW Facility Feed DQO Work Scope to LLW Baseline,* Change Request TWR-96-024, Westinghouse Hanford Company, Richland, Washington.

Washenfelder, D. J., 1996, *Pacific Northwest National Laboratory Letter of Instruction for FY 1996 Tank Waste Remediation system Work on the Privatization Waste Characterization Data Quality Objectives Development Activity,* Letter number 9651432, Westinghouse Hanford Company, Richland, Washington.

Wiemers, K. D., J. W. Hunt, G. F. Vandegrift, and J. Sedlet, 1995, *Data Requirements for TWRS Privatization Waste Characterization,* WHC-SD-WM-DQO-023, Rev. 0 (DRAFT), Westinghouse Hanford Company, Richland, Washington.

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APPENDIX A

SUBMITTAL OF THE TANK WASTE REMEDIATION SYSTEM DISPOSAL PROGRAM ASSUMPTIONS FOR THE OPERATIONAL WASTE VOLUME PROJECTION

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From: TWRS Disposal Program DPO-96-14
Phone: 376-7402 G3-21
Date: March 1, 1996
Subject: SUBMITTAL OF THE TWRS DISPOSAL PROGRAM ASSUMPTIONS FOR THE OPERATIONAL WASTE VOLUME PROJECTION

To: W. B. Barton R2-11

cc: J. S. Garfield H5-49
M. E. Johnson G3-21
E. J. Kosiancic H5-61
J. P. Sloughter R2-54
J. N. Strode R2-11
D. J. Washenfelder H5-27
JOH File/LB

The Tank Waste Remediation System (TWRS) Disposal Program has prepared assumptions to be used for the FY 1996 revision to the attached TWRS Operational Waste Volume Projection (OWVP). Tank waste retrieval assumptions are provided for FY 1996 through FY 2018. Tank waste treatment assumptions are provided for FY 1996 through FY 2011. These assumptions are consistent with DOE's proposed privatization of tank waste treatment services, as expressed in the TWRS Privatization Request for Proposals.

The TWRS Disposal Program is evaluating the information contained within the TWRS Privatization Request for Proposals to determine tank waste treatment process parameters for FY 2012 through FY 2028. This evaluation will be published on August 16, 1996 as a revision to the TWRS Process Flowsheet (WHC-SD-WM-TI-613). An update to the TWRS Disposal Program OWVP assumptions will be submitted after revising the TWRS Process Flowsheet.

If you have any questions on these assumptions, please contact M. E. Johnson at 372-3473.

J. O. Honeyman
Director

mej

attachment

1.0 DISPOSAL PROGRAM STRATEGY

The DOE strategy for treatment of Hanford Site tank wastes encompasses the use of private contractors (DOE 1995a). Under this concept, the DOE would privatize the treatment of Hanford Site tank wastes, including the design, permitting, construction, operation, decontamination, and decommissioning of equipment and facilities for treatment of Hanford Site tank wastes. Figure 1-1 identifies the functions which will be privatized.

As formulated by the DOE, privatization is divided into two phases. The first phase includes privatization of supernatant pretreatment, LLW immobilization, and an optional HLW immobilization. The scale of tank waste processing during phase 1 of privatization is selected to establish proof of concepts to demonstrate the technical, commercial, and procurement capabilities necessary for privatization. During phase 2 privatization, the private contractors work scope will include tank waste retrieval, interim storage of wastes, supernatant pretreatment, sludges/solids pretreatment, LLW immobilization, HLW immobilization, disposition of encapsulated Cs/Sr, and interim storage of immobilized wastes.

During phase 1 privatization, the Maintenance and Operations (M&O) contractor is responsible for continued safe waste storage, retrieval of tank wastes, sludges/solids pretreatment (i.e., in-tank sludge washing), interim storage of solidified wastes, and disposal of immobilized wastes. Additional responsibilities of the M&O contractor during phase 1 and 2 processing of tank wastes include disposition of radioactive secondary waste (e.g., radioactive liquid and solid wastes) generated by the privatization contractors. During phase 2 processing, the M&O contractor has the responsibility for continued safe management of the tank wastes, disposal of the immobilized LLW, and closure of operable units (i.e., tank farms, low-level waste sites).

1.1 SUMMARY SCHEDULE

The DOE, U.S. Environmental Protection Agency (EPA), and the Washington State Department of Ecology (Ecology) have entered into the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)(Ecology et al. 1994) to:

- Ensure that the environmental impacts associated with past and present activities at the Hanford Site are thoroughly investigated and appropriate response actions are taken as necessary to protect the public health, welfare, and environment.

- Provide a framework for permitting treatment, storage, and disposal units.

- Promote orderly, effective investigation and clean up of contamination at the Hanford Site, and avoid litigation between the three parties.

The Tri-Party Agreement establishes a time table (i.e., milestones) for characterizing the Hanford Site tank wastes, resolving tank safety issues, upgrading the underground storage tanks to comply with regulations, retrieving tank wastes, pretreatment, treatment, and disposal of tank wastes. The Tri-Party Agreement includes provisions for revision, if agreement of the three parties is reached.

The DOE and Washington State Department of Ecology have completed negotiations to revise the Tri-Party Agreement milestones relating to the privatization of tank waste treatment (DOE 1995b). Additionally, the DOE has developed a planning schedule for privatizing the treatment of Hanford Site tank wastes (DOE 1996). The proposed schedule for phase 1 processing of tank wastes is:

- Contract Award — December 29, 1997
- Evaluate / Select Contractors — April 30, 1998
- Obtain Permits / Complete Design — December 31, 1999
- Complete Construction/ Testing — June 1, 2002
- Operations
  Minimum Order Quantities — June 1, 2002 - June, 1,2007
  Additional Operations (optional) — - June 1, 2011
- Deactivation of phase 1 facilities is to take place within one years of completion of phase 1 activities (including any optional "additional operations")

The proposed schedule for phase 2 processing of tank wastes is (DOE 1995c):

- Contract Award — 2005
- Design, Permitting, Licensing, Construction, and Startup
  - Low-Activity Waste — 2005 to 2011
  - High-Level Waste — 2005 to 2013
- Operations
  - Low-Activity Waste — 2011 to 2021
  - High-Level Waste — 2013 to 2028
- Decontamination and Decommissioning
  - Low-Activity Waste — 2021 to 2026
  - High-Level Waste — 2028 to 2033

1.2 High-Level Waste (HLW) Pretreatment

Phase 1 processing of tank waste sludges is planned to be conducted in existing double-shell tanks. The NCAW sludges contained in tanks 241-AZ-101 and 241-AZ-102 are selected for phase 1 processing. The high-heat sludge presently contained in tank 241-C-106 is scheduled to begin retrieval to tank 241-AY-102 in the fourth quarter of FY1996. The combined 241-C-106 and 241-AY-102 sludges are also planned for phase 1 HLW processing.

An evaluation of water washing (i.e., 0.1 molar sodium hydroxide solution) versus enhanced sludge washing (i.e., 3.0 molar sodium hydroxide solution) has been conducted for these sludges (WHC 1996a). This evaluation indicates conducting either pretreatment process would result in the same projected HLW glass volume from vitrification of these sludges. This is because after removal of water soluble components, the glass composition is limited by the Fe_2O_3 content of these sludges. Neither enhanced sludge washing nor water washing reduces the Fe_2O_3 content of these sludges. Therefore, water washing of these sludges will be conducted to prepare HLW for the phase 1 private contractors.

An evaluation has been conducted to minimize the volume of wash solutions generated, while achieving the minimum quantity of HLW glass canisters. This evaluation differs from that presented in the *Phase I High-Level Waste Pretreatment and Feed Staging Plan* (WHC 1996a), which focused on minimizing the wash time cycle as well as the estimated quantity of HLW glass canisters. The results of the wash solution minimization evaluation are presented in Tables 1 through 3 for the sludges contained in tanks 241-AZ-101, 241-AZ-102, and 241-AY-102 / 241-C-106.

Alternatives options have been evaluated for consolidating the 241-AZ-101, 241-AZ-102, and 241-AY-102 / 241-C-106 sludges into a single aging waste tank (WHC 1996b). The combined sludges would provide a single, blended HLW feed for phase 1 vitrification processing. However, accomplishing the consolidation of these sludges would require modifications to the tank farm safety basis and generate potentially unacceptable quantities of sludge wash solutions during a period (1997 through 2001) when adequate double-shell tank storage capacity may not be available.

These alternatives for consolidation of high heat sludges are being reviewed by a decision board, which is comprised of representatives from effected WHC TWRS organizations, a DOE/RL representative, and a WDOE representative (WHC 1996c). The preliminary recommendation of this decision board is to not consolidate these high heat sludges into a single aging waste tank. This decision board has requested further evaluation of a synthesized alternative which conducts sequential pretreatment of each sludge. The assumptions provided in this letter are consistent with the preliminary recommendation of this decision board. A final recommendation on consolidation and pretreatment of these high heat sludges is anticipated to be available by April 1, 1996. If this final recommendation modifies the TWRS Disposal Program operational waste volume assumptions, changes will be communicated to your department.

Phase I High-Level Waste Feed Pretreatment - Low-Level Waste Impacts

Table 1. In-Tank Sludge Washing Sensitivity Runs - Dilute Caustic Washing of 241-AZ-101 (20 wt% Insoluble Solids Settling Efficiency) [1,2]

Number of Washes	Number of 0.62-m³ HLW Canisters [3]				
	1:1 Dilution	2:1 Dilution	3:1 Dilution	4:1 Dilution	5:1 Dilution
0	189.6	189.6	189.6	189.6	189.6
1	162.8	152.8	145.8	140.5	137.0
2	150.6	137.0	137.0	137.0	137.0
3	141.0	137.0	137.0	137.0	137.0
4	137.0	137.0	137.0	137.0	137.0
Initial Decant Volume (L)	3,030,000	3,030,000	3,030,000	3,030,000	3,030,000
Wash Solution(s) Volume (L)	452,000	476,000	710,000	960,000	607,000

Table 1 (Continued). In-Tank Sludge Washing Sensitivity Runs - Dilute Caustic Washing of 241-AZ-101 (20 wt% Insoluble Solids Settling Efficiency)

Number of Washes	Number of 0.62-m³ HLW Canisters [3]				
	6:1 Dilution	7:1 Dilution	8:1 Dilution	9:1 Dilution	Fill Tank (27:1)
0	189.6	189.6	189.6	189.6	189.6
1	137.0	137.0	137.0	137.0	137.0
2	137.0	137.0	137.0	137.0	137.0
3	137.0	137.0	137.0	137.0	137.0
4	137.0	137.0	137.0	137.0	137.0
Initial Decant Volume (L)	3,030,000	3,030,000	3,030,000	3,030,000	3,030,000
Wash Solution(s) Volume (L)	735,000	864,000	993,000	1,120,000	3,490,000

1. Assumes a 4-foot (1.22-m) minimum head for acceptable mixer pump performance at full speed.
2. The recommended dilution ratios are shaded.
3. Canister numbers are computed prior to the addition of transfer liquid.

Table 2. In-Tank Sludge Washing Sensitivity Runs - Dilute Caustic Washing of 241-AZ-102 (20 wt% Insoluble Solids Settling Efficiency) [1,2]

Number of Washes	Number of 0.62-m³ HLW Canisters [3]				
	1:1 Dilution	2:1 Dilution	3:1 Dilution	4:1 Dilution	5:1 Dilution
0	1048.0	1048.0	1048.0	1048.0	1048.0
1	704.7	531.8	427.0	356.8	306.4
2	473.4	269.5	214.1	214.1	214.1
3	317.7	214.1	214.1	214.1	214.1
4	214.1	214.1	214.1	214.1	214.1
Initial Decant Volume (L)	2,960,000	2,960,000	2,960,000	2,960,000	2,960,000
Wash Solution(s) Volume (L)	1,356,000	2,058,000	2,100,000	2,780,000	3,500,000

Table 1 (Continued). In-Tank Sludge Washing Sensitivity Runs - Dilute Caustic Washing of 241-AZ-101 (20 wt% Insoluble Solids Settling Efficiency) [1,2]

Number of Washes	Number of 0.62-m³ HLW Canisters [3]				
	6:1 Dilution	7:1 Dilution	8:1 Dilution	9:1 Dilution	Fill Tank (9.32:1)
0	1048.0	1048.0	1048.0	1048.0	1048.0
1	268.5	238.9	215.3	214.1	214.1
2	214.1	214.1	214.1	214.1	214.1
3	214.1	214.1	214.1	214.1	214.1
4	214.1	214.1	214.1	214.1	214.1
Initial Decant Volume (L)	2,960,000	2,960,000	2,960,000	2,960,000	2,960,000
Wash Solution(s) Volume (L)	4,220,000	4,940,000	2,820,000	3,180,000	3,300,000

1. Assumes a 4-foot (1.22-m) minimum head for acceptable mixer pump performance at full speed.
2. The recommended dilution ratios are shaded.
3. Canister numbers are computed prior to the addition of transfer liquid.

Table 3. In-Tank Sludge Washing Sensitivity Runs - Dilute Caustic Washing of 241-AY-102 and 241-C-106 (75%) (20 wt% Insoluble Solids Settling Efficiency) [1,2]

Number of Washes	Number of 0.62-m^3 HLW Canisters [3]				
	1:1 Dilution	2:1 Dilution	3:1 Dilution	4:1 Dilution	Fill Tank 4.45:1
0	413.9	413.9	413.9	413.9	413.9
1	398.0	390.0	384.4	380.3	378.8
2	388.1	376.8	370.2	366.1	364.7
3	380.3	368.3	362.5	359.3	358.4
4	374.3	362.9	358.3	356.2	355.6
5	369.7	359.4	356.0	354.7	354.4
6	366.1	357.3	354.8	354.0	353.8
7	363.3	355.9	354.2	353.7	353.6
8	361.1	355.0	353.8	353.5	353.5
Dry Solids	349.6	349.6	349.6	349.6	349.6
Initial Decant Volume (L)	1,640,000	1,640,000	1,640,000	1,640,000	1,640,000
Wash Solution(s) Volume (L)	4,080,000	6,800,000	8,120,000	8,130,000	9,070,000

1. Assumes a 4-foot (1.22-m) minimum head for acceptable mixer pump performance at full speed.
2. The recommended dilution ratios are shaded.
3. Canister numbers are computed prior to the addition of transfer liquid.

1.2.1 Water Washing of 101-AZ Sludge

Water washing of the tank 241-AZ-101 sludge is planned to be conducted during FY 1998 using the mixer pumps installed by Project W-151. To conduct the in-tank sludge washing of the 241-AZ-101 sludge, the following actions are necessary:

- The dilute complexed waste (~850,000 gallons) presently contained within tank 241-AY-101 is transferred to another DST prior to FY 1998.
- The NCAW supernatant (~872,000 gallons) presently contained in tank 241-AZ-101 is decanted to a level approximately 24 inches above the sludge surface, leaving approximately 35,000 gallons of sludge and 66,000 gallons of supernatant. The decanted NCAW supernatant, approximately 806,000 gallons, is received into tank 241-AY-101. This transfer is planned for October 1997.
- Approximately 126,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-101 in November 1997. The mixer pumps are operated to mobilize and wash the NCAW sludge.
- Operation of the mixer pumps in tank 241-AZ-101 is halted and the sludge allowed to settle. Estimated settling time is approximately 1 month.
- The wash solution contained in tank 241-AZ-101 is sampled and decanted during January 1998 to an available DST in either AN, AW or AP farm. The decant volume is approximately 126,000 gallons.
- Approximately 126,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-101 in February 1998. The mixer pumps are operated to mobilize and wash the NCAW sludge.
- Operation of the mixer pumps in tank 241-AZ-101 is halted and the sludge allowed to settle. Estimated settling time is approximately 1 month.
- The wash solution contained in tank 241-AZ-101 is sampled and decanted during April 1998 to an available DST in either AN, AW or AP farm. The decant volume is approximately 126,000 gallons.
- The washed NCAW solids are sampled to determine the effectiveness of the in tank sludge washing process.
- Approximately 100,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-101 in May 1998 to dilute the solids sufficiently for future transfer for phase 1 HLW vitrification processing. The volume of solids slurry within tank 241-AZ-101 should be ~200,000 gallons.

The estimated compositions and volumes of the initial supernatant and wash solutions decanted generated from tank 241-AZ-101 sludge washing are provided in Table 4.

1.2.2 Water Washing of 102-AZ Sludge

Water washing of the tank 241-AZ-102 sludge is planned to be conducted during FY 2001 using the mixer pimps installed by Project W-211. To conduct the in-tank sludge washing of the 241-AZ-102 sludge, the following actions are necessary:

- In tank concentration of the NCAW supernatant (~2.2 M Na) from approximately 860,000 gallons to 344,000 gallons (~5.5 M Na) is conducted from the present through FY 2000.
- Project W-211 installs mixer pumps in tank 241-AZ-102 by September 2000.
- The NCAW supernatant (~344,000 gallons) presently contained in tank 241-AZ-102 is decanted to a level approximately 24 inches above the sludge surface, leaving approximately 95,000 gallons of sludge and 66,000 gallons of supernatant. The decanted NCAW supernatant, approximately 278,000 gallons, is received into tank 241-AY-101. (If tank 241-AY-101 is not suitable for receipt of the NCAW supernatant, then a different DST in AN or AW farm should be used.) This transfer is planned for October 2000.
- Approximately 557,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-102 in November 2000. The mixer pumps are operated to mobilize and wash the NCAW sludge.
- Operation of the mixer pumps in tank 241-AZ-102 is halted and the sludge allowed to settle. Estimated settling time is approximately 1 month.
- The wash solution contained in tank 241-AZ-102 is sampled and decanted during January 2001 to an available DST in either AN, AW or AP farm. The decant volume is approximately 557,000 gallons.
- Approximately 557,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-102 in February 2001. The mixer pumps are operated to mobilize and wash the NCAW sludge.
- Operation of the mixer pumps in tank 241-AZ-102 is halted and the sludge allowed to settle. Estimated settling time is approximately 1 month.
- The wash solution contained in tank 241-AZ-102 is sampled and decanted during April 2001 to an available DST in either AN, AW or AP farm. The decant volume is approximately 557,000 gallons.

Table 4. Dilute Caustic Washing of 241-AZ-101
Optimized Results - Two Dilute Caustic Washes, 2:1 Dilution

	Supernate Composition			LLW Composition	
	Initial	After Initial Decant	After Second Wash/Decant	First Decant	Wash Solution(s)
Total Mass Flow (kg)	4.30E+06	5.26E+05	5.23E+05	3.78E+06	5.35E+05
Volume (L)	3.46E+06	4.22E+05	4.76E+05	3.03E+06	4.76E+05
Specific Gravity	1.25	1.25	1.10	1.25	1.12
Radionuclides (Ci/L)					
Am-241	2.50E-04	2.51E-04	9.73E-05	2.51E-04	1.25E-04
C-14	6.68E-05	6.68E-05	2.61E-05	6.70E-05	3.34E-05
Cm-244	5.52E-06	5.55E-06	2.14E-06	5.54E-06	2.75E-06
Co-60					
Cs-137	1.76E+00	1.77E+00	6.85E-01	1.77E+00	8.80E-01
Ba-137	1.67E+00	1.68E+00	6.51E-01	1.68E+00	8.36E-01
Pu-239	3.12E-07	3.13E-07	1.22E-07	3.14E-07	1.56E-07
Sr-90	8.21E-02	8.22E-02	3.19E-02	8.22E-02	4.10E-02
Y-90	8.21E-02	8.22E-02	3.19E-02	8.22E-02	4.10E-02
Tc-99	1.95E-04	1.95E-04	7.56E-05	1.95E-04	9.73E-05
Total Curies	1.25E+07	1.52E+06	6.66E+05	1.09E+07	8.55E+05
Chemicals (g/L)					
Ag+					
Am+3	7.28E-05	7.30E-05	2.84E-05	7.29E-05	3.63E-05
As+5	7.66E-04	7.68E-04	2.98E-04	7.69E-04	3.82E-04
B+3	2.60E-04	2.61E-04	1.01E-04	2.60E-04	1.30E-04
Ba+2	2.75E-05	2.75E-05	1.07E-05	2.75E-05	1.37E-05
Be+2	3.12E-07	3.13E-07	1.21E-07	3.13E-07	1.56E-07
Bi+3					
Ca+2	4.62E-04	4.62E-04	1.80E-04	4.62E-04	2.31E-04
Cd+2	1.70E-05	1.70E-05	6.62E-06	1.71E-05	8.49E-06
Ce+3	6.99E-04	7.01E-04	2.73E-04	7.00E-04	3.49E-04
Cm+3	6.82E-08	6.82E-08	2.65E-08	6.83E-08	3.40E-08
Co+3	2.17E-07	2.17E-07	8.42E-08	2.17E-07	1.08E-07
Cs+	7.89E-02	7.91E-02	3.07E-02	7.92E-02	3.95E-02
Cu+2	6.01E-05	6.04E-05	2.33E-05	6.04E-05	3.00E-05
Fe+3	1.40E-04	1.40E-04	5.44E-05	1.40E-04	7.00E-05
K+	1.97E-01	1.97E-01	7.67E-02	1.97E-01	9.85E-02
La+3	5.26E-05	5.28E-05	2.05E-05	5.28E-05	2.63E-05
Li+	1.30E-04	1.30E-04	5.06E-05	1.30E-04	6.49E-05
Mg+2	2.50E-05	2.51E-05	9.71E-06	2.50E-05	1.25E-05
Mn+4	1.28E-05	1.28E-05	4.98E-06	1.28E-05	6.41E-06
Mo+6	3.96E-03	3.98E-03	1.54E-03	3.99E-03	1.98E-03
Na+	1.01E+02	1.01E+02	4.08E+01	1.01E+02	5.15E+01
Ni+3	3.67E-05	3.67E-05	1.43E-05	3.70E-05	1.83E-05
Pb+4	2.77E-04	2.77E-04	1.08E-04	2.76E-04	1.38E-04
Pu+4	5.06E-06	5.05E-06	1.96E-06	5.05E-06	2.52E-06
Re+7	6.50E-05	6.52E-05	2.52E-05	6.50E-05	3.24E-05
Rh+3	4.65E-04	4.64E-04	1.81E-04	4.65E-04	2.31E-04
Ru+3	2.22E-04	2.23E-04	8.63E-05	2.22E-04	1.11E-04
Sb+5	6.01E-04	6.04E-04	2.33E-04	6.04E-04	3.00E-04
Se+6	1.13E-03	1.13E-03	4.39E-04	1.13E-03	5.63E-04
Si+4	1.64E-02	1.64E-02	6.37E-03	1.64E-02	8.17E-03
Sr+2	2.84E-03	2.84E-03	1.11E-03	2.85E-03	1.42E-03
Te+6	1.21E-03	1.21E-03	4.68E-04	1.21E-03	6.03E-04
Th+4	9.74E-04	9.76E-04	3.78E-04	9.77E-04	4.87E-04
Ti+4	3.47E-04	3.48E-04	1.35E-04	3.47E-04	1.73E-04
Tl+3	1.21E-02	1.21E-02	4.68E-03	1.21E-02	6.03E-03
UO2+2	2.67E-03	2.68E-03	1.04E-03	2.68E-03	1.33E-03
V+5	4.16E-05	4.17E-05	1.62E-05	4.19E-05	2.08E-05
Zn+2	6.18E-05	6.21E-05	2.42E-05	6.20E-05	3.09E-05
Zr+4					
Al(OH)4-	3.50E+01	3.51E+01	1.36E+01	3.50E+01	1.75E+01
Cl-	1.76E-01	1.77E-01	6.85E-02	1.77E-01	8.80E-02
CO3-2	2.95E+01	2.96E+01	1.15E+01	2.95E+01	1.47E+01
Cr(OH)4-	1.39E-01	1.39E-01	5.40E-02	1.39E-01	6.93E-02
F-	1.71E+00	1.72E+00	6.66E-01	1.72E+00	8.55E-01
I-	9.88E-05	9.91E-05	3.84E-05	9.90E-05	4.94E-05
NO2-	5.87E+01	5.88E+01	2.31E+01	5.87E+01	2.96E+01
NO3-	6.82E+01	6.82E+01	2.65E+01	6.83E+01	3.40E+01
OH-	9.57E+00	9.60E+00	4.77E+00	9.60E+00	5.63E+00
PO4-3	1.13E-02	1.13E-02	4.41E-03	1.14E-02	5.65E-03
SO4-2	6.36E-03	6.37E-03	2.48E-03	6.37E-03	3.17E-03
TcO4-	1.90E-02	1.90E-02	7.37E-03	1.90E-02	9.47E-03
H2O	9.39E+02	9.41E+02	9.77E+02	9.41E+02	9.71E+02
Organic Carbon	1.04E+00	1.04E+00	4.05E-01	1.04E+00	5.21E-01
ZrO2:2H2O	3.73E-05	3.72E-05	1.45E-05	3.73E-05	1.86E-05

- The washed NCAW solids are sampled to determine the effectiveness of the in tank sludge washing process.

- Approximately 240,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AZ-102 in May 2001 to dilute the solids sufficiently for future transfer for phase 1 HLW vitrification processing. The solids slurry volume within tank 241-AZ-102 should be ~400,000 gallons.

The estimated compositions and volumes of the initial supernatant and wash solutions decanted generated from tank 241-AZ-102 sludge washing are provided in Table 5.

1.2.3 Water Washing of 102-AY / 106-C Sludge

Water washing of the tank 241-AY-102 / retrieved 241-C-106 sludge is planned to be conducted during FY 2003 using the mixer pimps installed by Project W-211. To conduct the in-tank sludge washing of the 241-AY-102 sludge, the following actions are necessary:

- Project W-211 installs mixer pumps in tank 241-AY-102 by September 2001.

- Tank 241-AY-102 is estimated to contained ~800,000 gallons of dilute nitrate waste solution and 229,000 gallons of sludge following final retrieval demonstration of 241-C-106 (see retrieval section). The 241-AY-102 supernatant is decanted to a level approximately 24 inches above the sludge surface, leaving approximately 229,000 gallons of sludge and 66,000 gallons of supernatant. The decanted waste, approximately 734,000 gallons, is received into a DST in AN, AW, or AP farm. This transfer is planned for October 2003.

- Tank 241-AY-102 is refilled and decanted three times to wash the sludge. Each wash adds approximately 800,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution to tank 241-AY-102. The mixer pumps are operated to mobilize and wash the sludge from November 2003 through May 2004.

- Each wash solution contained in tank 241-AY-102 is sampled and decanted to an available DST in either AN, AW or AP farm. The total wash solution volume is approximately 2,400,000 gallons.

- The washed solids are sampled to determine the effectiveness of the in tank sludge washing process.

- Approximately 700,000 gallons of 0.1 M sodium hydroxide, 0.011 M sodium nitrate solution are added to tank 241-AY-102 in June 2004 to dilute the solids sufficiently for future transfer for phase 1 HLW vitrification processing. The solids slurry volume within tank 241-AY-102 should be ~1,000,000 gallons.

Table 6. Dilute Caustic Washing of 241-AZ-102
Optimized Results - Two Dilute Caustic Washes, 3:1 Dilution

	Supernate Composition			LLW Composition	
	Initial	After Initial Decant	After Second Wash/Decant	First Decant	Wash Solution(s)
Total Mass Flow (kg)	4.03E+06	7.48E+05	7.43E+05	3.28E+06	2.17E+06
Volume (L)	3.63E+06	6.74E+05	7.29E+05	2.96E+06	2.10E+06
Specific Gravity	1.11	1.11	1.02	1.11	1.03
Radionuclides (Ci/L)					
Am-241	4.63E-07	4.63E-07	7.08E-08	4.63E-07	1.24E-07
C-14	4.52E-05	4.51E-05	6.89E-06	4.49E-05	1.20E-05
Cm-244					
Co-60					
Cs-137	8.76E-01	8.75E-01	1.34E-01	8.75E-01	2.34E-01
Ba-137	8.32E-01	8.31E-01	1.27E-01	8.31E-01	2.22E-01
Pu-239	1.11E-05	1.11E-05	1.70E-06	1.11E-05	2.96E-06
Sr-90	2.46E-03	2.46E-03	3.76E-04	2.46E-03	6.57E-04
Y-90	2.46E-03	2.46E-03	3.76E-04	2.46E-03	6.57E-04
Tc-99	8.29E-05	8.28E-05	1.27E-05	8.26E-05	2.21E-05
Total Curies	6.22E+06	1.15E+06	1.91E+05	5.07E+06	8.62E+05
Chemicals (g/L)					
Ag+					
Am+3	1.35E-07	1.35E-07	2.06E-08	1.35E-07	3.61E-08
As+5	1.14E-03	1.14E-03	1.74E-04	1.14E-03	3.06E-04
B+3	6.34E-04	6.32E-04	9.67E-05	6.32E-04	1.70E-04
Ba+2	8.84E-05	8.84E-05	1.35E-05	8.85E-05	2.37E-05
Be+2	5.84E-06	5.82E-06	8.92E-07	5.81E-06	1.56E-06
Bi+3					
Ca+2	3.09E-03	3.09E-03	4.73E-04	3.09E-03	8.29E-04
Cd+2	9.94E-05	9.94E-05	1.52E-05	9.93E-05	2.66E-05
Ce+3	1.12E-03	1.12E-03	1.71E-04	1.12E-03	3.00E-04
Cm+3					
Co+3	1.03E-08	1.03E-08	1.58E-09	1.03E-08	2.76E-09
Cs+	3.94E-02	3.93E-02	6.02E-03	3.95E-02	1.05E-02
Cu+2	8.10E-05	8.09E-05	1.24E-05	8.07E-05	2.17E-05
Fe+3	8.40E-04	8.40E-04	1.28E-04	8.38E-04	2.25E-04
K+	7.19E-02	7.18E-02	1.10E-02	7.20E-02	1.92E-02
La+3	1.80E-04	1.80E-04	2.74E-05	1.80E-04	4.81E-05
Li+	8.13E-05	8.10E-05	1.24E-05	8.11E-05	2.17E-05
Mg+2	1.01E-04	1.01E-04	1.55E-05	1.01E-04	2.71E-05
Mn+4	7.63E-05	7.63E-05	1.17E-05	7.64E-05	2.04E-05
Mo+6	1.86E-03	1.85E-03	2.84E-04	1.86E-03	4.95E-04
Na+	5.07E+01	5.06E+01	9.89E+00	5.07E+01	1.54E+01
Ni+3	1.93E-04	1.93E-04	2.95E-05	1.93E-04	5.19E-05
Pb+4	3.97E-04	3.98E-04	6.08E-05	3.99E-04	1.06E-04
Pu+4	1.79E-04	1.78E-04	2.73E-05	1.79E-04	4.76E-05
Re+7	6.03E-05	6.01E-05	9.20E-06	6.01E-05	1.61E-05
Rh+3	7.71E-04	7.70E-04	1.18E-04	7.70E-04	2.06E-04
Ru+3	1.91E-04	1.91E-04	2.92E-05	1.91E-04	5.14E-05
Sb+5					
Se+6	9.39E-04	9.39E-04	1.44E-04	9.39E-04	2.51E-04
Si+4	4.96E-01	4.94E-01	7.57E-02	4.93E-01	1.32E-01
Sr+2	2.52E-04	2.52E-04	3.85E-05	2.52E-04	6.76E-05
Te+6	2.38E-04	2.37E-04	3.64E-05	2.38E-04	6.38E-05
Th+4					
Ti+4	6.75E-05	6.75E-05	1.03E-05	6.76E-05	1.81E-05
Tl+3	1.65E-04	1.65E-04	2.52E-05	1.65E-04	4.40E-05
UO2+2	1.59E+00	1.59E+00	2.43E-01	1.59E+00	4.25E-01
V+5	7.08E-05	7.06E-05	1.08E-05	7.06E-05	1.89E-05
Zn+2	3.83E-05	3.83E-05	5.86E-06	3.82E-05	1.02E-05
Zr+4					
Al(OH)4-	4.90E+00	4.90E+00	7.49E-01	4.90E+00	1.31E+00
Cl-					
CO3-2	2.60E+01	2.60E+01	3.96E+00	2.59E+01	6.95E+00
Cr(OH)4-	2.11E+00	2.11E+00	3.22E-01	2.10E+00	5.62E-01
F-	9.23E-01	9.23E-01	1.41E-01	9.22E-01	2.47E-01
I-	2.36E-05	2.36E-05	3.61E-06	2.36E-05	6.33E-06
NO2-	2.55E+01	2.54E+01	4.28E+00	2.54E+01	7.14E+00
NO3-	2.13E+01	2.12E+01	3.25E+00	2.13E+01	5.71E+00
OH-	1.49E+00	1.48E+00	1.67E+00	1.49E+00	1.65E+00
PO4-3	9.09E-03	9.08E-03	1.38E-03	9.09E-03	2.43E-03
SO4-2	1.54E+01	1.54E+01	2.36E+00	1.54E+01	4.12E+00
TcO4-	8.07E-03	8.06E-03	1.23E-03	8.07E-03	2.16E-03
H2O	9.59E+02	9.58E+02	9.92E+02	9.59E+02	9.90E+02
Organic Carbon	1.37E+00	1.37E+00	2.10E-01	1.37E+00	3.66E-01
ZrO2:2H2O	3.25E-04	3.26E-04	4.98E-05	3.26E-04	8.71E-05

The estimated compositions and volumes of the initial supernatant and wash solutions decanted generated from tank 241-AY-102 sludge washing are provided in Table 6.

1.3 HLW Immobilization

As part of DOE's planned strategy for treatment and disposal of tank wastes, an optional demonstration of HLW immobilization by a Private Contractor is proposed from June 2002 through June 2007 (DOE 1996). DOE has proposed processing 245 metric tons of high-level waste oxides (excluding Na and Si oxides). DOE has the option to increase the quantity of high-level waste oxides from 245 to 340 metric tons.

The Disposal Program assumes the Private Contractor will process all 340 metric tons of high-level waste oxides from June 2002 through June 2008. The source of these waste oxides will be from in tank washing the 241-AZ-101, 241-AZ-102, and 241-AY-102 sludges. The schedule and volumes of solids transferred to the HLW Private Contractors facilities are estimated in Table 7. The washed sludges will be transferred from these three aging waste tanks to the Private Contractor's facilities. The Private Contractor will provide a tank for receipt of these washed sludges; an existing DST will not be used for this function.

Phase I High-Level Waste Feed Pretreatment - Low-Level Waste Impacts

**Table 6. Dilute Caustic Washing of 241-AY-102 and 241-C-106 (75%)
Optimized Results - Three Dilute Caustic Washes, Fill Tank (4.45:1 Dilution)**

	Supernate Composition			LLW Composition	
	Initial	After Initial Decant	After Third Wash/Decant	First Decant	Wash Solution(s)
Total Mass Flow (kg)	4.11E+06	2.44E+06	2.42E+06	1.67E+06	9.14E+06
Volume (L)	4.03E+06	2.39E+06	2.41E+06	1.64E+06	9.07E+06
Specific Gravity	1.02	1.02	1.00	1.02	1.01
Radionuclides (Ci/L)					
Am-241	3.97E-06	3.98E-06	3.44E-07	3.97E-06	9.58E-07
C-14					
Cm-244	3.52E-09	3.53E-09	3.05E-10	3.52E-09	8.50E-10
Co-60	1.91E-06	1.92E-06	1.66E-07	1.91E-06	4.61E-07
Cs-137	1.34E-02	1.35E-02	1.16E-03	1.34E-02	3.24E-03
Ba-137	1.26E-02	1.28E-02	1.10E-03	1.27E-02	3.08E-03
Pu-239	7.64E-05	7.66E-05	6.60E-06	7.62E-05	1.84E-05
Sr-90	9.16E-04	9.16E-04	7.93E-05	9.15E-04	2.21E-04
Y-90	9.16E-04	9.16E-04	7.93E-05	9.15E-04	2.21E-04
Tc-99	1.27E-05	1.27E-05	1.10E-06	1.27E-05	3.05E-06
Total Curies	1.13E+05	6.74E+04	5.87E+03	4.60E+04	6.15E+04
Chemicals (g/L)					
Ag+	7.37E-03	7.41E-03	6.39E-04	7.38E-03	1.78E-03
Am+3	1.16E-06	1.16E-06	1.00E-07	1.16E-06	2.80E-07
As+5					
B+3	1.37E-03	1.37E-03	1.19E-04	1.37E-03	3.30E-04
Ba+2	1.30E-03	1.31E-03	1.12E-04	1.30E-03	3.13E-04
Be+2					
Bi+3	4.04E-03	4.06E-03	3.51E-04	4.04E-03	9.77E-04
Ca+2	1.52E-02	1.52E-02	1.31E-03	1.51E-02	3.65E-03
Cd+2	4.96E-02	4.98E-02	4.27E-03	4.94E-02	1.19E-02
Ce+3					
Cm+3	4.34E-11	4.35E-11	3.76E-12	4.34E-11	1.05E-11
Co+3	1.69E-09	1.69E-09	1.46E-10	1.69E-09	4.08E-10
Cs+	8.19E-04	8.20E-04	7.10E-05	8.17E-04	1.97E-04
Cu+2	4.02E-04	4.04E-04	3.49E-05	4.02E-04	9.71E-05
Fe+3	5.96E-04	5.98E-04	5.15E-05	5.95E-04	1.43E-04
K+	8.76E-02	8.79E-02	7.59E-03	8.76E-02	2.12E-02
La+3	4.29E-05	4.31E-05	3.71E-06	4.28E-05	1.03E-05
Li+					
Mg+2	3.00E-03	3.01E-03	2.60E-04	2.99E-03	7.23E-04
Mn+4	1.32E-03	1.33E-03	1.15E-04	1.32E-03	3.19E-04
Mo+6					
Na+	1.55E+01	1.55E+01	3.65E+00	1.55E+01	5.66E+00
Ni+3	8.71E-03	8.70E-03	7.55E-04	8.66E-03	2.09E-03
Pb+4	2.70E-02	2.71E-02	2.34E-03	2.70E-02	6.50E-03
Pu+4	1.23E-03	1.23E-03	1.07E-04	1.23E-03	2.97E-04
Re+7					
Rh+3					
Ru+3					
Sb+5					
Se+6					
Si+4	4.67E-01	4.64E-01	4.02E-02	4.64E-01	1.12E-01
Sr+2	1.52E-04	1.52E-04	1.32E-05	1.52E-04	3.66E-05
Te+6					
Th+4					
Tl+4					
Tl+3					
UO2+2	4.49E-01	4.52E-01	3.90E-02	4.49E-01	1.08E-01
V+5					
Zn+2					
Zr+4	3.05E-02	3.05E-02	2.63E-03	3.04E-02	7.33E-03
Al(OH)4-	2.58E-02	2.58E-02	2.22E-03	2.57E-02	6.20E-03
Cl-	6.82E-01	6.82E-01	5.89E-02	6.83E-01	1.64E-01
CO3-2					
Cr(OH)4-	3.85E-02	3.85E-02	3.32E-03	3.83E-02	9.25E-03
F-	1.63E-01	1.64E-01	1.41E-02	1.63E-01	3.94E-02
I-					
NO2-	8.59E-01	8.58E-01	4.94E-01	8.54E-01	5.56E-01
NO3-	4.34E-01	4.35E-01	3.75E-02	4.32E-01	1.04E-01
OH-	1.05E+01	1.05E+01	2.46E+00	1.05E+01	3.83E+00
PO4-3	1.23E+00	1.23E+00	1.07E-01	1.23E+00	2.97E-01
SO4-2	1.54E+00	1.55E+00	1.34E-01	1.54E+00	3.72E-01
TcO4-	1.24E-03	1.24E-03	1.07E-04	1.23E-03	2.98E-04
H2O	9.85E+02	9.87E+02	9.96E+02	9.82E+02	9.96E+02
Organic Carbon	1.59E+00	1.59E+00	1.38E-01	1.59E+00	3.84E-01
ZrO2:2H2O	1.29E-04	1.29E-04	1.12E-05	1.29E-04	3.11E-05

Table 7. Preliminary Schedule for Transfer of Washed HLW Solids to the HLW Immobilization Private Contractor

Tank	Schedule	Volume
241-AZ-101	June 2002	100,000 gallons
241-AZ-101	January 2003	100,000 gallons
Note: Tank 241-AZ-101 should be empty after these transfers.		
241-AZ-102	August 2003	100,000 gallons
241-AZ-102	January 2004	100,000 gallons
241-AZ-102	July 2004	100,000 gallons
241-AZ-102	January 2005	100,000 gallons
Note: Tank 241-AZ-102 should be empty after these transfers.		
241-AY-102	June 2005	100,000 gallons
241-AY-102	September 2005	100,000 gallons
241-AY-102	December 2005	100,000 gallons
241-AY-102	April 2006	100,000 gallons
241-AY-102	August 2006	100,000 gallons
241-AY-102	December 2006	100,000 gallons
241-AY-102	March 2007	100,000 gallons
241-AY-102	July 2007	100,000 gallons
241-AY-102	November 2007	100,000 gallons
241-AY-102	February 2008	100,000 gallons
Note: Tank 241-AY102 should be empty after these transfers.		

Attachment 1: TWRS Disposal Program OWVP Assumptions

2.0 Low-Activity Waste (LAW) Treatment

As part of DOE's planned strategy for treatment and disposal of tank wastes, a demonstration of LAW treatment by two Private Contractors is proposed from June 2002 through June 2007 (DOE 1996). DOE has proposed each Private Contractor processes LAW solutions containing a total of 2,800 metric tons of sodium. Each private contractor is required to process a minimum of 2600 metric tons of sodium from waste envelope A (primarily DSSF, DSS, or DN type wastes), 100 metric tons of sodium from waste envelope B (NCAW supernatant), and 100 metric tons from waste envelope C (primarily CC waste).

DOE has the option to increase the quantity of LAW solutions processed by each Private Contractor to a maximum of 5,100 metric tons sodium. The maximum quantity of sodium to be processed by each Private Contractor for waste envelope A is 4900 metric tons; waste envelope B is 1,000 metric tons; and waste envelope C is 2,400 metric tons.

The Disposal Program assumes each Private Contractor will process the maximum quantities of LAW solutions from June 2002 through January 2010.

2.1 Custody Transfer of 106-AP and 108-AP to Private Contractors

The TWRS Privatization Request for Proposal (RFP) has allocated the use of tanks 241-AP-106 and 241-AP-108 to private contractors for receipt and lag storage of low-activity waste feed solutions (DOE 1996). The date has not been established nor the conditions for custody transfer of these tanks from the M&O contractor to the Private Contractors.

Based upon the proposed schedule for phase 1 processing of tank wastes (see section 1.1), it is assumed that the custody transfer of these tanks occurs after April 1998. For planning purposes, custody transfer of these two DSTs to the selected private contractors is assumed to occur at the beginning of FY 1999. This allows 6 months (from April until September 1998) for the DOE and the Private Contractors to reach agreement on the conditions of tank transfer. It is also assumed for planning purposes that tanks 241-AP-106 and 241-AP-108 are filled with the first batch of the LAW feed solution at the time of custody transfer of these tanks to the Private Contractors.

2.2 Staging LAW Feed Solution in Tanks 241-AP-102 and 241-AP-104

The Private Contractors will receive payment for LAW treatment services based upon the quantity of sodium incorporated into the immobilized low-activity waste consistent with the provisions of the RFP (DOE 1996). In order to accurately determine the quantity of sodium transferred to the Private Contractors for treatment and to comply with the transfer conditions established in the RFP, it has been proposed to use tanks 241-AP-102 and 241-AP-104 as intermediate LAW feed solution staging tanks (WHC 1996d). Formal review of this recommendation must be conducted by the DOE/RL.

For planning purposes, the Disposal Program has assumed tanks 241-AP-102 and 241-AP-104 will be used as intermediate feed staging tanks prior to transfer to the Private Contractors' DSTs (i.e. 241-AP-106 and 241-AP-108). Additionally, it is assumed that tanks 241-AP-102 and 241-AP-104 are filled with the second batch of LAW feed solution prior to June 2002. See section 2.3 for a discussion of the schedule for transfer of the LAW feed solutions to the Private Contractors.

2.3 Transfer of LAW Feed Solutions to Private Contractors

The schedule and volumes of tank waste solutions transferred to the Private Contractors facilities are estimated in Table 8. The origin and composition of these tank waste solutions is discussed in the *Preliminary Low-Level Waste Feed Staging Plan* (WHC 1996d). This schedule is consistent with section *H.9 Ordering and Contract Order Quantities* of the TWRS Privatization RFP (DOE 1996).

The draft TWRS Privatization RFP (November 1995) assumed the LAW feed solutions would be diluted or concentrated to a maximum 7 M sodium concentration. However the recently issued TWRS Privatization RFP (DOE 1996) specifies the LAW feed solutions will be transferred to the Private Contractors at a sodium concentration from 3 to 14 M. This modification in the TWRS Privatization RFP requirements negates the dilution of LAW feed solutions in the intermediate feed staging tanks (i.e., 241-AP-102 and 241-AP-104) as originally planned in the *Preliminary Low-Level Waste Feed Staging Plan* (WHC 1996d). Therefore, LAW feed solutions will be transferred into the DSTs operated by the Private Contractors at their present concentrations, without dilution.

Based upon the November 1995 draft RFP, the *Preliminary Low-Level Waste Feed Staging Plan* (WHC 1996d) envisioned the LAW feed sequence for each Private Contractor as:

- Waste Envelope A: ~600 metric tons Na
- Waste Envelope B: ~200 metric tons Na
- Waste Envelope C: ~375 metric tons Na
- Waste Envelope A: ~3100 metric tons Na
- Waste Envelope C ~500 metric tons Na

However the recently issued TWRS Privatization RFP (DOE 1996) specifies the LAW feed sequence will be all of the minimum quantity of waste envelope A (2600 MT Na, all of the minimum order quantity of waste envelope B (100 MT Na), all of the minimum order quantity of envelope C (100 MT Na). Processing of additional LAW feed from waste envelopes A, B, or C will be determined by DOE based upon DOE's needs. This modification in the TWRS Privatization RFP requirements will be incorporated into subsequent revisions of the *Preliminary Low-Level Waste Feed Staging Plan* (WHC 1996d). The LAW feed processing sequence identified in Table 8 reflects a preliminary revision to the sequence identified in the *Preliminary Low-Level Waste Feed Staging Plan* (WHC 1996d).

Table 8. Preliminary Schedule for Transfer of LAW Solution to the LAW Treatment Private Contractors

Tank	Projected Waste Type	Feed Envelope	Volume Transferred (ML)	MT Na	Private Contractor		Private Contractor Processing Schedule
241-AP-104	DN	A	4.13	554	1		June 2002 - May 2003
241-AN-101	DSSF	A	3.58	520		2	June 2002 - May 2003
241-AN-105 241-AW-105	DSSF NCRW Sup.	A	2.1 2.1	579 53	1		May 2003 - June 2004
241-AN-105 241-AW-105	DSSF NCRW Sup.	A	2.1 2.1	579 53		2	May 2003 - June 2004
241-AP-106	DSSF	A	2.93	575	1		June 2004 - June 2005
241-AP-101	DSSF	A	3.29	496		2	June 2004 - May 2005
241-AN-104	DSSF	A	1.46	403	1		June 2005 - February 2006
241-AN-104	DSSF	A	1.46	403		2	May 2005 - January 2006
241-AW-101	DSSF	A	1.92	441	1		February 2006 - October 2006
241-AW-101	DSSF	A	1.92	441		2	January 2006 - September 2006
241-AZ-101 (from AY-101)	NCAW supernatant	B	0.69	100	1		October 2006 - December 2006
241-AZ-101 (from AY-101)	NCAW supernatant	B	0.69	100		2	September 2006 - November 2006
241-AN-107	CC	C	1.79	379	1		December 2006 - July 2007
241-AN-107	CC	C	1.79	379		2	November 2006 - June 2007
241-AN-107	CC	C	1.79	379	1		July 2007 - March 2008
241-AN-107	CC	C	1.79	379		2	June 2007 - February 2008
241-AN-102	CC	C	1.93	489	1		March 2008 - January 2009
241-AN-102	CC	C	1.93	489		2	February 2008 - December 2008

Table 8. Preliminary Schedule for Transfer of LAW Solution to the LAW Treatment Private Contractors

Tank	Projected Waste Type	Feed Envelope	Volume Transferred (ML)	MT Na	Private Contractor		Private Contractor Processing Schedule
241-AN-103	DSS	A	1.76	591	1		January 2009 - January 2010
241-AN-103	DSS	A	1.76	591		2	December 2008 - December 2009
241-AN-106	CC	A	2.19	529	1		January 2010 - December 2010
241-AN-106	CC	A	2.19	529		2	December 2009 - November 2010
241-AZ-101 (from AY-101)	NCAW supernatant	B	0.74	108	1		December 2010 - February 2011
241-AZ-101 (from AY-101)	NCAW supernatant	B	0.74	108		2	November 2010 - January 2011

Notes: The first LAW feed batch identified as originating from tanks 241-AP-104 and 241-AN-101 is assumed to be transferred into tanks 241-AP-106 and 241-AP-108 by FY 1999.

The second LAW feed batch identified as originating from tanks 241-AN-105 and 241-AW-105 is assumed to be transferred into the intermediate feed staging tanks 241-AP-102 and 241-AP-104 by June 2002.

All subsequent LAW feed batch transfers stage solutions in tanks 241-AP-102 and 241-AP-104, then transfer these LAW feed batches into tanks 241-AP-106 and 241-AP-108.

2.4 Storage of Separated Sr/TRU and Entrained Solids

The Private Contractors conducting LAW treatment services will separate entrained solids, cesium, technetium, strontium and transuranic (TRU) elements from the LAW feed solutions as specified in the TWRS Privatization RFP. Cesium will be returned as a dry, free flowing material with containers. Technetium will be separated and stored by the Private Contractors. At the end of the contract, the Private Contractors will return the technetium to DOE in a manner which allows for storage within the DST system. Entrained solids, strontium, and TRU elements will be separated as necessary from each waste envelope feed batch. The Private Contractors will transfer the separated solids, strontium and TRU elements to DOE for storage within the DST system. All transfers by the Private Contractors to the DST system will meet applicable tank farms waste acceptance criteria.

Estimates have not been prepared of the composition and quantity of the separated solids, strontium and TRU elements which will be transferred by the Private Contractors to the DST system. Private Contractors will prepare technical information on the estimated composition and quantity of the separated solids, strontium and TRU elements which will be transferred to the DST system. This information will be available in April 1998, after DOE selects Private Contractors to proceed with the design, construction, and operation of waste treatment facilities. Please assume a DST in AP tank farm will be dedicated to receive waste solution transfers from the privatized facilities from June 2002 through October 2011.

3.0 SST Waste Retrieval

A demonstration of SST waste sluicing and resolution of the high-heat safety issue associated with tank 241-C-106 is scheduled to begin in FY 1997. Sluicing of the high-heat solids from tank 241-C-106 into 241-AY-102 is anticipated to be completed during FY 1997. An estimated 150,000 gallons of sludge will be transferred from tank 241-C-106 into 241-AY-102. However, sluicing could potentially remove essentially all of the sludge present in tank 241-C-106. If not removed by the initial sluicing during FY 1997, the sludge heel (approximately 37,000 gallons) in tank 241-C-106 will be removed and transferred into tank 241-AY-102 beginning June 30, 2002 and completing by September 30, 2003, per the Hanford Federal Facility Agreement and Consent Order.

Retrieval of waste from additional single-shell tanks will commence in December 2003 and be completed by September 2018, per the Hanford Federal Facility Agreement and Consent Order (i.e., Tri-Party Agreement). A preliminary SST waste retrieval sequence (see Table 9). has been developed by Disposal Engineering. The main goals in preparing this preliminary SST waste retrieval sequence were to comply with the Tri-Party Agreement target schedule and minimizes the amount of wastes generated for interim storage within the DSTs. Optimization of this preliminary SST waste retrieval sequence will be conducted by Disposal Engineering and a revised sequence issued by September 30, 1997 (milestone M-45-02B). Annual revisions to the SST waste retrieval sequence will be conducted through fiscal year 2017.

TABLE 9. SST WASTE RETRIEVAL TIMING

	Tank Numbers	Per Tank Volumes (Kgallons)				Cumulative Volume (Kgallons)				Year to be Retrieved
		Sludge	Saltcake	Dilution Water	Total As-Retrieved	Sludge	Saltcake	Total Saltcake & Sludge	As-Retrieved	
1	AX-103	2	110	331	443	2	110	112	443	2003 through 2005
2	C-103	62	0	173	235	64	110	174	678	
3	A-102	15	22	106	143	79	132	211	822	
4	C-105	130	0	462	592	209	132	341	1,413	
5	A-104	28	0	14	42	237	132	369	1,455	
6	A-105	19	0	57	76	256	132	388	1,531	
7	A-106	125	0	249	374	381	132	513	1,905	
8	AX-102	7	29	88	124	388	161	549	2,030	
9	AX-104	7	0	21	28	395	161	556	2,058	
10	C-101	88	0	138	226	483	161	644	2,284	
11	C-107	237	0	317	554	720	161	881	2,838	
12	C-108	66	0	58	124	786	161	947	2,961	
13	C-109	62	0	84	146	848	161	1,009	3,108	
14	C-110	177	0	210	387	1,025	161	1,186	3,494	
15	C-111	57	0	80	137	1,082	161	1,243	3,632	
16	C-112	104	0	138	242	1,186	161	1,347	3,874	
17	C-201	2	0	4	6	1,188	161	1,349	3,880	
18	C-202	1	0	2	3	1,189	161	1,350	3,882	
19	C-203	5	0	9	14	1,194	161	1,355	3,896	
20	C-204	3	0	3	6	1,197	161	1,358	3,902	
21	SX-107	104	0	322	426	1,301	161	1,462	4,328	
22	SX-108	87	0	377	464	1,388	161	1,549	4,792	2005 through 2011
23	SX-110	62	0	251	313	1,450	161	1,611	5,105	
24	SX-111	125	0	346	471	1,575	161	1,736	5,576	
25	SX-112	92	0	229	321	1,667	161	1,828	5,897	
26	SX-113	26	0	-19	7	1,693	161	1,854	5,904	
27	SX-115	12	0	50	62	1,705	161	1,866	5,966	
28	U-101	22	0	40	62	1,727	161	1,888	6,028	
29	U-104	122	0	-10	112	1,849	161	2,010	6,140	
30	U-106	26	185	711	922	1,875	346	2,221	7,062	
31	U-110	186	0	100	286	2,061	346	2,407	7,348	
32	U-112	45	0	78	123	2,106	346	2,452	7,471	
33	U-201	4	0	17	21	2,110	346	2,456	7,492	
34	U-202	4	0	17	21	2,114	346	2,460	7,513	
35	U-203	2	0	9	11	2,116	346	2,462	7,523	
36	U-204	2	0	7	9	2,118	346	2,464	7,532	
37	A-101	3	950	2,914	3,867	2,121	1,296	3,417	11,399	2011 through 2018 (Avg Retrieval Rate of 380 Kgallons of Saltcake & Sludge/Month)
38	A-103	366	0	1,107	1,473	2,487	1,296	3,783	12,872	
39	AX-101	3	745	2,274	3,022	2,490	2,041	4,531	15,894	
40	B-101	113	0	240	353	2,603	2,041	4,644	16,247	
41	B-102	18	10	71	99	2,621	2,051	4,672	16,346	
42	B-103	59	0	163	222	2,680	2,051	4,731	16,569	
43	B-104	301	69	302	672	2,981	2,120	5,101	17,241	
44	B-105	40	266	821	1,127	3,021	2,386	5,407	18,368	
45	B-106	116	0	331	447	3,137	2,386	5,523	18,815	
46	B-107	164	0	175	339	3,301	2,386	5,687	19,155	
47	B-108	94	0	207	301	3,395	2,386	5,781	19,455	
48	B-109	127	0	207	334	3,522	2,386	5,908	19,789	
49	B-110	245	0	250	495	3,767	2,386	6,153	20,285	

TANK-VOL.XLS

TANK-VOL.XLS

TABLE 9. SST WASTE RETRIEVAL TIMING

	Tank Numbers	Sludge	Saltcake	Dilution Water	Total As-Retrieved	Sludge	Saltcake	Total Saltcake & Sludge	As-Retrieved	Year to be Retrieved
50	B -111	236	0	263	499	4,003	2,386	6,389	20,784	
51	B -112	30	0	75	105	4,033	2,386	6,419	20,889	
52	B -201	28	0	25	53	4,061	2,386	6,447	20,941	
53	B -202	27	0	24	51	4,088	2,386	6,474	20,992	
54	B -203	50	0	44	94	4,138	2,386	6,524	21,086	
55	B -204	49	0	43	92	4,187	2,386	6,573	21,178	
56	BX-101	42	0	129	171	4,229	2,386	6,615	21,349	
57	BX-102	96	0	29	125	4,325	2,386	6,711	21,473	
58	BX-103	62	0	129	191	4,387	2,386	6,773	21,664	
59	BX-104	96	0	19	115	4,483	2,386	6,869	21,780	
60	BX-105	43	3	86	132	4,526	2,389	6,915	21,911	
61	BX-106	31	0	106	137	4,557	2,389	6,946	22,049	
62	BX-107	344	0	368	712	4,901	2,389	7,290	22,761	
63	BX-108	26	0	28	54	4,927	2,389	7,316	22,815	
64	BX-109	193	0	1,482	1,675	5,120	2,389	7,509	24,490	
65	BX-110	189	9	327	525	5,309	2,398	7,707	25,015	
66	BX-111	68	143	726	937	5,377	2,541	7,918	25,952	
67	BX-112	164	0	232	396	5,541	2,541	8,082	26,349	
68	BY-101	109	278	1,382	1,769	5,650	2,819	8,469	28,118	
69	BY-102	0	341	1,208	1,549	5,650	3,160	8,810	29,667	2011 through 2018
70	BY-103	5	395	1,503	1,903	5,655	3,555	9,210	31,570	(Avg Retrieval Rate of
71	BY-104	40	366	1,237	1,643	5,695	3,921	9,616	33,213	380 Kgallons of
72	BY-105	44	459	1,547	2,050	5,739	4,380	10,119	35,263	Saltcake &
73	BY-106	95	547	2,248	2,890	5,834	4,927	10,761	38,153	Sludge/Month)
74	BY-107	60	206	731	997	5,894	5,133	11,027	39,150	
75	BY-108	154	74	515	743	6,048	5,207	11,255	39,893	
76	BY-109	83	340	1,527	1,950	6,131	5,547	11,678	41,843	
77	BY-110	103	295	1,087	1,485	6,234	5,842	12,076	43,328	
78	BY-111	21	438	1,695	2,154	6,255	6,280	12,535	45,483	
79	BY-112	5	286	1,076	1,367	6,260	6,566	12,826	46,849	
80	C -102	423	0	1,515	1,938	6,683	6,566	13,249	48,788	
81	C -104	295	0	1,117	1,412	6,978	6,566	13,544	50,199	
82	S -101	244	171	732	1,147	7,222	6,737	13,959	51,347	
83	S -102	4	545	1,752	2,301	7,226	7,282	14,508	53,647	
84	S -103	10	221	768	999	7,236	7,503	14,739	54,647	
85	S -104	293	0	862	1,155	7,529	7,503	15,032	55,802	
86	S -105	2	454	1,681	2,137	7,531	7,957	15,488	57,939	
87	S -106	32	511	1,886	2,429	7,563	8,468	16,031	60,367	
88	S -107	293	69	835	1,197	7,856	8,537	16,393	61,564	
89	S -108	4	600	2,216	2,820	7,860	9,137	16,997	64,384	
90	S -109	13	555	2,051	2,619	7,873	9,692	17,565	67,003	
91	S -110	131	259	1,038	1,428	8,004	9,951	17,955	68,431	
92	S -111	139	447	1,606	2,192	8,143	10,398	18,541	70,623	
93	S -112	6	631	2,333	2,970	8,149	11,029	19,178	73,593	
94	SX-101	112	343	701	1,156	8,261	11,372	19,633	74,748	
95	SX-102	117	426	1,782	2,325	8,378	11,798	20,176	77,073	
96	SX-103	115	536	2,009	2,660	8,493	12,334	20,827	79,733	
97	SX-104	136	478	1,665	2,278	8,629	12,812	21,440	82,011	
98	SX-105	73	610	2,348	3,031	8,702	13,422	22,123	85,043	
99	SX-106	12	465	1,456	1,933	8,714	13,887	22,600	86,975	
100	SX-109	250	0	1,134	1,384	8,964	13,887	22,850	88,359	
101	SX-114	181	0	1,041	1,222	9,145	13,887	23,031	89,581	

TABLE 9. SST WASTE RETRIEVAL TIMING

	Tank Numbers	Sludge	Saltcake	Dilution Water	Total As-Retrieved	Sludge	Saltcake	Total Saltcake & Sludge	As-Retrieved	Year to be Retrieved
102	T-101	101	0	80	181	9,246	13,887	23,132	89,762	
103	T-102	19	0	68	87	9,265	13,887	23,151	89,849	
104	T-103	23	0	63	86	9,288	13,887	23,174	89,935	
105	T-104	442	0	358	800	9,730	13,887	23,616	90,735	
106	T-105	98	0	79	177	9,828	13,887	23,714	90,912	
107	T-106	19	0	38	57	9,847	13,887	23,733	90,969	
108	T-107	171	0	100	271	10,018	13,887	23,904	91,240	
109	T-108	44	0	89	133	10,062	13,887	23,948	91,374	
110	T-109	58	0	171	229	10,120	13,887	24,006	91,603	
111	T-110	376	0	357	733	10,496	13,887	24,382	92,335	
112	T-111	456	0	126	582	10,952	13,887	24,838	92,917	
113	T-112	60	0	-10	50	11,012	13,887	24,898	92,967	
114	T-201	28	0	25	53	11,040	13,887	24,926	93,020	
115	T-202	21	0	19	40	11,061	13,887	24,947	93,059	
116	T-203	35	0	31	66	11,096	13,887	24,982	93,125	
117	T-204	38	0	33	71	11,134	13,887	25,020	93,196	
118	TX-101	84	0	172	256	11,218	13,887	25,104	93,452	
119	TX-102	0	113	472	585	11,218	14,000	25,217	94,037	2011 through 2018
120	TX-103	157	0	659	816	11,375	14,000	25,374	94,853	(Avg Retrieval Rate of
121	TX-104	0	64	214	278	11,375	14,064	25,438	95,130	380 Kgallons of
122	TX-105	0	609	2,560	3,169	11,375	14,673	26,047	98,300	Saltcake &
123	TX-106	0	453	1,897	2,350	11,375	15,126	26,500	100,649	Sludge/Month)
124	TX-107	0	35	125	160	11,375	15,161	26,535	100,810	
125	TX-108	0	134	553	687	11,375	15,295	26,669	101,497	
126	TX-109	0	384	418	802	11,375	15,679	27,053	102,299	
127	TX-110	0	462	1,831	2,293	11,375	16,141	27,515	104,592	
128	TX-111	0	370	1,407	1,777	11,375	16,511	27,885	106,369	
129	TX-112	0	649	2,728	3,377	11,375	17,160	28,534	109,746	
130	TX-113	0	607	1,994	2,601	11,375	17,767	29,141	112,347	
131	TX-114	0	535	2,179	2,714	11,375	18,302	29,676	115,061	
132	TX-115	0	640	2,685	3,325	11,375	18,942	30,316	118,386	
133	TX-116	0	631	2,144	2,775	11,375	19,573	30,947	121,161	
134	TX-117	0	626	2,357	2,983	11,375	20,199	31,573	124,144	
135	TX-118	0	347	1,343	1,690	11,375	20,546	31,920	125,834	
136	TY-101	118	0	356	474	11,493	20,546	32,038	126,308	
137	TY-102	0	64	234	298	11,493	20,610	32,102	126,605	
138	TY-103	162	0	416	578	11,655	20,610	32,264	127,183	
139	TY-104	43	0	35	78	11,698	20,610	32,307	127,262	
140	TY-105	231	0	57	288	11,929	20,610	32,538	127,549	
141	TY-106	17	0	12	29	11,946	20,610	32,555	127,579	
142	U-102	43	313	1,246	1,602	11,989	20,923	32,911	129,181	
143	U-103	32	423	1,499	1,954	12,021	21,346	33,366	131,135	
144	U-105	32	349	1,152	1,533	12,053	21,695	33,747	132,668	
145	U-107	15	360	958	1,333	12,068	22,055	34,122	134,001	
146	U-108	29	415	1,394	1,838	12,097	22,470	34,566	135,839	
147	U-109	48	396	1,362	1,806	12,145	22,866	35,010	137,645	
148	U-111	26	303	978	1,307	12,171	23,169	35,339	138,952	

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