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This document contains technical information only. This document is not intended for, nor should it be interpreted as a presentation, agreement, or proposal regarding changes to the Fiscal Year 1998 work scope identified in the Fiscal Year 1998 Characterization Project Multi-Year Work Plan. The Fiscal Year 1999 work scope as identified in the Fiscal Year 1999 Characterization Project Multi-Year Work Plan, the contract which Lockheed Martin Hanford Corporation has with Fluor Daniel Hanford, Inc. (Contract #80232764-9-K001) or the contract Fluor Daniel Hanford, Inc. has with the U.S. Department of Energy, Richland Operations Office (DE-AC06-96RL 13200).

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LIST OF TERMS

BIO	Basis for Interim Operations
Btu/hr	British thermal units per hour
DNFSB	Defense Nuclear Facilities Safety Board
DOE-RL	U.S. Department of Energy, Richland Operations Office
DQO	data quality objective
DST	double-shell tank
Ecology	Washington State department of Ecology
EPA	U. S. Environmental Protection Agency
ESW	enhanced sludge washing
FY	fiscal year
HDW	Hanford Defined Waste
HLW	high-level waste
HTI	Hanford Tanks Initiative
IMUST	inactive miscellaneous underground storage tanks
ISVS	in-situ vapor sampling
LAW	low activity waste
LDUA	light-duty utility arm
LLW	low level waste
LMHC	Lockheed Martin Hanford Corporation
LOI	letter of instruction
MOU	memorandum of understanding
MYWP	Multi-Year Work Plan
PHMC	Project Hanford Management Contract
PC	private contractor(s)
RGS	retained gas sampler
RTP	Readiness-to-proceed
SORWT	sort on radioactive waste type
SST	single-shell tank
TCR	tank characterization report
TOC	total organic carbon
Tri-Party Agreement	Hanford Federal Facility Agreement and Consent Order
TWINS	Tank Waste Information Network System
TWRS	Tank Waste Remediation System
USQ	unreviewed safety question
VSS	vapor sampling system
WHC	Westinghouse Hanford Company
WIRD	Waste Information Requirements Document

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1.0 PURPOSE AND BACKGROUND

1.1 PURPOSE

The *Waste Information Requirements Document* (WIRD) has the following purposes:

- To describe the overall drivers that require characterization information and to document their source.
- To define how characterization is going to satisfy the drivers, close issues, and measure and report progress.
- To describe the deliverables and acceptance criteria for characterization.

Characterization information is required to maintain regulatory compliance, perform operations and maintenance, resolve safety issues, and prepare for disposal of waste. Commitments addressing these requirements are derived from the *Hanford Federal Facility Agreement and Consent Order* (Ecology et al. 1996), also known as the Tri-Party Agreement; the *Recommendation 93-5 Implementation Plan* (DOE-RL 1996a) to the Defense Nuclear Facilities Safety Board (DNFSB); and other requirement sources listed in Section 2.0.

The document is submitted as a draft so that the U.S. Department of Energy, Richland Operations Office (DOE-RL) and the Washington State Department of Ecology (Ecology) can review and comment before the final *Waste Information Requirements Document* is submitted in August 1998 for fiscal year (FY) 1999 as required by the *Waste Characterization Fiscal Year 1998 Multi-Year Work Plan* (TWRS 1997b), Milestone Description Sheet, "Submit Draft Waste Information Requirements Document (WIRD) for FY 1999 to Ecology (M-44-13B)," Milestone Control Number T01-98-100.

1.2 BACKGROUND

Prior to FY 1998, the Tri-Party Agreement Milestone M-44-00 required the sampling of all tanks and the development of a specific number of tank characterization reports (TCRs) as deliverables. This milestone intended that the TCRs would be used by Ecology to measure the progress of the Characterization Project in meeting the information requirements of the Tank Waste Remediation System (TWRS).

While this was appropriate during the formative stage of the project, it became apparent that this process did not effectively tie characterization activities to program needs as they matured. The milestone was modified to establish the *Waste Information Requirements Document*. The first document that resulted from the effort was HNF-SD-WM-PLN-126, Rev. 0, *Fiscal Year 1997-1998 Waste Information Requirements Document*, August 1997 (Winkelman et al. 1997).

The *Waste Information Requirements Document* replaces the tank waste analysis plans and the tank characterization plan previously required by the Tri-Party Agreement, Milestone M-44-01 and M-44-02 series.

1.3 CHARACTERIZATION INFORMATION FLOW DIAGRAM

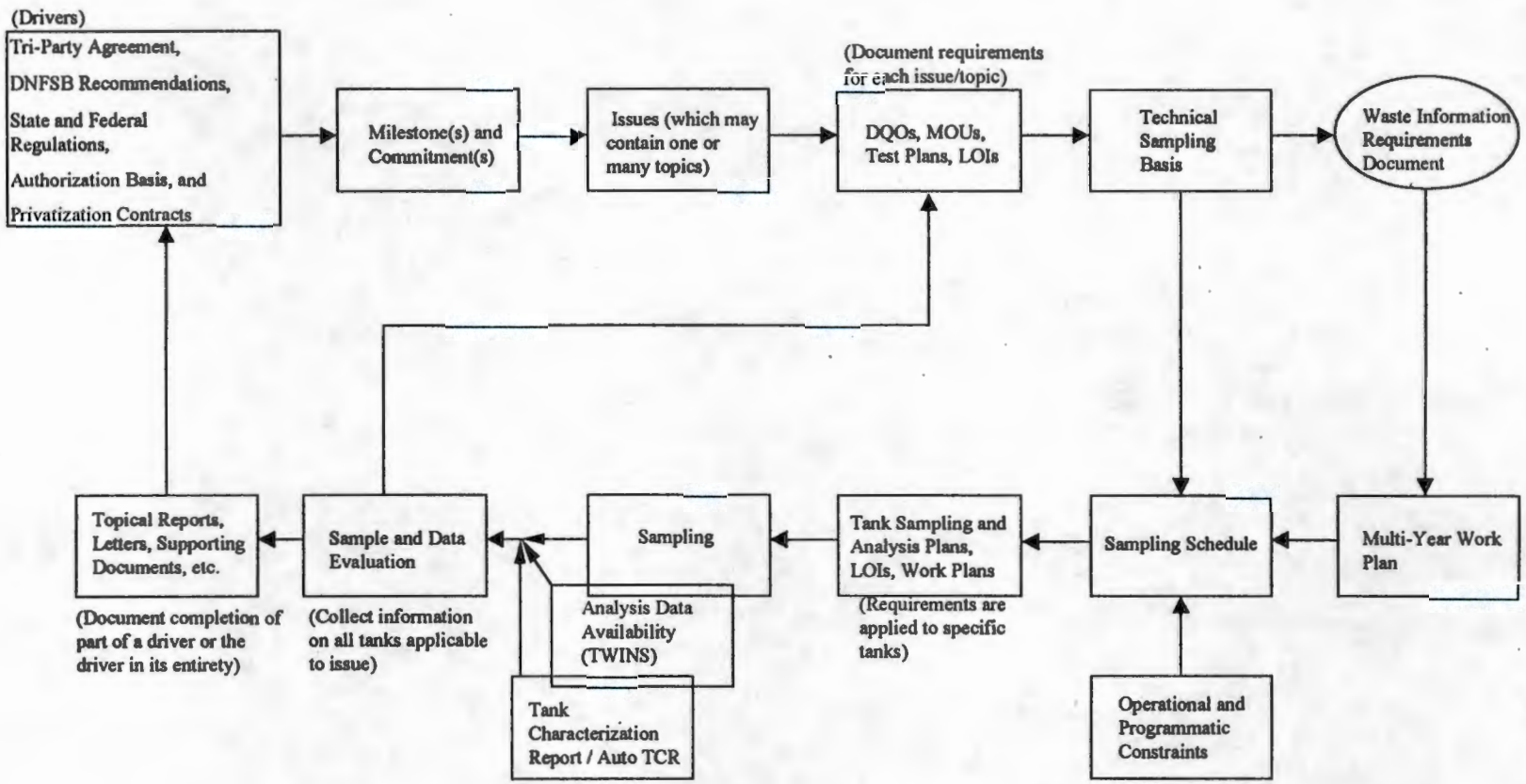
Figure 1-1 illustrates the process by which characterization information is generated and utilized. This document, the WIRD, is shown with an oval for clear and quick identification. Each box or oval represents a step in the information process. A step may be the creation of a document(s), execution of an event(s), or performance of a necessary work function(s). Each step requires information from the previous steps.

This drawing illustrates the flow of characterization information as a continuous, iterative process. This is prominently shown by focusing on the "Sample and Data Evaluation" and the "Topical Reports, Letters, Supporting Documents, etc." boxes. Information learned from these boxes may cause subsequent changes.

The specific information represented by each box changes over time. The number of drivers may change over time or portions of the drivers may be completed over time. Milestones and commitments may be added or removed which may change the number and scope of the issues and topics within those issues. Data quality objectives (DQOs), memorandums of understanding (MOUs), test plans, and letters of instruction (LOIs) are created, removed, or updated periodically to be consistent with the current data needs. The Technical Sampling Basis (Brown et al. 1998a) is updated annually or more often to gather and prioritize needs from each issue.

The WIRD is updated to reflect changes in the Technical Sampling Basis (Brown et al. 1998a) and milestone and commitment changes. The Multi-Year Work Plan (TWRS 1997b) uses the applicable milestones and commitments to build a budget-driven work plan. The work plan, Technical Sampling Basis (Brown et al. 1998a), and operational and programmatic constraints are combined to build a sampling schedule. Data quality objectives, tank sampling and analysis plans, LOIs, and work plans are generated prior to tank sampling. The information from one or many sampling events, analytical report(s), and/or TCRs is used to evaluate data, address issues, and satisfy information drivers. Information from data evaluations is reported and interpreted via reports, letters, supporting documents, etc., in order to complete portions of a driver of the driver in its entirety. The cycle ends when there are no more drivers for information and all issues are resolved.

Figure 1-1. Characterization Information Flow Diagram



Note: Figure does not contain surveillance data or any data not directly related to milestones and tank sampling.

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2.0 TWRS CHARACTERIZATION INFORMATION DRIVERS AND SUPPORTING DOCUMENTS

Tank Waste Remediation System information drivers are derived from the following primary sources: Tri-Party Agreement milestones, DNFSB recommendations, regulatory requirements, Authorization Basis documents, and TWRS Readiness-to-Proceed (Privatization) documents. Documents describing these drivers, program activities meeting the objectives of the drivers, and associated information needs were used as input to this *Waste Information Requirements Document*.

Documents used to prepare this *Waste Information Requirements Document* have been divided into documents containing information drivers and supporting documents. A characterization information driver is defined as an issue or document containing milestones, commitments, and/or deliverables. Requirements may be regulatory, technical, or programmatic in nature. The following documents are scanned for information drivers, and drivers are extracted when found:

- *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement)
- DNFSB *Recommendation 93-5 Implementation Plan*
- Regulatory requirements
- Authorization Basis documents
- Privatization Contracts and supporting TWRS Readiness-to-Proceed and Mission Analysis

Supporting documents report or reflect information driver milestones, commitments, or deliverables. The supporting documents include the following:

- Waste Characterization Multi-Year Work Plan
- TWRS Topical Reports
- Characterization Technical Sampling Basis document
- TWRS Data Quality Objectives

Each information driver source is discussed in the sections below.

2.1 CHARACTERIZATION INFORMATION DRIVER SOURCES

Each major TWRS characterization information driver is classified and discussed according to the source from which it was extracted.

2.1.1 Tri-Party Agreement Milestones

The Tri-Party Agreement (Ecology et al. 1996) is an agreement between the U.S. Department of Energy, Washington State Department of Ecology, and the U.S. Environmental Protection Agency (EPA). The agreement defines what actions the U.S. Department of Energy must take to support the cleanup mission at the Hanford Site. The milestones in the Tri-Party Agreement constitute a major driver for characterization activities. Ten major Tri-Party Agreement milestones are supported by the Characterization Project. These are M-40-00, M-41-00, M-43-00, M-44-00, M-45-00, M-50-00, M-51-00, M-60-00, M-61-00, and M-90-00. Each milestone includes interim milestones. Appendix A lists Tri-Party Agreement milestone numbers, titles, and due dates.

2.1.1.1 Tri-Party Agreement Major Milestone M-40-00, "Mitigate/Resolve Tank Safety Issues for High Priority Watch List Tanks." Tri-Party Agreement Milestone M-40-00 deals with closing all safety issues associated with single-shell and double-shell tanks. The Characterization Project supports completing this milestone through the sampling and analysis of tank waste material. Each safety issue has an associated DQO that specifies what information is required to resolve the safety issue.

2.1.1.2 Tri-Party Agreement Major Milestone M-41-00, "Complete Single-Shell Tank Interim Stabilization." Tri-Party Agreement Milestone M-41-00 deals with the stabilization of single-shell tanks (SSTs). This involves removing the pumpable liquid from the SST tanks and moving it to double-shell tanks (DSTs). This operation requires compatibility analysis on the tank liquid to be stabilized and the receiving tank. The Characterization Project supports this major Tri-Party Agreement milestone by providing compatibility sampling and analysis.

2.1.1.3 Tri-Party Agreement Major Milestone M-43-00, "Complete Tank Farm Upgrades." Tri-Party Agreement Milestone M-43-00 deals with tank farm upgrades including ventilation upgrades (e.g., Project W-030) and the cross-site transfer system. Characterization support is provided to these activities on an as-needed basis. Some process samples will be taken to support these upgrades.

2.1.1.4 Tri-Party Agreement Major Milestone M-44-00. The TWRS characterization program directly supports milestone M-44-00. The WIRD itself is a deliverable each fiscal year in the M-44-00 milestone series. Milestones in the Tri-Party Agreement M-44-13, M-44-14, M-44-15, and M-44-16 series are listed in Table 2-1. The next specific deliverables in each of these series are:

- **M-44-14B.** *Hanford Federal Facility Agreement and Consent Order* Change Control form M-44-97-03, commitment M-44-14B, "Submit Final WIRD for FY 1999 to Ecology," due August 31, 1998.

- **M-44-15B.** *Hanford Federal Facility Agreement and Consent Order* Change Control form M-44-97-03, commitment M-44-15B, "Issue Characterization deliverables consistent with *Waste Information Requirements Document* (WIRD) developed for FY 1998," due September 30, 1998, a letter summarizing accomplishments during FY 1998.

- **M-44-16B.** *Hanford Federal Facility Agreement and Consent Order* Change Control form M-44-97-03, commitment M-44-16B, "Complete input of characterization information for HLW tanks, for which sampling and analysis are completed per the FY 1998 WIRD into electronic database. Off-site access to the database containing tank waste characterization will be made available to the EPA and Ecology," due September 30, 1998.

2.1.1.5 Tri-Party Agreement Major Milestone M-45-00, "Complete Closure of All Single-Shell Tanks." Milestone M-45-00 directs the closure of all single-shell tank farms. Closure of a single-shell tank follows the retrieval of as much tank waste as technically possible. Characterization support of this milestone includes the sluicing of tank 241-C-106. Further characterization support of Milestone M-45-00 will be provided as the Hanford Tanks Initiative (HTI) continues its effort to bring closure to one tank and to develop technology to bring closure to other tanks.

2.1.1.6 Tri-Party Agreement Major Milestone M-50-00, "Complete Pretreatment Processing of Hanford Tank Waste." Milestone M-50-00 requires the completion of pretreatment processing of Hanford Site tank waste. Before waste is pretreated, sludge washing and sludge pretreatment methods will be evaluated to determine whether these processes will be capable of satisfying set criteria for pretreatment. Characterization is supporting this evaluation of pretreatment methods by supplying the pretreatment program with tank samples.

2.1.1.7 Tri-Party Agreement Major Milestone M-51-00, "Complete Vitrification of Hanford High Level Tank Waste." Milestone M-51-00 directs the vitrification of Hanford Site high-level waste (HLW). Although the sub-milestones under milestone M-51-00 were written to an older strategy for processing HLW, milestone M-51-00 is still the primary driver of HLW vitrification. Contracts DE-RP06-96RL13308 and DE-PR06-96RL13309 (DOE-RL 1996b) between the U.S. Department of Energy and two private vendors were written so that vendors could support the vitrification effort. Characterization is supporting the private vendors with waste samples and characterization support as necessary.

2.1.1.8 Tri-Party Agreement Milestone M-60-00, "Submit Conceptual Design and Initiate Definitive Design of LLW Vitrification Facility." Milestone M-60-00 directs the vitrification of Hanford Site low-activity waste (LAW). Many sub-milestones under milestone M-60-00 were renegotiated to reflect the new strategy for LAW vitrification. Contracts DE-PR06-96RL13308 and DE-RP06-96RL13309 (DOE-RL 1996b) between the U.S. Department of Energy and two private vendors were written so that vendors could support the vitrification effort (privatization). Characterization will support the private vendors with waste samples and characterization support as necessary.

2.1.1.9 Tri-Party Agreement Major Milestone M-61-00, "Complete Pretreatment and Immobilization of Hanford Low-Activity Waste (LAW)." Milestone M-61-00 initiates hot operations of a pretreatment and immobilization facility for Phase I LAW waste and initiates negotiations on Phase II LAW pretreatment and immobilization.

2.1.1.10 Tri-Party Agreement Major Milestone M-90-00, "Complete Acquisition of New Facilities, Modification of Existing Facilities, and/or Modification of Planned Facilities as Necessary for Storage of Hanford Site IHLW and ILAW, and Disposal of ILAW." Milestone M-90-00 directs the planning and construction of facilities to store the final immobilized waste product. Characterization information will be required to design the immobilized low-activity waste disposal facility.

2.1.2 DNFSB *Recommendation 93-5 Implementation Plan*

On July 19, 1993, the DNFSB transmitted Recommendation 93-5 (Conway 1993) to the U.S. Department of Energy. Recommendation 93-5 identified two general issues:

- "Insufficient tank waste technical information exists, and the pace of acquiring additional information is too slow to ensure that wastes can be safely stored and that operations can be conducted safely, and

- Insufficient tank waste technical information exists, and the pace of acquiring additional information is too slow to ensure that future disposal program data requirements can be met."

In response to this Board recommendation, the U.S. Department of Energy issued the *Recommendation 93-5 Implementation Plan* (DOE-RL 1996a). The Implementation Plan "concentrates on actions necessary to ensure that wastes can be stored safely, that operations can be safely conducted, and the timely characterization information for the tank waste disposal program can be obtained." The titles of DNFSB milestone commitments being supported through fiscal year 2002 can be found in Table 2-2 of this WIRD.

2.1.2.1 Safe Storage of Tank Wastes and Safe Operation of Tank Farms. Section 5.4.3 of the Implementation Plan (DOE-RL 1996a) identified several milestones to accelerate the resolution of the tank safety issues and to ensure safe operations in TWRS. Safe operations in TWRS are enhanced by upgrading the Authorization Basis documents. Milestones related to upgrading the Authorization Basis are listed in Section 5.4.3.1 of DOE-RL (1996a). Those requiring characterization support are listed in Table 2-2 of this WIRD. The *Tank Waste Remediation System Basis for Interim Operation*, HNF-SD-WM-BIO-001, Rev. 0G (TWRS 1997a), was published in July 1997.

The identified safety issues included ferrocyanide, organic complexants, organic solvents, flammable gas, high heat, and criticality. Milestones supporting the resolution of these safety issues are listed in Sections 5.4.3.2 through 5.4.3.7 of DOE-RL (1996a). The ferrocyanide issue was resolved and closed with issuance of an internal memorandum (Cash 1996). Closure of the organic complexant and organic solvents issues is pending. (See Section 3.8 of this WIRD.)

2.1.2.2 Disposal Program Data Requirements. Characterization support for the disposal program consists primarily of supplying waste samples for process testing. High-priority tanks for disposal sampling were identified in Section 5.5.6.1 of DOE-RL (1996a). This milestone was met with issuance of the *High Priority Tank Sampling and Analysis Report* (Brown et al. 1998b) in March 1998.

2.1.2.3 Technical Basis for Characterization. The *Recommendation 93-5 Implementation Plan* (DOE-RL 1996a) identified the need to increase the sampling efforts of the Characterization Project. Section 5.6.3.1 of DOE-RL (1996a) lists the milestones to drive the improved characterization of tank waste. These milestones are also listed in Table 2-2 of this WIRD.

2.1.3 Regulatory Drivers to Characterization

Several state and federal regulatory requirements are associated with sampling and analysis of dangerous waste, wastewater, and air emissions applicable within TWRS. Other regulatory drivers for future privatization activities include land disposal restrictions for LAW feed and delisting for HLW. Characterization activities supporting regulatory requirements have been identified in the *Tank Characterization Sampling Basis* (Brown et al. 1998a). Regulatory drivers are listed in Mulkey (1996a), Mulkey and Markillie (1995), and Mulkey and Markillie (1996). Regulatory drivers for Privatization will be listed in the Privatization regulatory compliance DQO, currently being prepared.

2.1.4 Authorization Basis

The Authorization Basis consists of a suite of documents including the *Tank Waste Remediation System Basis for Interim Operation* (BIO), HNF-SD-WM-BIO-001 (TWRS 1997a) and a number of supporting or subordinate documents. The documents constitute the technical basis for safe operation and maintenance of the tank farm facilities, equipment, and processes.

The suite of Authorization Basis documents consists of the latest revisions of TWRS (1997a) and the supporting documents listed below as well as a DOE approved letterbook. (This suite of documents is revised frequently. Reference should be made to the controlled "gold" copy suite located in the Tank Characterization and Safety Resource Center in the 2750E Building. Only TWRS [1997a] is included in the References in Section 10.0 for brevity, but all documents in the suite are listed here for completeness.) It should be noted that only some of the documents in this suite contain characterization data requirements. Characterization milestones that support the Authorization Basis driver have been extracted and are listed in Table 2-2 of this WIRD.

- HNF-SD-WM-BIO-001, Rev. 0G, *Tank Waste Remediation System Basis for Interim Operation* (TWRS 1997a)
- HNF-SD-WM-TSR-006, Rev. 0-I, *Tank Waste Remediation System Technical Safety Requirement*
- LMHC-9757421A R1, Attachment 3, *Project W-030 Safety and Licensing Strategy*
- LA-UR-92-3196, Revs. 14 and 14A, *Safety Assessment for Proposed Pump Operations to Mitigate Episodic Gas Releases in Tank 241-SY-101*
- SD-HS-SAR-009, Rev. 0, *242-T Evaporator Facility Shutdown/Standby to Condition V Safety Analysis Report*
- SD-WM-SSP-002, Rev. 0, *242-S Facility Shutdown/Standby Plan*
- WHC-SD-SQA-CSA-20326, Rev. 0, *CSER 90-008 Reclassification of the Critical Mass Laboratory, Building 209E as a Limited Control Facility*
- WHC-SD-WM-TI-789, Rev. 0, *Preliminary Hazards Analysis - 209E Building - Critical Mass Laboratory*
- WHC-SD-WM-SAD-035, Rev. 0-B, *A Safety Assessment for Rotary Mode Core Sampling in Flammable Gas Single-Shell Tanks, Hanford Site, Richland, Washington*

- WHC-SD-WM-SAD-036, Rev. 0, *A Safety Assessment for Salt Well Jet Pumping Operations in Tank 241-A-101, Hanford Site, Richland, Washington*

- WHC-SD-WM-SAR-027, Rev. 2, *Hazards Identification and Evaluation Report for the Operation of the Grout Facilities and Near-Surface Disposal of Grouted Phosphate/Surface Low-Level Liquid Waste*

- WHC-SD-WM-SSP-005, Rev. 0, *Grout Facilities Standby Plan*

2.1.5 Privatization Contract(s) and Supporting TWRS Retrieval and Disposal Mission Readiness-to-Proceed Memorandum

The TWRS Privatization Contracts (DE-RP06-96RL13308 and DE-RP06-96RL13309) will specify data needed for low and high activity waste envelopes, including due dates.

In preparation for and anticipation of supporting the Privatization Contract(s), the *Tank Waste Remediation System Retrieval and Disposal Mission Readiness-to-Proceed Memorandum*, HNF-2019, Rev. 1, (Jordan and Boston 1998) was prepared and provides a summary of work scope for the Phase I TWRS Retrieval and Disposal Mission. Item 20 in the readiness-to-proceed checklist contained in the document is of particular importance to the characterization program. The item states, "Waste has been characterized as necessary to satisfy all Data Quality Objectives (DQOs)." Data Quality Objectives are discussed in Section 3.1.7 of this WIRD.

A number of other relevant documents relating to readiness-to-proceed are appendices, attachments, or enclosures to HNF-2019. These documents include:

- *Tank Waste Remediation System Mission Analysis Report*, HNF-SD-WM-MAR-008, Rev. 3, (Acree 1998). The TWRS Mission Analysis Report describes and analyzes the technical requirements TWRS must satisfy to supply feed to the private contractors' facilities and to store or dispose of the immobilized waste following processing in the facilities. The document describes a two-phased approach to reflect the nature of the mission. Phase I establishes the technical, operational, regulatory, and financial elements required by the privatized facilities. Phase I also establishes the facilities and infrastructure to immobilize LAW and HLW. Initial feed delivery to private contractors is scheduled to begin in June 2002.

  Tank waste characterization is addressed in the top-level functional requirement description (Table 17 of the Mission Analysis Report) as follows:

- The Tank Waste Characterization System will take samples from the DSTs and analyze them to provide waste information for current and future mission activities (e.g., storage, retrieval, transfer).

- The Tank Waste Characterization System will take samples from the SSTs and analyze them to provide waste information for current and future mission activities (e.g., storage, retrieval, transfer).

- *Tank Waste Remediation System Retrieval and Disposal Mission Initial Updated Baseline Summary*, HNF-1946, Rev. 1, (Swita et al. 1998).
  HNF-1946 provides a summary of the TWRS Retrieval and Disposal Mission Initial Updated Baseline (scope, schedule, and cost), developed to demonstrate readiness-to-proceed in support of the TWRS Phase I mission. The document also provides a crosswalk between the Level 1 Logic and the work breakdown structure. The Master Baseline Schedule contains numerous tank characterization activities related to source tanks, pre-stage tanks, and stage tanks. Characterization support will be necessary to complete these activities.

- *Tank Waste Remediation System Retrieval and Disposal Mission Key Enabling Assumptions*, HNF-1945, Rev. 1 (Baldwin et al. 1998). This document contains the key assumptions to enable readiness-to-proceed (RTP). Enabling assumption number 11, Private Contractor Sampling and Analysis (EAMCS.MD.8) is of interest to the characterization program. "Sampling material and analytical scope includes only Project Hanford Management Contract (PHMC) requirements to verify that feed meets the envelope requirements. Sampling requirements of RL and the PCs are not included in the RTP plan (cost and schedule)." Enabling assumption 35, "co-mingling of wastes in DSTs during pumping," is also relevant to characterization.

In addition to the above RTP documents, a *Readiness to Proceed: Characterization Planning Basis*, HNF-2117, Rev. 0 (Field et al. 1998) has been prepared. The document summarizes characterization requirements, data availability, and data acquisition plans in support of the Phase I Waste Feed Readiness-to-Proceed Mid-Level Logic. It summarizes characterization requirements from a number of planning documents including DQOs available as of January 1998.

2.2 SUPPORTING DOCUMENTS

Supporting documents report, status, schedule, evaluate, or reflect the milestone, commitments, or deliverables connected with information drivers. Supporting documents generally do not contain information drivers themselves.

2.2.1 Waste Characterization Program Multi-Year Work Plan

The TWRS *Waste Characterization Multi-Year Work Plan*, HNF-SP-1230 (TWRS 1997b) contains the technical baseline, work breakdown structure, schedule, and cost baseline for the Characterization Project. The document is issued each fiscal year. The most recent version addressed fiscal year 1998 and was issued September 26, 1997. Milestones contained in the most recent version of the Multi-Year Work Plan (MYWP) through FY 2002 are listed in Tables 2-1 and 2-2 of this WIRD.

2.2.2 TWRS Topical Reports

Topical reports are technical documents that discuss and evaluate the current knowledge on a particular issue. Topical reports have resulted in or may result in waste phenomena and/or waste behavior studies. Additional data or analysis needs may be discovered during preparation of a topical report.

Topical reports include:

- *Flammable Gas Project Topical Report*, HNF-SD-1193, Rev. 2 (Johnson et al. 1997)
- *Organic Complexant Topical Report*, HNF-SD-WM-CN-058, Rev. 1 (Meacham et al. 1997)
- *Organic Solvent Topical Report*, HNF-SD-WM-SARR-036, Rev. 1A (Cowley et al. 1997).

2.2.3 Tank Characterization Technical Sampling Basis

The *Tank Characterization Technical Sampling Basis* (Brown et al. 1998a) establishes priorities for sampling and characterization activities for TWRS. The document is revised and reissued each fiscal year. The sampling basis prioritizes the information needed and tanks for sampling to address safety issues, operations and maintenance, disposal, historical model evaluation, regulatory, and other issues.

2.2.4 Data Quality Objectives

The DQOs define the work scope required to address a specific issue and contain guidance on the type and extent of characterization necessary to address those issues. Each TWRS program issue has an associated DQO that defines questions, required information and the quality of information required to address those questions. Table 2-3 lists active TWRS DQOs and their

status. An active DQO is one wherein data are still being collected to satisfy it or a DQO is actively in preparation but has not yet been released.

2.3 MILESTONES AND ISSUES TABLES

Table 2-1 relates characterization program issues to specific Tri-Party Agreement milestones. The milestone due dates are also given. Table 2-2 relates characterization program issues to non-Tri-Party Agreement milestones. The due dates of non-Tri-Party Agreement milestones are given in the table. Appendix A provides more details including titles of the Tri-Party Agreement and DNFSB milestones.

Table 2-1. Tri-Party Agreement Milestones and Issues. (5 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver**	**Milestone Due Date**
Flammable Gas	M-40-00 M-40-09	9/30/2001 9/30/1998
Organic Fuel	M-40-00	9/30/2001
Compatibility	M-41-00[1] M-41-22 M-41-23 M-41-24 M-41-25 M-41-26 M-41-27 M-41-27-T03 M-41-27-T04 M-41-27-T05	9/30/2000 9/30/1997 3/31/1998 9/30/1998 3/31/1999 9/30/1999 9/30/2000 9/30/1998 9/30/1999 9/30/2000
W-320 Sluicing of tank 241-C-106/High Heat	M-40-00	9/30/2001
	M-45-00 M-45-03A	9/30/2024 10/31/1997
Organic Solvents	M-40-00	9/30/2001

Table 2-1. Tri-Party Agreement Milestones and Issues. (5 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver**	**Milestone Due Date**
Waste Feed Delivery [Phase I]	M-50-00 M-50-04	12/31/2028 6/30/2008
	M-51-00 M-51-02 M-51-03	12/31/2028 9/30/1998 12/31/2009
	M-60-00 M-60-10 M-60-11 M-60-12	12/31/2024 7/31/1998 8/31/1998 12/31/2002
	M-61-00[2] M-61-01 M-61-02	12/31/2028 TBD 12/31/2003

Table 2-1. Tri-Party Agreement Milestones and Issues. (5 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver**	**Milestone Due Date**
Privatization - DOE Management of Contract(s) [Phase I]	M-50-00 M-50-04	12/31/2028 6/30/2008
	M-51-00 M-51-02 M-51-03	12/31/2028 9/30/1998 12/31/2009
	M-60-00 M-60-10 M-60-11 M-60-12	12/31/2024 7/31/1998 8/31/1998 12/31/2002
	M-61-00[1] M-61-01 M-61-02	12/31/2028 TBD 12/31/2003
	M-90-00 M-90-05-T01	TBD 12/31/2001
Privatization - Supply Samples To Private Contractor(s) [Phase I]	M-51-00 M-51-02 M-51-03	12/31/2028 9/30/1998 12/31/2009
	M-60-00 M-60-11 M-60-12	12/31/2024 7/31/1998 12/31/2002
	M-61-00[2] M-61-01 M-61-02	12/31/2028 TBD 12/31/2003

Table 2-1. Tri-Party Agreement Milestones and Issues. (5 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver**	**Milestone Due Date**
Pretreatment, Immobilization, and Retrieval [Phase II][3]	M-45-00 M-45-02C M-45-02D M-45-02E M-45-02F M-45-02G	9/30/2024 9/30/1998 9/30/1999 9/30/2000 9/30/2001 9/30/2002
	M-50-00 M-50-03	12/31/2028 3/31/1998
	M-51-00	12/31/2028
	M-60-00 M-60-13	12/31/2024 12/31/2003
	M-61-00[2] M-61-03	12/31/2028 12/31/2004
Single-Shell Tank Waste Retrieval and Tank Closure	M-45-00 M-45-03-T01 M-45-03-T02 M-45-04-T02 M-45-06-T01 M-45-06-T02 M-45-06-T03 M-45-06-T04	9/30/2024 9/30/2003 6/30/2002 12/31/2000 11/30/2004 9/30/2006 3/31/2012 3/31/2014
Criticality	M-40-00 M-40-12	9/30/2001 9/30/1999
Process Sampling	M-43-00	6/30/2005

Table 2-1. Tri-Party Agreement Milestones and Issues. (5 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver**	**Milestone Due Date**
Characterization Planning Deliverables[4]	M-44-00A	9/30/2002
	M-44-13B	6/30/1998
	M-44-13C	6/30/1999
	M-44-13D	6/30/2000
	M-44-13E	6/30/2001
	M-44-14B	8/31/1998
	M-44-14C	8/31/1999
	M-44-14D	8/31/2000
	M-44-14E	8/31/2001
	M-44-15B	9/30/1998
	M-44-15C	9/30/1999
	M-44-15D	9/30/2000
	M-44-15E	9/30/2001
	M-44-15F	9/30/2002
	M-44-16B	9/30/1998
	M-44-16C	9/30/1999
	M-44-16D	9/30/2000
	M-44-16E	9/30/2000
	M-44-16F	9/30/2002

Notes: [1] Proposed to be deleted in Draft Change Request M-41-98-01 dated 4/15/98.
[2] These milestones become enforceable only if DOE elects to abandon the primary path set forth in the M-60 milestones. These milestones will automatically be deleted from the action plan upon DOE's completion of the primary path milestone M-60-10.
[3] Some of the activities in support of these milestones also support Single-Shell Tank Retrieval and Tank Closure milestones.
[4] Consists of draft WIRD, final WIRD, issued characterization deliverables report, and characterization data input to electronic database.

Table 2-2. Non-Tri-Party Agreement Milestone and Issues. (2 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver[1]**	**Milestone Due Date**
Organic Fuel	DNFSB *5.4.3.3B	11/30/1998
	Authorization Basis	N/A
Compatibility[2]	Authorization Basis	N/A
W-320 Sluicing of tank 241-C-106/High Heat[3]	DNFSB 5.4.3.6C	10/31/1997
	DNFSB 5.4.3.6D	5/31/1998
Vapor Space Phenomenology	DNFSB 5.6.3.1.E	10/31/1997
Organic Solvents	DNFSB 5.4.3.4D	12/31/1999
	DNFSB 5.4.3.4E	2/28/2000
	DNFSB 5.4.3.4F	11/30/2000
Vapor Screening to support rotary mode sampling	Regulatory Drivers	N/A
General Characterization	DNFSB 5.5.6.1A	3/31/1998
	DNFSB 5.6.3.1.G	3/31/1998
	DNFSB 5.6.3.1.J	12/31/2002
Caustic Mitigation	Authorization Basis	NA
Waste Feed Delivery [Phase I][3]	Privatization Contracts (DE-RP06-96RL13308, DE-RP06-96RL13309)	Footnote 4
Privatization - DOE Management of Contract(s) [Phase I][3]	Regulatory Drivers	N/A
	Privatization Contracts (DE-RP06-96RL13308, DE-RP06-96RL13309)	Footnote 4
Privatization - Provide Samples to Contactor(s) [Phase I]	Privatization Contracts (DE-RP06-96RL13308, DE-RP06-96RL13309)	Footnote 4

Table 2-2. Non-Tri-Party Agreement Milestone and Issues. (2 sheets)

TWRS Driver		
Program or Issue	**Milestone or Driver[1]**	**Milestone Due Date**
Historical Model Evaluation	DNFSB 5.6.3.1.I	12/31/1998
Air Emissions and Dangerous Waste	Regulatory Drivers	N/A
Process Sampling	Authorization Basis	N/A
	State and Federal Regulations	N/A
Criticality	Authorization Basis	N/A
Source Term	Authorization Basis	N/A
Characterization Planning Deliverables	DNFSB 5.6.3.1.F	11/30/1997
	DNFSB 5.6.3.1.H	7/31/1998

Notes: [1] DNFSB Milestones (n.n.n.n.a) all begin with "93-5", "93-5" has been removed for brevity.
[2] Milestones and commitments of other programs also may require compatibility (e. g. W-320 Sluicing of tank 241-C-106, Evaporator campaigns, Waste Feed Delivery and Privatization - DOE Management of Contract(s).
[3] Some of the activities in support of these milestones may require compatibility.
[4] Due date for moving feed to Private Contractor is 6/30/2002.

Table 2-3. Active TWRS Characterization Program Data Quality Objectives and Other Comparable Requirements Documents. (2 Sheets)

Subject	Document Number	Date Issued or Due Date
Air Emission Regulatory	WHC-SD-WM-DQO-021	Issued 11/30/95, Rev. 0
Caustic Mitigation- Test Plans	Developed as needed	N/A
Crust Burn Flammable Gas[1]	WHC-SD-WM-DQO-003	Issued 4/27/94, Rev. 1
Dangerous Waste Regulatory	WHC-SD-WM-DQO-025	Issued 7/2/96, Rev. 0
Evaporator/LERF	WHC-SD-WM-DQO-014	Issued 5/16/95, Rev. 1A
Feed Delivery - Confirm Tank T for Batch X (HLW)		Due: June 1998.
Feed Delivery - Confirm Tank T for Batch X (LAW)	HNF-1796	Issued 3/11/98, Rev. 0
Feed Delivery - Delivery Transfer to Private Contractors (HLW)		Due: 1999.
Feed Delivery - Delivery Transfer to Private Contractors (LAW)		Due: June 1998.
Feed Delivery - Waste Transfer Control		Due: July 1998.
Flammable Gas	WHC-SD-WM-DQO-004	Issued 12/18/97, Rev. 3
Historical Data Acquisition Model Verification	WHC-SD-WM-DQO-018	Issued 2/18/97, Rev. 2
HTI AX-104 Vadose Zone	HNF-2326	Issued 3/24/98, Rev. 0.
HTI AX-104 Waste Characterization	HNF-SK-WM-DQO-027	Issued 10/10/97, Rev. 0B
HTI C-106 Hard Heel Characterization		Due: May 1999.
In-Tank Generic Vapor[1]	WHC-SD-WM-DQO-002	Issued 11/15/95, Rev. 2
Organic Complexant[1]	WHC-SD-WM-DQO-006	Issued 9/8/95, Rev. 2
Organic Solvent[1]	HNF-SD-WM-DQO-026	Issued 8/13/97, Rev. 0
Phase 2 -HLW		Due: TBD

Table 2-3. Active TWRS Characterization Program Data Quality Objectives and Other Comparable Requirements Documents. (2 Sheets)

Subject	Document Number	Date Issued or Due Date
Phase 2 LAW		Due: November 1998.
Pretreatment	WHC-SD-WM-DQO-022	Issued 6/29/95, Rev. 0
Privatization Low-Activity Waste Feed	WIT-98-010	Issued 11/27/97 (under revision).
Privatization High Level Waste Feed		Due: May 1998.
Privatization - Regulatory Compliance		Due: May 1998.
Retrieval	WHC-SD-WM-DQO-008	Issued 7/31/96, Rev. 1
Safety Screening	WHC-SD-WM-SP-004	Issued 8/31/95, Rev. 2
Tank 241-C-106 Sluicing Process Control Plan	HNF-SD-WM-PCP-013	Issued: 1998, Rev. 0
Tank 241-Z-361 Characterization		Due: June 1998.
Technical Planning Requirements for Sending Samples to Private Contractors	Internal memorandum (Gasper 1998)	Issued: 4/9/98.
Vapor Rotary Mode[1]	WHC-SD-WM-SP-003	Issued 2/25/94, Rev. 0
Waste Compatibility	WHC-SD-WM-DQO-001	Issued 6/23/97, Rev. 2
Wastewater Regulatory[2]	WHC-SD-WM-DQO-024	Issued 3/28/96, Rev. 0

Notes:

1. Sampling for these DQOs has been completed. DQO is being closed.
2. Sampling requirements have not been identified for this DQO.

3.0 ISSUES AND REQUIREMENTS ADDRESSED BY CHARACTERIZATION INFORMATION

There are five primary drivers for Characterization Project information: (1) commitments to the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1996); (2) commitments to the DNFSB contained in DOE-RL (1996a); (3) regulatory drivers; (4) the Authorization Basis suite of documents; and (5) the Privatization Contract(s) and supporting TWRS Retrieval and Disposal Mission Readiness-to-Proceed documents.

Issues and requirements contained in these drivers have been organized into categories for discussion. Each category has several specific issues and/or have special data requirements that distinguishes it from other categories.

- Safety issue resolution
- Operations and maintenance
- Disposal
- Historical data validation
- Regulatory requirements
- Data Systems Management
- Inactive Miscellaneous Underground Storage Tanks (IMUST).

Each TWRS program (i.e., engineering, operations, and safety) has the responsibility to evaluate its information requirements for safely operating and monitoring facilities that store, receive, retrieve, treat, or dispose of waste materials. These information requirements are associated with specific issues. The information required by each issue is assembled and documented through the DQO process (EPA 1994 and LMHC 1997c). The DQO process documentation defines information needs, data quality, boundary requirements, and special handling requirements pertinent to sampling and analyses. The DQO process is an iterative process which requires that a DQO be revised when the requirements and/or program needs for information change. Table 2-3 contains a listing of all active and pending TWRS DQOs.

3.1 SAFETY ISSUE RESOLUTION

The safety issue resolution program addresses tank waste safety issues of varying maturity. Flammable gas and high heat driven sluicing of tank 241-C-106 actively require new characterization information. The organic solvents, safety screening, organic complexants,

and vapor phenomenology issues are areas of significant progress with most, if not all, sampling and analysis complete and issue closure pending. (See Section 3.8). The ferrocyanide issue has been resolved and closed.

3.1.1 Flammable Gas

The release of flammable gases into the headspace of a waste tank is a major issue because the ignition of confined gases could result in a release of radioactive and chemical materials to the environment. The requirements of the Flammable Gas Safety Issue are being addressed by *Data Quality Objective to Support Resolution of the Flammable Gas Safety Issue*, Revision 3 (Bauer and Jackson 1997).

Although progress has been made in the flammable gas issue, some phenomena require further explanation, hence three data collection approaches are used:

1. Measure gases released into the headspace.

2. Monitor gas retention in the liquid and solid waste.

3. Measure chemical and physical properties of the waste that could affect gas generation, retention, and release.

The first approach is implemented by measuring gas concentration and composition in the headspace using Standard Hydrogen Monitoring Systems. Work for the first approach is ongoing, and data are being collected by planned vapor grab sampling events. Opportunistic vapor grab samples are also desired, particularly when high flammable gas measurements are observed during any tank intrusive activity. The analyses desired from such vapor grab samples are hydrogen, ammonia, methane, and nitrous oxide. Modeling and analysis of data to predict the degree to which a tank could develop a flammable gas problem is being performed.

The second approach uses the retained gas sampler (RGS) and the void fraction instrument to measure retained gas in the waste. The RGS is designed for use with push-mode sampling (truck #1).

The third approach is implemented by measuring the chemical and physical properties of liquid and solid waste in the tanks wherein flammable gas concentrations are of concern. In particular, the chemical and physical properties of wastes, predicted to affect gas generation, retention, and release, are studied. Tank waste sampling and analysis is the primary method of determining the chemical and physical properties of the waste.

Understanding the phenomena of gas production, retention, and release enhances the ability to manage the flammable gas hazard during the safe storage and retrieval mission.

3.1.2 Sluicing of Tank 241-C-106

Tank 241-C-106 has been used for radioactive waste storage since mid-1947. Based on its capacity to store waste, this tank received an excess of sludge containing high levels of strontium-90. The heat load of tank 241-C-106 is estimated at 123,000 Btu/hr (January 1997), which exceeds the heat load limit of 40,000 Btu/hr and classifies the tank as a high-heat load tank (Ogden 1997). Tank 241-C-106 is the only single-shell tank which requires water additions to maintain active cooling. To alleviate high-heat problems, tank 241-C-106 is planned for sluicing, retrieval, and waste transfer to tank 241-AY-102. During and after the sluicing of tank 241-C-106, grab samples from both tanks will be needed to verify process control and to demonstrate the success of the project. A process control plan was written to identify when samples are needed during the sluicing process and what analyses should be performed (Carothers et al. 1998). Resolution of this safety issue is expected when sufficient waste is transferred to tank 241-AY-102.

3.2 OPERATIONS AND MAINTENANCE

TWRS operations and maintenance organization is responsible for all waste transfers in the 200 Area tank farms. The waste transfers are associated with external transfers (i.e., B Plant), the stabilization program, evaporator operations, and caustic mitigation storage issues. The concerns of these programs include worker safety, environmental regulatory compliance, and operational efficiency. The programs and associated applicable DQOs are described below.

3.2.1 Waste Transfers and Compatibility

Information requirements to support waste compatibility issues and waste transfers are described by the *Data Quality Objectives for Tank Farms Waste Compatibility Program* (Fowler 1995, Mulkey and Miller 1997). Waste transfers that require compatibility information include transfers from double-shell tank (DST) to DST, SST to DST, waste generators to DSTs and 242-A Evaporator to DSTs.

All DSTs are within the scope of the compatibility DQO. The SSTs are within the scope of the compatibility DQO only if waste is scheduled to be transferred out of a SST for tank stabilization.

There are two functions associated with sampling and analysis for compatibility. The first function is to ensure that the transfer of waste will not result in any unsafe conditions or condition that precludes future disposal/retrieval. The second function is to ensure continued operability during waste transfer, waste concentration/minimization, and waste storage.

Analytical requirements are taken from the compatibility DQO (Mulkey and Miller 1997), the DST Waste Analysis Plan (Mulkey 1996b), and from the BIO (TWRS 1997a).

The compatibility DQO must be executed whenever waste is sent to a DST. Compatibility is not considered to be a separate issue in this report, but a function necessary to support other operations. Other operations that are supported by the compatibility DQO include (not exclusively) saltwell pumping and waste evaporation. These two functions are discussed in the following subsections

3.2.1.1 Saltwell Pumping (Interim Stabilization). The primary method in tank farm operations to prevent tanks from leaking until the waste is processed is to remove liquids from the tanks by saltwell pumping. This process is called interim stabilization. The liquid (both supernatant and drainable interstitial liquid) is pumped out of the saltwell of a SST and into a DST. Since waste is being transferred to a DST, the waste compatibility study must be performed on both the SST and DST liquids prior to the transfer.

3.2.1.2 Waste Transfers to Support Evaporator Operations. Many waste transfers occur before and after waste evaporation. Before waste supernatant can be evaporated, the waste must be staged to the evaporator candidate feed tanks (see Section 3.2.2 for a list of candidate feed tanks). Hence, the compatibility DQO must be performed between DSTs and candidate feed tanks (which are also DSTs) prior to the waste staging. After evaporation, evaporator bottoms must be sent to DSTs, which transfer also requires a compatibility analysis.

Compatibility analysis to support evaporator operations is a separate analysis from the analysis specified in the evaporator DQO (see Section 3.2.2), and is performed on more tanks than is required for the evaporator DQO.

3.2.2 Evaporator Operations

Successful operation of the 242-A Evaporator requires sampling and analysis of the evaporator feed waste. Sampling and analysis needs are described in *242-A Evaporator/Liquid Effluent Retention Facility Data Quality Objectives* (Von Bargen 1995).

Several tanks are associated with evaporator operations. Tank 241-AW-102 is the feed tank to the evaporator. Tank 241-AW-106 receives the evaporator bottoms after waste evaporation and is called the slurry tank. Evaporator condensate is sent to the Liquid Effluent Retention Facility. Tanks that transfer waste to the feed tank for processing in the evaporator are called candidate feed tanks. Candidate feed tanks include tanks 241-AP-104, 241-AP-107, 241-AN-105, and 241-AW-104. Candidate feed tanks are the only tanks that will be sampled in accordance with the evaporator DQO. An exception to this will occur in FY 1999 when liquid waste to be evaporated will be sent directly to tank 241-AW-102 and not staged first in one of the candidate feed tanks. Tank 241-AW-102 is expected to be sampled for the evaporator DQO in January 1999.

The evaporator DQO has three functions:

1. Process control evaluation ensures the evaporator operates efficiently with minimal equipment degradation. Process control evaluation also compares the waste compatibility in the candidate feed tanks with the wastes in the feed and slurry tanks.

2. Safety evaluation ensures that hazardous wastes do not endanger workers or the environment.

3. Environmental compliance evaluation ensures the waste released to the slurry tank, the gases released to the air, and the water released to Liquid Effluent Retention Facility are in compliance with environmental limits.

Sampling to support evaporator operations will be performed on candidate feed tanks involved in upcoming evaporator campaigns. The characterization sampling of candidate feed tanks will be driven by operations schedules.

3.2.3 Caustic Mitigation

Operating specifications for DSTs and saltwell receivers (double-contained receiver tanks [DCRTs] 244-BX, 244-S, 244-TX, and 244-U, and TK-003 of CR vault) (LMHC 1997a, LMHC 1997b, WHC 1996) limit nitrite, nitrate, and hydroxide concentrations in order to inhibit uniform corrosion rates and stress corrosion cracking. Operations often require information on the caustic level of these tanks. Currently, no DQO exists which describes the information requirements of tanks with low hydroxide concentrations. When information is required, operations provides a process memorandum and Process Engineering prepares a letter of instruction or sampling and analysis plan to direct characterization work.

Only DSTs are required to remain within the operating specifications outlined in the DST waste operating specification document (LMHC 1997b). Waste information is needed to verify a tank is within its corrosion specifications to the extent to which it is caustic deficient. Characterization information obtained for caustic deficient tanks is evaluated to predict the corrosion rate and to determine whether caustic additions to the tank will bring it back within specification or whether another type of mitigation effort is necessary.

The sampling and analysis of caustic deficient tanks is schedule-driven. When a tank falls out of operating limits, operations will determine whether characterization sampling and analysis is required.

3.2.4 Process Sampling

Occasionally, a safety or tank farm operations issue arises within TWRS that requires characterization sampling that may not be covered by any of the safety or operations issues identified earlier in this report. When such an issue arises, a mechanism is in place to ensure that the correct characterization sampling is performed. This mechanism will be referred to as process sampling in this report.

Process sampling includes characterization sampling to meet operational needs, specifically including industrial safety hazards and other safety issues. Much of the sampling of inactive facilities and K-basin sludge prior to transfer to the Tank Farms is covered by this issue. When a process sampling need is identified, a test plan or letter to specify sampling and analytical requirements must be generated.

3.3 DISPOSAL

The disposal program is responsible for contract support to private vendors, feed delivery, retrieval and immobilization, and waste integration team activities. The information requirements and associated DQO requirements for the information are described below.

3.3.1 Waste Feed Delivery (Phase I)

In 1996, the DOE proposed a strategy to retrieve and treat the waste in the Hanford Site's tanks using a combination of existing DOE contractors and privatized contractor teams. The DOE divided treatment of the tank waste into a demonstration phase (phase I) and a full-scale production mode (Phase II). Phase I is planned to last 10 to 14 years and will process 6% to 13% of the total Hanford Site tank waste (Acree 1998).

In Phase I, the PHMC team will upgrade the associated tank farms and transfer piping, move the waste feed to staging tanks, adjust feed as necessary to meet specifications, and deliver the feed to private contractors. The private contractors will treat and immobilize the wastes and transfer the immobilized waste to DOE for storage and disposal (Acree 1998). The work performed by the PHMC team to ensure that waste is delivered to the private contractors is referred to as "feed delivery" in this report.

Sixteen tanks (14 DSTs and 2 SSTs) have been selected as available source tanks for Phase I feed. To date, inventory estimates (Best-Basis Inventory) have been determined for all Phase I feed tanks. Process testing to determine the physical characteristics, dilution, and pretreatment requirements of waste materials is also being performed for many of the Phase I feed tanks. A mixer pump is planned in tank 241-AZ-101 to verify actual mixer pump performance and empirical correlations developed to predict pump performance.

Waste from all tanks in scope of Phase I feed delivery will be sent to the private contractors for processing. Sampling is desired after the tanks become static (transfers of waste in or out of the tank have ended). Some of the Phase I feed staging tanks are already static and have been sampled. These tanks have no further priority for sampling for the feed delivery issue provided the information needs have been or can be satisfied with the existing samples. Tanks not yet static have no priority for sampling until they become static. Tank 241-AZ-101 will need to be sampled during the Project W-151 mixer pump test.

3.3.2 Privatization Phase I -DOE Management of Private Contract(s)

The DOE is evaluating proposals in preparation for awarding low-activity and high-level waste immobilization contract(s). The DOE is responsible for managing the private contractors(s) and the site contractor for TWRS Privatization. The DOE will request samples for two reasons: (1) to support DOE planning and management of the private contracts and (2) to provide samples to the private contractor(s). The first function, DOE management of the private contractor(s), will be discussed in this section. The second function, to provide samples to the private contractor(s), will be discussed in Section 3.3.3 (Privatization Phase I - Direct Samples to Private Contractor[s]).

Data is being gathered according to the *Low-Activity Waste Feed Data Quality Objectives* (LAW DQO) (Wiemers and Miller 1997) except for Environmental Planning. Ecology has approved this document with the exception of Environmental Planning. The LAW DQO is to be revised by July 1998. The Environmental Planning section will be deleted and replaced with a data quality objectives document to support regulatory compliance for Privatization. The regulatory compliance DQO will cover regulatory compliance for low-activity and high-level waste (HLW) in both Phase I and Phase II. In addition, a *High-Level Waste Feed Data Quality Objectives* is being prepared for completion by May 31, 1998.

The data for low-activity waste will be used to:

- verify the feed staging baseline
- provide information for contractor process and facility designs,
- provide information for immobilized LAW storage and disposal design/specifications
- support completion of the LAW performance assessments for disposal
- substantiate the ability to comply with U.S. Nuclear Regulatory Commission guidelines for incidental waste.

Use of data for HLW will be similar to that of the LAW.

The tanks in scope of the Privatization - DOE management of private contract(s) function are the same tanks as the tanks in the feed delivery (Phase I) function. Sixteen tanks (14 DSTs and 2 SSTs) have been selected by the PHMC team as available source tanks for Phase I.

3.3.3 Privatization Phase I - Direct Samples to Private Contractor(s)

Authorization to proceed with waste immobilization efforts is expected to be issued to private contractor(s) in 1998. When issued, the private contractor(s) may require samples from tanks for the purpose of testing their process design. Providing samples to the private contractor(s) is the second function of characterization support.

Specific sampling requirements of the private contractor(s) is proprietary until authorization to proceed is awarded by DOE. Specific sampling requirements will be identified during Phase I Part B contract negotiations between DOE and the private contractor(s).

3.3.4 Retrieval and Immobilization (Phase II)

The current DOE strategy is to procure retrieval and treatment services from private contractors during Phase II. The SST waste and the waste remaining in the DSTs after Phase I will be processed during Phase II.

Phase II planning activities will be directed by a DQO to define data needs to low-activity waste feed in support of Phase II Privatization contracts and a second DQO to define data needs for high-level waste feed in support of Phase II Privatization contracts. Phase II retrieval data needs will be defined after experience is gained from the sluicing of tank 241-C-106 and the tank 241-AZ-101 mixer pump test. Until these DQOs are completed, the current pretreatment DQO (Slankas et al. 1995) and test plans will be used to direct characterization efforts for Phase II planning activities.

Of the Phase II activities, characterization sampling is required only for enhanced sludge washing (ESW) testing at this time. The required samples can be described as coming from three general categories listed in order of higher relative priority: tanks containing reduction-oxidation plant (REDOX) sludge, tanks which contain miscellaneous untested sludge types, and tanks which contain miscellaneous saltcake types which are either untested or are of interest for further study (Kupfer et al. 1995).

Phase II activities can be divided into four primary areas of focus, as summarized in the following sections.

Single-Shell Tank Retrieval Sequence. Single-shell tank sequencing studies determine a sequence for retrieval of SSTs which produces an acceptable and near minimum volume of HLW glass. These are only examples of the measures used to evaluate retrieval sequences, since other measures not listed are also used. Development of SST retrieval sequences requires as input (among other things): waste inventories, water wash factors, and caustic leach factors. Further refinement of the SST retrieval sequence is an end use for data from enhanced sludge washing (ESW) tests planned for FY 1998 and FY 1999. Some new samples are needed to complete characterization needs defined by the ESW activity.

The goal of sludge wash testing is to test a sufficient number of samples from defined waste "types" which have been determined to best represent Hanford SST waste. Tanks from which samples have been determined to be needed to support the ESW testing goal are specified in *Strategy for Sampling Hanford Site Tank Wastes for Development of Disposal Technology* (Kupfer et al. 1995). To date most of the tanks listed in Kupfer et al. (1995) have been sampled and evaluated for sludge washing characteristics (Lumetta and Rapko 1994, Lumetta et al. 1994, Lumetta et al. 1996, Lumetta et al. 1997, Rapko et al. 1995, Temer and Villarreal 1995a, 1995b, 1996, and 1997). Some additional samples remain to be obtained and tested to complete the ESW testing.

Sort on Radioactive Waste Type (SORWT) Group Model Validation. The goal of this activity is to study the validity of using the SORWT group model (Hill et al. 1995) to extrapolate ESW data obtained from representative tanks to untested and uncharacterized SSTs. The SORWT group model validation does not at this time require any sampling activities.

Single-Shell Tank Saltcake Dissolution. The goal of current saltcake dissolution testing is to provide laboratory data from actual tank waste samples to support engineering evaluations of retrieval technologies and to improve and validate the thermodynamic computer model used to predict waste solubility behavior. The testing will use actual tank waste samples representing three different types of SST saltcake. The three saltcake types are (1) high sodium nitrate saltcake, (2) high sodium carbonate saltcake, and (3) high sodium phosphate or high sodium aluminate or high sodium sulfate saltcake, depending on sample availability. Currently, samples for the saltcake dissolution testing activity are expected to be met by using existing archive samples. The saltcake testing described above is being performed in FY 1998 and is expected to be expanded in FY 1999 to include those containing insoluble chromium and other saltcake types. No new sampling needs or activities are required to support the SST saltcake dissolution activities at this time.

Single-Shell Tank Retrieval Equipment. Activities related to this issue attempt to determine how to introduce water or some aqueous solution into a tank to dissolve saltcakes and mobilize sludges while avoiding leaks to the environment in those tanks with compromised containments. Many of the data needs to support this issue are expected to be addressed by the results obtained from Phase I tank retrieval activities. No new sampling needs or activities are required to support SST retrieval equipment activities at this time.

3.3.5 Single-Shell Tank Waste Retrieval and Tank Closure: Hanford Tank Initiative (HTI)

Single-shell tank waste retrieval and tank closure will be demonstrated through the Hanford Tank Initiative (HTI) project. The HTI is a five-year project (1997-2002) resulting from the technical and financial partnership of the DOE Office of Waste Management and the Office of Science and Technology. The purpose of the HTI is to accelerate activities to gain key technical, cost performance, and regulatory perspectives on two high-level waste tanks (tanks

241-AX-104 and 241-C-106). The HTI will define the process, criteria, and technology to support retrieval and closure performance objectives of a single-shell tank.

The first tank to be sampled for the HTI is tank 241-AX-104. Tank 241-AX-104 was chosen for HTI because it is expected to represent the configuration of an assumed leaker single-shell tank after sluicing. A sluiced tank is the baseline of the retrieval process. The objective of HTI in sampling tank 241-AX-104 is to characterize the constituents and volume of waste in the tank. The purpose of characterizing the constituents and volume of the waste in tank 241-AX-104 is to develop a process for tank closure. The current tank closure criteria is to leave no more than 360 ft^3 of waste in the tank or the limit of best waste retrieval technology.

Another tank that is planned to be sampled for the HTI is tank 241-C-106. Once the soft-sludge sluicing retrieval of tank 241-C-106 is completed, the remaining waste in the tank will be mainly comprised of a layer of hard-heel sludge. This sludge has physical properties very different from the soft sludge layer above it and is not expected to be dislodged and removed during the Project W-320 sluicing activities. The HTI will apply technologies and processes to remove this hard-heel and any other waste remaining in tank 241-C-106. The objective is to demonstrate the ability to close a tank by removing enough waste so that the residue is less than 360 ft^3 or the limit of waste retrieval technology. The hard-heel sludge from tank 241-C-106 is currently scheduled to be transferred to double-shell tank 241-AY-102.

A DQO to direct the characterization activities of tank 241-AX-104 to support HTI objectives was prepared in September 1997 (Miller 1997), with two subsequent Engineering Change Notices (ECNs) (Banning 1997, 1998). Four auger samples were taken from two risers in November 1997. Results of the analysis of the auger samples are pending. Light-duty utility arm (LDUA) sampling is scheduled for September 1998. The LDUA samples will be taken from the floor, walls, and dome of the tank. All characterization sampling of tank 241-AX-104 will be used to support the basis for waste retrieval and tank closure of an SST.

In addition to the DQO to direct in-tank characterization of tank 241-AX-104 waste, a DQO for the vadose zone cone penetrometer work in the AX Tank Farm for tank 241-AX-104 is in preparation. The vadose zone core penetrometer may be used to support tank farm closure and risk assessment.

The HTI is in the early planning stages of the closure demonstration process for tank 241-C-106. Private industry will be asked to identify retrieval technologies to remove the hard-heel in the tank, with requests for proposals scheduled to be issued in August 1998. In order to obtain the best retrieval technology proposals, HTI must determine as much information on the composition of the hard-heel as possible. Without information on the physical properties of the hard-heel waste, the tooling for the hard-heel retrieval will need to be over designed to bound all possible waste compositions which could result in more expensive technologies than are necessary. Very little information regarding the hard-heel of tank 241-C-106 is currently available. A core sample of the tank was obtained in 1986, but this core sample (which included both the hard-heel and the soft sludge) was composited.

Because the physical properties of the hard-heel waste are so different from that of the soft sludge layer, this information is not useful to HTI. Therefore, identified characterization data needs for HTI include obtaining at least two rotary core samples of the hard-heel in tank 241-C-106. Physical and chemical analyses are necessary to satisfy the objectives of HTI and to complete the compatibility assessment of tank 241-C-106 waste with tank 241-AY-102 waste.

3.4 CHARACTERIZATION FOR HISTORICAL DATA EVALUATION

Throughout the life of the operating facilities at Hanford, process information has been generated including waste transfer logs, chemical purchase records, and process flow sheets. Efforts have been made to use that historical information for characterizing waste tank contents. This includes creating models for specific waste types within the tank, along with their spatial variability and contribution to total tank inventory (Agnew et al. 1997).

Information requirements for evaluating historical data are described in the *Historical Model Evaluation Data Requirements* (Simpson and McCain 1997). Bounding tanks and alternates are listed as well as the key analytes required to evaluate waste types and inventory.

The Hanford Defined Waste model, developed by the Los Alamos National Laboratory, uses historical information from waste transfer logs, chemical purchase records, and process flow sheets to estimate the contents of waste tanks (Agnew et al. 1997). Currently, the Hanford Defined Waste model is not used for decision-making because the data quality and the assumptions driving the model have not been fully evaluated.

The purpose of the historical model evaluation DQO (Simpson and McCain 1997) is to evaluate the ability of the Hanford Defined Waste model to accurately predict tank waste composition by quantifying the uncertainties intrinsic to the model estimates and sample data.

Simpson and McCain (1997) have identified five bounding tanks and eight alternative tanks remaining to be sampled to meet historical model evaluation needs. They identify the acquisition and analyses of samples from each tank to determine the range of compositions encountered in each major waste type that has contributed to the overall tank contents.

3.5 REGULATORY REQUIREMENTS

Regulatory compliance is responsible for meeting the regulatory laws which apply to waste tanks. Information requirements are directed towards air emissions, dangerous waste, and wastewater. These issues are described below.

3.5.1 Air Emissions

Characterization sampling and analysis of tank headspace is to be conducted according to the *Data Quality Objectives for Regulatory Requirements for Hazardous and Radioactive Air Emissions Sampling and Analysis* (Mulkey and Markillie 1995). Although this DQO applies to all DSTs and SSTs, whether actively or passively ventilated, the current sampling needs for air emissions will be directed to tanks that have an immediate need for an air permit.

Sampling for the air emissions DQO consists of both a vapor grab sample and a surface liquid grab sample (only where a supernatant layer is present). Vapor grab sampling is required for all tanks that require an air permit, regardless of whether the tank has been vapor-sampled previously or not.

Sampling the surface of the supernatant layer of each tank for total organic concentration is required to establish whether a floating organic layer is present, and if so, its effect on air emissions. If a surface layer sample has been collected, and the tank has had no transfers since the previous collection, additional sampling is not required.

3.5.2 Dangerous Waste

Regulatory information on solid and liquid components of tank waste material is required according to the *Data Quality Objectives for Regulatory Requirements for Dangerous Waste Sampling and Analysis* (Mulkey 1996a). This information is to be collected from full depth, composited samples. The current sampling needs for the dangerous waste DQO are to sample static tanks in preparation for feed delivery.

3.5.3 Wastewater

Regulatory information required for TWRS facilities and operations that discharge or potentially discharge wastewater is defined in *Data Quality Objectives for Regulatory Requirements for Wastewater Effluents Sampling and Analysis* (Mulkey and Markillie 1996). The wastewater regulations apply to effluents from facilities and do not require in-tank waste data.

3.6 DATA SYSTEMS MANAGEMENT

TWRS Characterization Project data system management plans, activities, and commitments are documented in the TWRS Process Engineering Data Management Plan updated annually (See Schaffer and Adams 1997 for most recent plan release). The plan for fiscal year 1999 is scheduled for release on September 30, 1998. Milestones M-44-16B and M-44-16-C require

characterization data to be entered into an electronic database and made available offsite to Ecology and EPA. (The next revision of the Multi-Year Work Plan is scheduled for release in September 1998.) Annual self-assessment audits of key data systems such as the Tank Waste Information Network System (TWINS) are conducted using a standard checklist to evaluate hardware, software, and data administration. An annual program report of data management activities is prepared in October to cover each preceding fiscal year.

3.7 INACTIVE MISCELLANEOUS UNDERGROUND STORAGE TANKS (IMUST)

The plans for characterization of IMUST facilities are in preparation. No DQO is yet scheduled or released for IMUST facilities. Current descriptions, management plans, and status of these tanks can be found in Lee (1995), WHC (1995), Mayer (1997), and Lipke (1998).

3.8 CHARACTERIZATION PROGRESS: ISSUES WITH CLOSURE PENDING

3.8.1 Organic Fuels (Complexants)

Organic complexant salts were sent to waste tanks. In sufficiently high concentrations with nitrates and/or nitrites and at sufficiently high temperatures, organic complexants could support a propagating chemical reaction. Organic complexant and solvent degradation products have been widely distributed in the tanks as a result of waste management activities (Agnew 1996). The requirements for the organic complexant issue include energetics, moisture, total organic carbon (TOC) measurements, and at times, propagation testing and organic speciation (Schreiber 1997).

In June 1997, the Organic Complexant Safety Program issued the *Organic Complexant Topical Report* (Meacham et al. 1997). The topical report makes a strong case that the organic complexant material found in Hanford tanks will not propagate if ignited. To completely satisfy the hypothesis that complexants in the tanks will not propagate, seven tanks that were expected to contain high complexant waste were chosen for sampling. The analysis and evaluation of these bounding tanks is expected to be sufficient to resolve the Organic Complexant Safety Issue. The sampling of these seven tanks has been completed. Therefore, no further sampling for the Organic Complexant Safety Issue is necessary. Complete resolution of the issue is expected before the end of FY 1998.

3.8.2 Safety Screening

The safety screening DQO (Dukelow et al. 1995) was developed to ensure that tanks that were not originally included on a watch list would be screened to determine if they should be

categorized under one of the existing safety issues. The safety screening DQO also tested tanks that were on a watch list to confirm that the correct safety issues were applied to the tank. The safety screening DQO was not sufficient to remove a tank from a watch list.

Significant improvements in scientific, technical data, and knowledge of safety issues has occurred since the *Recommendation 93-5 Implementation Plan* (DOE-RL 1996a) was issued. The ferrocyanide safety issue has been closed; the criticality unreviewed safety question (USQ) has been closed (but not the milestones in Table 2-1); the organic solvent topical report has been issued for review; all organic complexant samples have been obtained. The Basis for Interim Operations has been issued and implemented.

The sampling and analysis requirements of the safety screening issue will be met either due to safety issue resolution or requirements being covered by other specific safety issue DQOs. In summary, the Safety Program has learned enough about the specific safety issues to render the safety screening issue obsolete as a sole driver for sampling. However, the DQO will continue to be applied opportunistically to all tanks sampled for other issue purposes.

3.8.3 Organic Solvents

Given a sufficient ignition source, there are two potential hazards associated with organic solvents: an organic solvent pool fire and ignition of organic solvent that is entrained in waste solids (a wick fire). Eighty-two tanks have been vapor sampled to evaluate the Organic Solvent Safety Issue (Huckaby and Sklarew 1997).

The Organic Safety Program has been re-evaluating the consequences of a solvent pool fire in the tanks. The revised consequence calculations show that the solvent fire hazard falls below risk evaluation guidelines when controls are applied. This is true even if all tanks were assumed to contain organic solvent. Resolution of the Organic Solvent Safety Issue is expected by the end of FY 1998. Further vapor sampling of tanks for the purpose of evaluating organic solvents is not necessary.

3.8.4 Vapor Space Phenomenology

An understanding of headspace vapor phenomenology is essential to ensure that vapor samples are meaningful and that results can be used with confidence to resolve vapor issues. The requirements for characterization of vapor samples to support the vapor space phenomenology issue are outlined in the *Recommendation 93-5 Implementation Plan* (DOE-RL 1996a), with the exception of the third issue listed below which is driven by the Tri-Party Agreement requirement to close the flammable gas unreviewed safety question (USQ).

The following three headspace concerns were identified as critical to the technical basis of the vapor sampling effort.

1. Whether samples, collected from a single tank headspace location, generally represent headspace (homogeneity). If large differences in composition exist from one location to another, samples at multiple locations would be required for vapor space characterization.

2. The changes in headspace vapor composition over time.

3. The effect of the exchange of atmospheric air and tank headspace vapor, or exchanges between overflow (cascade) connected tanks on the homogeneity and composition of tank headspace vapor. Specific data requirements to obtain this information were developed in the *Vapor Sampling and Analysis Plan/Test Plan for Temporal Studies of Tanks BX-104, BY-108, C-107 and S-102* (Buckley 1997) and the *Vapor Sampling and Analysis Plan for Headspace Homogeneity Tests of Tanks B-103, TY-103, and U-112* (Buckley 1996).

The vapor space phenomenology tests are completed, and closure of this issue is pending.

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4.0 TECHNICAL SAMPLING BASIS FOR CHARACTERIZATION - DEVELOPMENT OF SAMPLING PRIORITIES AND SCHEDULES

One of the purpose of the WIRD is to describe and prioritize the characterization work needed to satisfy the drivers for characterization. The tool used in characterization to optimize characterization activities is the *Tank Characterization Sampling Basis* (Brown et al. 1998a), referred to hereafter as the "sampling basis." The sampling basis optimizes characterization activities by creating a tank sampling priority list. Priority numbers have been assigned to every tank. These priority numbers become the basis for identifying tanks that, if sampled, will support resolution of important safety issues, help to develop the waste disposal process, and support on-site operations activities. The remainder of this section discusses how priority numbers were developed and how the WIRD uses priority numbers to optimize characterization activities.

4.1 DEVELOPMENT OF SAMPLING PRIORITY NUMBERS

The sampling basis report (Brown et al. 1998a) defines priority numbers for safety, disposal, and regulatory issues. Sampling priority numbers were not developed in the sampling basis report for tank farm operations functions because sampling needs for operations change frequently. Operations priority numbers were developed separately for this WIRD. The development of safety, disposal, and regulatory priority numbers in the sampling basis document, as well as the separate development of the operations numbers, is discussed below.

4.1.1 Sampling Basis Priority Numbers

A separate priority number is estimated for each type of sampling event in the sampling basis reports; solid sampling, supernatant sampling, and vapor sampling. Sampling numbers are calculated for each type of sampling event because each type of sampling event is treated as a separate activity and are rarely performed together for one tank.

The sampling priority number of a tank is based upon three factors: (1) the number of issues that are supported by the tank; (2) the relative importance of each of the issues supported by the tank; and (3) the relative importance of the specific tanks within each issue. Each of these three factors is discussed in the following paragraphs.

The number of issues supported by each tank sampling event is shown in Appendix B of Brown et al. (1998a). The DQO documents used to direct the sampling requirements for each issue list which tanks are in scope for each issue. Tanks that support many issues are generally more important than tanks that only support one issue.

Some issues are more important than other issues in fulfilling the overall objectives of the primary drivers. The determination of the priority of issues with respect to other issues is made in a facilitated session with representatives of the TWRS programs requiring characterization information, DOE-RL, and Ecology (Hunt 1998). This facilitated session results in a table of issue priority numbers which is shown in Table 5-1 of Brown et al. (1998a).

The relative importance of the tanks within each issue is determined and documented in the sampling basis (Brown et al. 1998a). In short, one tank may be better suited to supporting an issue than another tank.

The three factors, the number of issues supported by a tank, the relative importance of each issue, and the relative importance of each tank within an issue, are used to create the overall priority list. The overall priority list, consisting of a priority number for each tank, is generated using a spreadsheet matrix. The method for creating the overall priority list is documented in Brown et al. (1998a). The overall priority list is shown in Table 6-1 of Brown et al. (1998a) and Table 5-2 of this WIRD.

4.1.1 Operations Priority Numbers

The priority numbers generated in Table 6-1 of the sampling basis (Brown et al. 1998a) do not reflect the sampling needs of tank farms operations. Operations requirements were not incorporated into the sampling basis priority numbers because operations schedules change often and are difficult to forecast, but operations priority numbers are included in this WIRD because it is desirable to optimize characterization information collected in support of operations to the extent practicable.

Operations priority numbers were developed specifically for the WIRD, using the same methodology as was used in the sampling basis report (Brown et al. 1998a). Table 5-1 of the sampling basis report (Brown et al. 1998a) reports issue priority numbers for the operations functions of evaporator, compatibility, and caustic mitigation. By combining operations issue priority numbers with the tanks desired for operations sampling, priority numbers for sampling tanks for operations issues were developed. Operations sampling priority numbers are listed in Table 5-2 of this WIRD.

4.2 MEANING OF SAMPLING PRIORITY NUMBERS

The sampling priority number represents the anticipated value expected from sampling a particular tank, in terms of information expected to be gained from the sampling and analysis results. Sampling a tank with a value of 100 is anticipated to be twice as important as sampling a tank with a value of 50. The tank with a value of 100 probably supports more issues and/or supports issues that are more important to the drivers mentioned in Section 2.0 of this WIRD.

4.3 DESCRIPTION OF THE SAMPLING PRIORITY TABLE

Table 5-2 provides a list of tanks prioritized consistent with the sampling basis (Brown et al. 1998a). The first column of Table 5-2 lists all 177 single and double-shell tanks. The second, third, fourth, and fifth columns contain the priority values for solid, liquid, vapor, and operations sampling, respectively. The tanks in the first column are sorted according to the solid sampling priority number (from column 2). The derivation of the priority values in Table 5-2 is explained briefly in Sections 4.1.1 and 4.1.2 above and in detail in Brown et al. (1998a). Columns 6 through 9 are for WIRD reporting purposes and will be discussed in Section 5.0 of this report.

4.4 USE OF PRIORITY TABLES IN CHARACTERIZATION SCHEDULING

Most Characterization Project contributions to TWRS information requirements are through the collection and analysis of waste tank samples and reporting of results. Once program information requirements are prioritized (Brown et al. 1998a), these sampling requirements are incorporated into a sampling schedule which becomes the basis of the Characterization Project work scope.

When the sampling schedule is created, it is not always possible (or desirable) to sample in the exact order of the sampling priority lists in Table 5-2. When creating the sampling schedule, consideration must be given to: (1) priority number of tanks; (2) overall coverage of TWRS issues and primary sampling drivers; and (3) operational constraints. These considerations will be discussed throughout the remainder of this section.

The first consideration when creating the sampling schedule is to schedule tanks with high priority numbers as early as possible. Scheduling tanks with high priority numbers ensures that the best tanks are being sampled to support TWRS issues.

The second consideration in creating the sampling schedule is to ensure that all drivers are being considered. If several tanks at the top of the priority list all support the same issues (and the same drivers), it may be necessary to only schedule a few tanks at the top of the list and skip down to tanks lower on the list to ensure that other issues (and drivers) are also being supported.

The third consideration when creating the sampling schedule is operational constraints. Operational constraints will often change the order in which samples are taken and analyzed. Some of the most common operational constraints are discussed below.

- Rotary-mode sampling. In past years, rotary-mode sampling has been a problem in characterization sampling. When the rotary-mode sampling system is not operating, many tanks with high priority numbers cannot be sampled.

- Retained gas sampling. Only core sampling truck #1 is capable of retained gas sampling. If truck #1 is not functioning, tanks on the priority list that require retained gas sampling may be delayed from sampling. Retained gas sampling may only be performed in push mode; hence, tanks that should be retained gas sampled that have hard waste may be constrained from sampling.

- Tank farm operations. If a tank is scheduled for other tank farm operations (i.e, saltwell pumping or caustic additions), it may be necessary to delay characterization sampling of the tank regardless of the priority number.

- Location. Moving the sampling equipment from farm to farm is time consuming and somewhat costly because of considerations of radiological control and worker exposure. It may be beneficial to sample tanks lower on the priority list while the sampling truck is positioned in the farm (instead of going back a month or two later).

These are only a few examples of the types of operational constraints considered in the characterization sampling schedule. Not all operational constraints can be foreseen. The sampling schedule is re-developed often to ensure that the best sampling configuration is planned at any given time.

5.0 REPORTING AND MEASURING CHARACTERIZATION PROGRESS

Two tools are provided to measure characterization progress. These tools are:

- Table 5-1 provides a summary of the number of tanks that is needed for sampling in FY 1999 and the out years to address the issues indicated. The total number of planned TCRs to address each issue is also given for FY 1999. Please note that these are planned numbers are based on technical need not yet restrained by budget or operational realities. As the Multi-Year Work Plan and detailed sampling schedule are worked out, the total tanks scheduled and total TCRs scheduled will be filled in. These rows do represent the number of tanks to be sampled restrained by financial and operational considerations. A separate row indicate the number of tanks actually sampled. This row will be completed each quarter and the table submitted as part of the quarterly report. The reader is encouraged to read the brief footnotes on Table 5-1 before using the table.

- Table 5-2 provides a tool to check characterization progress tank-by-tank, quarter by quarter. The table provides the priority values for solids, supernatant, vapor, and operations samples. Additional explanation of this table is found in the next paragraph. This table will be updated and submitted as part of each quarterly report.

Please note that Table 5-1 lists tanks needing to be sampled by issue. Because sampling of any given tank may satisfy more than one issue, the minimum number of tanks to be sampled is: FY 1999 - 14; FY 2000 - 9; FY 2001 9; FY 2002 - 8; and FY 2003 - 3. The minimum number of TCRs planned for FY 1999 is 17.

The priority values in the columns of Table 5-2 provide a direct "normalized" measure of the priority of sampling each tank. For instance, the highest priority tank for sampling of solids is indicated by a priority value of 100, the highest priority tank for sampling of supernatant is indicated by a priority value of 100 in the "relative supernatant priority value" column, and so forth. These priority values are taken directly from the sampling basis document (Brown et al. 1998a) and they reflect the number of issues associated with each tank and the priority of those issues. It should be noted that sampling for solids (or supernatant, etc.) will not always proceed beginning with the tank with a value of 100 to be followed by the next highest tank in the column as discussed in Section 4.0 of this WIRD. Nevertheless, as tanks are sampled, the appropriate columns of Table 5-2 will be filled in for that tank. This provides a direct view of how well the characterization program is optimizing efforts through sampling tanks of high relative priority consistent with the constraints discussed in Section 4.0 of this WIRD.

Table 5-1a Summary of Sampling/Reporting by Issue

	Flammable Gas		Organic Fuel	Waste Feed Delivery [Phase I]	Privatization - DOE Mgmt of Contract(s) [Phase I]	W-320 Sluicing of tank 241-C-106 / High heat[1]	Dangerous Waste and Air Emissions		SST Waste Retrieval and Tank Closure[1,2]	Privatization - Provide Samples to Contractor(s) [Phase I][3]	Retrieval, Pretreatment, and Immobilization [Phase II][3]	Historical Model Evaluation	Compatibility (Interim Stab.)[3]	Evap.[3]	Caustic Mitigation[3]	Safety Screening [including criticality]
Sampling Needed:	Cond.	Vapor[3,4]	Cond.	Cond.	Cond.	Cond.	Cond.	Vapor[3]	Cond.	Cond.	Cond.	Cond.	Cond.	Cond.	Cond.	Cond.
Total Tank Samplings Needed for Issue[5]	0	46	0	10	4	1	19	11	2	7	18	Opport.	5	Oper.	Oper.	Opport.
Milestone Due Date (FY)	1998	N/A	1998	2003	2002	1998	N/A[6]	N/A[6]	2002	2003	2004	N/A	1999	N/A	N/A	N/A
Tanks FY1999	0	46	0	3	2	1	5	3	1	2	3	Opport.	5	Oper.	Oper.	Opport.
Total Tanks Scheduled FY1999																
Total Tanks Sampled FY1999																
Tanks FY2000	-	46	-	3	1	-	5	3	1	2	4	Opport.	-	Oper.	Oper.	Opport.
Tanks FY2001	-	46	-	2	1	-	5	3	-	2	4	Opport.	-	Oper.	Oper.	Opport.
Tanks FY2002	-	46	-	2	-	-	4	2	-	1	4	Opport.	-	Oper.	Oper.	Opport.
Tanks FY2003	-	46	-	-	-	-	-	-	-	-	3	Opport.	-	Oper.	Oper.	Opport.

Table 5-1a Summary of Sampling/Reporting by Issue

	Flammable Gas		Organic Fuel	Waste Feed Delivery [Phase I]	Privatization - DOE Mgmt of Contract(s) [Phase I]	W-320 Sluicing of tank 241-C-106 / High heat[1]	Dangerous Waste and Air Emissions		SST Waste Retrieval and Tank Closure[1,2]	Privatization - Provide Samples to Contractor(s) [Phase I][3]	Retrieval, Pretreatment, and Immobili-zation [Phase II][3]	Historical Model Evaluation	Compati-bility (Interim Stab.)[3]	Evap.[3]	Caustic Mitigation[3]	Safety Screening [including criticality]
TCRs Planned FY1999 From FY1999 Sampling[7]	0	-	0	1	1	0	1	-	1	-	-	1	-	-	-	2
TCRs Planned FY1999 From FY1998 Sampling	3	-	2	0	0	0	0	-	0	-	-	1	-	-	-	7
TCRs Planned FY1999 From Archive	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-
Total TCRs Planned FY1999	3	-	2	4	1	0	1	-	1	-	-	2	-	-	-	9
Total TCRs Scheduled																
Total TCRs Issued																

Notes:

Archive = Have data or will get data from archive sample, Cond. = Condensed, N/A = Not Applicable, Oper. = Operations Driver, Opport. = Opportunistic

1. Tank sampling is based on tank 241-C-106 sluicing.
2. Completion of sampling for this issue requires LDUA deployment in 241-AX-104
3. TCRs are not required for this issue.
4. All 46 tanks are vapor sampled every year on a quarterly basis.
5. Needs for each program may change over time.
6. For projection purposes, the same milestone due date as Waste Feed Delivery is assumed.
7. TCRs for FY1999 from FY1999 sampling are calculated by assuming 9 months for TCR production., after tank is sampled.

Table 5-1b Total Sampling/Reporting (minimum)

Total Tanks Sampled	FY1999	14
	FY2000	9
	FY2001	9
	FY2002	8
	FY2003	3
Total TCRs	FY1999	17

Note: Totals in table do not necessarily equal the sum of tanks in Table 5-1a because sampling of a tank may address more than one issue, likewise a TCR may address more than one issue.

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
SY-101	100	0	74	0																
AZ-102	96	19	100	0																
SY-103	67	0	74	0																
C-104	57	0	0	0																
S-102	45	0	74	44																
U-109	45	0	74	0																
AZ-101	45	100	100	0																
S-111	40	0	74	44																
AN-107	16	64	100	23																
AW-101	16	64	100	44																
AN-105	16	31	100	77																
AN-103	16	19	100	44																
AN-104	16	19	100	44																
AN-102	16	12	0	23																
AX-104	13	0	0	0																
C-106	13	0	74	0																
SX-101	7	0	74	44																
SX-104	7	0	74	44																
TX-118	6	0	0	0																
SX-103	6	0	74	44																
TX-113	6	0	0	0																
TX-116	6	0	0	0																
TX-105	5	0	0	0																
TX-110	5	0	0	0																
TX-115	5	0	0	0																
SX-114	5	0	0	0																
S-110	5	0	0	0																
SX-107	5	0	0	0																
SX-110	5	0	0	0																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
SX-111	5	0	0	0																
SX-112	5	0	0	0																
TY-105	4	0	0	0																
BY-105	4	0	74	44																
SX-109	4	0	74	0																
TX-106	4	0	0	0																
C-102	1	0	0	0																
TX-111	1	0	0	0																
AY-101	0	0	0	23																
AY-102	0	43	100	44																
AP-102	0	19	26	0																
AP-104	0	19	26	100																
SY-102	0	19	100	44																
244-A	0	0	74	0																
244-BX	0	0	74	0																
244-S	0	0	74	0																
244-TX	0	0	74	0																
244-U	0	0	0	0																
A-101	0	0	74	44																
A-102	0	0	0	0																
A-103	0	0	0	0																
A-104	0	0	0	0																
A-105	0	0	0	0																
A-106	0	0	0	0																
AN-101	0	0	74	44																
AN-106	0	0	0	0																
AP-101	0	0	0	44																
AP-103	0	0	0	44																
AP-105	0	0	0	44																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
AP-106	0	0	0	44																
AP-107	0	0	0	100																
AP-108	0	0	0	44																
AW-102	0	0	0	77																
AW-103	0	0	0	0																
AW-104	0	0	0	77																
AW-105	0	0	0	44																
AW-106	0	0	0	44																
AX-101	0	0	74	44																
AX-102	0	0	0	0																
AX-103	0	0	74	0																
B-101	0	0	0	0																
B-102	0	0	0	0																
B-103	0	0	0	0																
B-104	0	0	0	0																
B-105	0	0	0	0																
B-106	0	0	0	0																
B-107	0	0	0	0																
B-108	0	0	0	0																
B-109	0	0	0	0																
B-110	0	0	0	0																
B-111	0	0	0	0																
B-112	0	0	0	0																
B-201	0	0	0	0																
B-202	0	0	0	0																
B-203	0	0	0	0																
B-204	0	0	0	0																
BX-101	0	0	0	0																
BX-102	0	0	0	0																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
BX-103	0	0	0	0																
BX-104	0	0	0	0																
BX-105	0	0	0	0																
BX-106	0	0	0	0																
BX-107	0	0	0	0																
BX-108	0	0	0	0																
BX-109	0	0	0	0																
BX-110	0	0	0	0																
BX-111	0	0	0	0																
BX-112	0	0	0	0																
BY-101	0	0	0	0																
BY-102	0	0	0	0																
BY-103	0	0	74	0																
BY-104	0	0	0	0																
BY-106	0	0	74	44																
BY-107	0	0	0	0																
BY-108	0	0	0	0																
BY-109	0	0	74	0																
BY-110	0	0	0	0																
BY-111	0	0	0	0																
BY-112	0	0	0	0																
C-101	0	0	0	0																
C-103	0	0	0	44																
C-105	0	0	0	0																
C-107	0	0	0	0																
C-108	0	0	0	0																
C-109	0	0	0	0																
C-110	0	0	0	0																
C-111	0	0	0	0																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
C-112	0	0	0	0																
C-201	0	0	0	0																
C-202	0	0	0	0																
C-203	0	0	0	0																
C-204	0	0	0	0																
S-101	0	0	74	44																
S-103	0	0	0	44																
S-104	0	0	0	0																
S-105	0	0	0	0																
S-106	0	0	74	44																
S-107	0	0	74	44																
S-108	0	0	0	0																
S-109	0	0	74	44																
S-112	0	0	74	44																
SX-102	0	0	74	44																
SX-105	0	0	74	44																
SX-106	0	0	74	44																
SX-108	0	0	0	0																
SX-113	0	0	0	0																
SX-115	0	0	0	0																
T-101	0	0	0	0																
T-102	0	0	0	0																
T-103	0	0	0	0																
T-104	0	0	0	0																
T-105	0	0	0	0																
T-106	0	0	0	0																
T-107	0	0	0	0																
T-108	0	0	0	0																
T-109	0	0	0	0																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
T-110	0	0	74	44																
T-111	0	0	0	0																
T-112	0	0	0	0																
T-201	0	0	0	0																
T-202	0	0	0	0																
T-203	0	0	0	0																
T-204	0	0	0	0																
TX-101	0	0	0	0																
TX-102	0	0	0	0																
TX-103	0	0	0	0																
TX-104	0	0	0	0																
TX-107	0	0	0	0																
TX-108	0	0	0	0																
TX-109	0	0	0	0																
TX-112	0	0	0	0																
TX-114	0	0	0	0																
TX-117	0	0	0	0																
TY-101	0	0	0	0																
TY-102	0	0	0	0																
TY-103	0	0	0	0																
TY-104	0	0	0	0																
TY-106	0	0	0	0																
U-101	0	0	0	0																
U-102	0	0	74	44																
U-103	0	0	74	44																
U-104	0	0	0	0																
U-105	0	0	74	0																
U-106	0	0	0	0																
U-107	0	0	74	44																

Table 5-2. Tank List With Associated Sampling Priority Values. (7 Sheets)

Tanks	Solids Value	Supernatant Value	Vapor Value	Operations Value[1]	FY99 First Quarter				FY99 Second Quarter				FY99 Third Quarter				FY99 Fourth Quarter			
					Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops	Sol	Sup	Vap	Ops
U-108	0	0	74	44																
U-110	0	0	0	0																
U-111	0	0	0	44																
U-112	0	0	0	0																
U-201	0	0	0	0																
U-202	0	0	0	0																
U-203	0	0	0	0																
U-204	0	0	0	0																

Note:

[1] Operations activities usually require grab samples for supernatant, however if solid sampling retrieves supernatant, it may be used in place of a grab sample.

6.0 DESCRIPTION OF DELIVERABLES AND ACCEPTANCE CRITERIA

Characterization Project deliverables that support the milestones listed in the tables of Section 2.0 are associated with the completion of a significant scope of work. The primary focus in acquiring characterization information for safety, disposal, and TWRS operations functions is to sample tanks, analyze samples, and interpret data obtained. Deliverables for the Washington State Department of Ecology are described below. These include reporting of sampling activity status on a quarterly basis, tank characterization reports, the WIRD, and the characterization deliverables year end report.

6.1 CHARACTERIZATION PROJECT SAMPLING ACTIVITIES

This section outlines the types of sampling performed by the Characterization Project.

6.1.1 Core Sampling

Core sampling provides a sample that represents the entire waste depth, regardless of whether the waste is in the liquid or solid phase. Core sampling may be performed in push mode or rotary mode. At this time, the RGS may only be used in push mode core sampling.

6.1.2 Grab Sampling

Grab sampling is used to take a liquid sample or a sample of salt or sludge solids that are suspended in a slurry in liquid. Grab sampling can take liquid samples from the surface of the tank or below the surface as long as there is no solid layer to obstruct the sampler.

Grab samples are used to satisfy requirements of the operations issues, particularly waste compatibility, evaporator operations, and caustic mitigation. Grab samples may also be used to provide privatization LAW samples to the private vendors. When no solid waste layers are expected, grab samples may be used to satisfy other sampling requirements.

6.1.3 Auger Sampling

Auger sampling involves manually drilling an auger into the waste surface to obtain a sample from the top of the waste (usually the top 25 to 30 inches). Auger sampling is not effective in dry, crumbly waste because the sample will not adhere to the auger or in liquids.

6.1.4 Vapor Sampling

Vapor sampling is used to take a gas sample from inside the tank dome, above the surface of the solid or liquid waste. Past vapor sampling has used both the vapor sampling system (VSS) and the in-situ vapor sampling (ISVS). Future vapor sampling will use only the ISVS.

Vapor samples are used to satisfy requirements of the organic solvent safety issue and vapor space phenomenology studies. Vapor samples must also be taken for each tank that requires rotary-mode core sampling before core sampling. Vapor samples in rotary-mode tanks are taken to meet requirements outlined in the air emissions regulatory DQO.

6.2 TANK CHARACTERIZATION REPORTS

A TCR has two primary functions. The first function is to report the results of the characterization performed for the DQO requirements. The DQOs represent the current tank characterization needs of the TWRS programs. The second function is to report the Characterization Project's "Best-Basis" evaluation of the inventory of chemical and radionuclide constituents within the waste. The TCR reports tank waste inventory by including the Best-Basis inventory reports as an Appendix to the TCR.

Information in TCRs shall be placed into an electronic database accessible to Ecology within seven business days after completion of the Laboratory Analysis Report (for analytical data). TCRs shall use standardized formats for tables and figures. Standardized text shall be used to the greatest possible extent. A standard electronic template shall be used to prepare TCRs to enable consistent and controlled format and content to the extent possible.

6.3 ACCEPTANCE CRITERIA FOR ECOLOGY DELIVERABLES

6.3.1 Waste Information Requirements Document

The TWRS information needs shall be defined in a Waste Information Requirements Document (WIRD) to be submitted annually to Ecology. The document shall identify characterization deliverables to support safe storage, retrieval, and disposal of tank waste. The WIRD shall identify the tank waste behavior information needs. The WIRD shall describe characterization deliverables to be issued based on existing Tri-Party Agreement milestones.

When other TWRS program related tank waste characterization Tri-Party Agreement milestones are revised or modified via the Tri-Party Agreement change control process, the appropriate changes will be reflected in subsequent quarterly reports.

That portion of the WIRD that identifies tank waste characterization activities outside of the scope of the Tri-Party Agreement (that is U.S. Department of Energy Secretarial Initiatives, DNFSB Milestones, etc.) shall not be subject to Ecology approval or concurrence, but shall be included for informational purposes only.

The draft WIRD shall be submitted to Ecology on or before June 30 of each year. Ecology shall provide comments within 30 days after submittal. The final WIRD shall be submitted to Ecology on or before August 31 of each year. If the parties do not agree on any individual deliverable, then Ecology shall issue a final decision no later than September 30 of that year for the scope of the deliverable. U.S. Department of Energy, Richland Operations Office (DOE-RL) shall implement the final decision of Ecology. If DOE-RL disputes the final decision, Ecology's final decision shall be implemented during the dispute resolution process.

Each year the WIRD submittal to Ecology shall include an end of the fiscal year progress summary report. Only those milestones listed in Tables 2-1 and 2-2 of this WIRD that are also contained in milestone description sheets in the Characterization Project Multi-Year Work Plan are considered to be commitments used to determine an acceptable level of performance.

6.3.2 Quarterly Reports

Quarterly reports will be provided to DOE and Ecology to provide status on characterization progress. The quarterly reports will include use of the measures of progress described in Section 5.0 of this WIRD. In general, the quarterly reports will consist of the following elements:

- Use of Table 5-1 to view a summary of planned, scheduled, and actual numbers of tanks sampled and TCRs produced.

- Use of Table 5-2 to indicate and discuss the tanks sampled by priority value. This provides a direct indication of the priority of each tank sampled by each method.

- A list and discussion of the milestones met by reference to Tables 2-1 and 2-2. Progress against milestones will also be discussed for milestones in progress as appropriate.

- Other information and discussion as deemed appropriate to report characterization status and progress.

6.3.3 Characterization Deliverables Report

Each fiscal year, a summary report reflecting characterization deliverables identified in the most current version of WIRD is provided to report the extent to which deliverables were completed. The report also identifies specific issues and/or tanks to which the deliverables are applied. The annual report will rely, in part, upon the performance measures discussed in Section 5.0 of this WIRD and will build upon information provided in quarterly reports (see Section 6.3.2). The next report (for FY 1998) is due to Ecology September 30, 1998 (M-44-15B) as defined in the Milestone Description Sheet (T01-98-169).

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APPENDIX A

MILESTONE LIST: TRI-PARTY AGREEMENT AND DNFSB MILESTONES

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Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-40-00	MITIGATE/RESOLVE TANK SAFETY ISSUES FOR HIGH PRIORITY WATCH LIST TANKS.	09/30/01	
M-40-09	CLOSE ALL UNREVIEWED SAFETY QUESTIONS FOR DOUBLE-SHELL & SINGLE-SHELL TANKS.	09/30/98	
M-40-12	RESOLVE NUCLEAR CRITICALITY SAFETY ISSUE	09/30/99	
M-41-00	COMPLETE SINGLE-SHELL TANK INTERIM STABILIZATION.	09/30/00	
M-41-22	START INTERIM STABILIZATION OF SIX (6) SINGLE-SHELL TANKS.	09/30/97	Added by Change Request 41-96-02
M-41-23	START INTERIM STABILIZATION OF EIGHT (8) SINGLE-SHELL TANKS.	03/31/98	Added by Change Request 41-96-02
M-41-24	START INTERIM STABILIZATION OF NINE (9) SINGLE-SHELL TANKS.	09/30/98	Added by Change Request 41-96-02
M-41-25	START INTERIM STABILIZATION OF THREE (3) SINGLE-SHELL TANKS.	03/31/99	Added by Change Request 41-96-02
M-41-26	START INTERIM STABILIZATION OF TWO (2) SINGLE-SHELL TANKS.	09/30/99	Added by Change Request 41-96-02
M-41-27	COMPLETE SALTWELL PUMPING OF SINGLE-SHELL TANKS.	09/30/00	Added by Change Request 41-96-02
M-41-27-T03	COMPLETE SALTWELL PUMPING OF FIVE (5)SINGLE-SHELL TANKS.	09/30/98	Added by Change Request 41-96-02
M-41-27-T04	COMPLETE SALTWELL PUMPING OF EIGHT (8)SINGLE-SHELL TANKS.	09/30/99	Added by Change Request 41-96-02
M-41-27-T05	COMPLETE SALTWELL PUMPING OF SIXTEEN (16) SINGLE-SHELL TANKS.	09/30/00	Added by Change Request 41-96-02
M-43-00	COMPLETE TANK FARM UPGRADES.	06/30/05	
M-43-01	COMPLETE PROJECT W-030 TANK FARM VENTILATION UPGRADES.	03/31/98	Due date changed to 3/31/98 per Change Request 43-97-04
M-43-01C	BEGIN OPERATION FOR W-030, TANK FARM VENTILATION UPGRADES.	03/31/98	Due date changed to 3/31/98 per Change Request 43-97-04

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-43-07	COMPLETE PROJECT W-058 REPLACEMENT OF CROSS-SITE TRANSFER SYSTEM.	05/31/98	Due date changed to 5/31/98 per Change Request 43-98-01
M-43-07C	CROSS SITE TRANSFER SYSTEM OPERATIONAL.	05/31/98	Due date changed to 5/31/98 per Change Request 43-98-01
M-43-11	PROVIDE W-314 CONSTRUCTION SCHEDULE TO ECOLOGY	09/30/98	
M-43-12	START CONSTRUCTION FOR UPGRADES IN THE FIRST TANK FARM.	06/30/99	
M-43-13	START CONSTRUCTION FOR UPGRADES IN THE SECOND TANK FARM.	06/30/00	
M-43-14	START CONSTRUCTION FOR UPGRADES IN THE THIRD TANK FARM.	03/31/01	
M-43-15	START CONSTRUCTION FOR UPGRADES IN THE FOURTH TANK FARM.	03/31/02	
M-43-16	START CONSTRUCTION FOR UPGRADES IN THE FIFTH TANK FARM.	06/30/03	
M-44-00A	COMPLETE DELIVERY OF INFORMATION REQUIREMENTS AS IDENTIFIED IN THE ANNUALLY SUBMITTED WIRD.	09/30/02	Added by Change Request 44-97-03
M-44-13B	SUBMIT DRAFT WIRD TO ECOLOGY FOR FY1999. ECOLOGY WILL PROVIDE COMMENTS WITHIN 30 DAYS AFTER SUBMITTAL.	06/30/98	Added by Change Request 44-97-03
M-44-13C	SUBMIT DRAFT WIRD TO ECOLOGY FOR FY2000. ECOLOGY WILL PROVIDE COMMENTS WITHIN 30 DAYS AFTER SUBMITTAL.	06/30/99	Added by Change Request 44-97-03
M-44-13D	SUBMIT DRAFT WIRD TO ECOLOGY FOR FY2001. ECOLOGY WILL PROVIDE COMMENTS WITHIN 30 DAYS AFTER SUBMITTAL.	06/30/00	Added by Change Request 44-97-03

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-44-13E	SUBMIT DRAFT WIRD TO ECOLOGY FOR FY2002. ECOLOGY WILL PROVIDE COMMENTS WITHIN 30 DAYS AFTER SUBMITTAL.	06/30/01	Added by Change Request 44-97-03
M-44-14B	SUBMIT FINAL WIRD FOR FY1999 TO ECOLOGY. IF THE 3 PARTIES DO NOT AGREE ON ANY INDIVIDUAL DELIVERABLE THEN ECOLOGY WILL ISSUE A FINAL DECISION NO LATER THAN 9/30 OF THAT YEAR FOR THE SCOPE OF THE DELIVERABLE. RL WILL IMPLEMENT THE FINAL DECISION BY ECOLOGY. IF RL DISPUTES THE FINAL DECISION, ECOLOGY'S FINAL DECISION WILL BE IMPLEMENTED DURING THE DISPUTE RESOLUTION PROCESS.	08/31/98	Added by Change Request 44-97-03
M-44-14C	SUBMIT FINAL WIRD FOR FY2000 TO ECOLOGY. IF THE 3 PARTIES DO NOT AGREE ON ANY INDIVIDUAL DELIVERABLE THEN ECOLOGY WILL ISSUE A FINAL DECISION NO LATER THAN 9/30 OF THAT YEAR FOR THE SCOPE OF THE DELIVERABLE. RL WILL IMPLEMENT THE FINAL DECISION BY ECOLOGY. IF RL DISPUTES THE FINAL DECISION, ECOLOGY'S FINAL DECISION WILL BE IMPLEMENTED DURING THE DISPUTE RESOLUTION PROCESS.	08/31/99	Added by Change Request 44-97-03

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-44-14D	SUBMIT FINAL WIRD FOR FY2001 TO ECOLOGY. IF THE 3 PARTIES DO NOT AGREE ON ANY INDIVIDUAL DELIVERABLE THEN ECOLOGY WILL ISSUE A FINAL DECISION NO LATER THAN 9/30 OF THAT YEAR FOR THE SCOPE OF THE DELIVERABLE. RL WILL IMPLEMENT THE FINAL DECISION BY ECOLOGY. IF RL DISPUTES THE FINAL DECISION, ECOLOGY'S FINAL DECISION WILL BE IMPLEMENTED DURING THE DISPUTE RESOLUTION PROCESS.	08/31/00	Added by Change Request 44-97-03
M-44-14E	SUBMIT FINAL WIRD FOR FY2002 TO ECOLOGY. IF THE 3 PARTIES DO NOT AGREE ON ANY INDIVIDUAL DELIVERABLE THEN ECOLOGY WILL ISSUE A FINAL DECISION NO LATER THAN 9/30 OF THAT YEAR FOR THE SCOPE OF THE DELIVERABLE. RL WILL IMPLEMENT THE FINAL DECISION BY ECOLOGY. IF RL DISPUTES THE FINAL DECISION, ECOLOGY'S FINAL DECISION WILL BE IMPLEMENTED DURING THE DISPUTE RESOLUTION PROCESS.	08/31/01	Added by Change Request 44-97-03
M-44-15B	ISSUE CHARACTERIZATION DELIVERABLES CONSISTENT WITH WIRD DEVELOPED FOR FY1998.	09/30/98	Added by Change Request 44-97-03
M-44-15C	ISSUE CHARACTERIZATION DELIVERABLES CONSISTENT WITH WIRD DEVELOPED FOR FY1999.	09/30/99	Added by Change Request 44-97-03
M-44-15D	ISSUE CHARACTERIZATION DELIVERABLES CONSISTENT WITH WIRD DEVELOPED FOR FY2000.	09/30/00	Added by Change Request 44-97-03
M-44-15E	ISSUE CHARACTERIZATION DELIVERABLES CONSISTENT WITH WIRD DEVELOPED FOR FY2001.	09/30/01	Added by Change Request 44-97-03

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-44-15F	ISSUE CHARACTERIZATION DELIVERABLES CONSISTENT WITH WIRD DEVELOPED FOR FY2002.	09/30/02	Added by Change Request 44-97-03
M-44-16B	COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR HLW TANKS FOR WHICH SAMPLING AND ANALYSIS WERE COMPLETED PER THE FY1998 WIRD INTO ELECTRONIC DATABASE. OFF-SITE ACCESS TO THE DATABASE CONTAINING INFORMATION WILL BE MADE AVAILABLE TO ECOLOGY AND EPA.	09/30/98	Added by Change Request 44-97-03
M-44-16C	COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR HLW TANKS FOR WHICH SAMPLING AND ANALYSIS WERE COMPLETED PER THE FY1999 WIRD INTO ELECTRONIC DATABASE. OFF-SITE ACCESS TO THE DATABASE CONTAINING INFORMATION WILL BE MADE AVAILABLE TO ECOLOGY AND EPA.	09/30/99	Added by Change Request 44-97-03
M-44-16D	COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR HLW TANKS FOR WHICH SAMPLING AND ANALYSIS WERE COMPLETED PER THE FY2000 WIRD INTO ELECTRONIC DATABASE. OFF-SITE ACCESS TO THE DATABASE CONTAINING INFORMATION WILL BE MADE AVAILABLE TO ECOLOGY AND EPA.	09/30/00	Added by Change Request 44-97-03

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-44-16E	COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR HLW TANKS FOR WHICH SAMPLING AND ANALYSIS WERE COMPLETED PER THE FY2001 WIRD INTO ELECTRONIC DATABASE. OFF-SITE ACCESS TO THE DATABASE CONTAINING INFORMATION WILL BE MADE AVAILABLE TO ECOLOGY AND EPA.	09/30/01	Added by Change Request 44-97-03
M-44-16F	COMPLETE INPUT OF CHARACTERIZATION INFORMATION FOR HLW TANKS FOR WHICH SAMPLING AND ANALYSIS WERE COMPLETED PER THE FY2002 WIRD INTO ELECTRONIC DATABASE. OFF-SITE ACCESS TO THE DATABASE CONTAINING INFORMATION WILL BE MADE AVAILABLE TO ECOLOGY AND EPA.	09/30/02	Added by Change Request 44-97-03
M-45-00	COMPLETE CLOSURE OF ALL SST FARMS.	09/30/24	
M-45-02C	SUBMIT ANNUAL UPDATE OF SST RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.	09/30/98	
M-45-02D	SUBMIT ANNUAL UPDATE OF SST RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.	09/30/99	
M-45-02E	SUBMIT ANNUAL UPDATE OF SST RETRIEVAL SEQUENCE DOCUMENT.	09/30/00	
M-45-02F	SUBMIT ANNUAL UPDATE OF SST RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.	09/30/01	
M-45-02G	SUBMIT ANNUAL UPDATE OF SST RETRIEVAL SEQUENCE DOCUMENT FOR ECOLOGY APPROVAL.	09/30/02	
M-45-03A	INITIATE SLUICING RETRIEVAL OF C-106.	10/31/97	

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-45-03-T01	COMPLETE SST WASTE RETRIEVAL DEMONSTRATION.	09/30/03	
M-45-03-T02	INITIATE FINAL RETRIEVAL DEMONSTRATION OF C-106.	06/30/02	
M-45-04-T02	COMPLETE DESIGN FOR THE INITIAL SST RETRIEVAL SYSTEMS.	12/31/00	
M-45-05	RETRIEVE WASTE FROM ALL REMAINING SSTs	09/30/18	
M-45-06-T01	SUBMIT TANK CLOSURE/POST-CLOSURE PLAN FOR SELECTED CLOSURE DEMONSTRATION OPERABLE UNIT OR TANK FARM TO ECOLOGY FOR APPROVAL.	11/30/04	
M-45-06-T02	ECOLOGY WILL ISSUE FINAL CLOSURE/POST CLOSURE PLAN FOR SELECTED CLOSURE DEMONSTRATION OPERABLE UNIT OR TANK FARM.	09/30/06	
M-45-06-T03	INITIATE CLOSURE ACTIONS ON AN OPERABLE UNIT OR TANK FARM BASIS. CLOSURE SHALL FOLLOW COMPLETION OF THE RETRIEVAL ACTIONS UNDER PROPOSED MILESTONE M-45-05. CLOSURE WILL BE DEFINED IN AN APPROVED CLOSURE PLAN FOR THE DEMONSTRATION FARM. FINAL CLOSURE IS DEFINED AS REGULATORY APPROVAL OF COMPLETION OF CLOSURE ACTIONS.	03/31/12	
M-45-06-T04	COMPLETE CLOSURE ACTIONS ON ONE OPERABLE UNIT OR TANK FARM	03/31/14	
M-50-00	COMPLETE PRETREATMENT PROCESSING OF HANFORD TANK WASTE.	12/31/28	
M-50-01	START CONSTRUCTION OF LLW PRETREATMENT FACILITY.	11/30/98	Deleted

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-50-03	COMPLETE EVALUATION OF ENHANCED SLUDGE WASHING TO DETERMINE WHETHER ADVANCED SLUDGE SEPARATION PROCESSES ARE REQUIRED.	03/31/98	
M-50-04	START HOT OPERATIONS OF HLW PRETREATMENT FACILITY.	06/30/08	
M-50-04-T01	SUBMIT CONCEPTUAL DESIGN OF HLW PRETREATMENT FACILITY.	03/31/98	
M-50-04-T02	INITIATE DEFINITIVE DESIGN OF HLW PRETREATMENT FACILITY.	11/30/98	
M-50-04-T03	START CONSTRUCTION OF HLW PRETREATMENT FACILITY.	06/30/01	
M-51-00	COMPLETE VITRIFICATION OF HANFORD HIGH LEVEL TANK WASTE.	12/31/28	
M-51-02	COMPLETE MELTER TESTS AND SELECT REFERENCE MELTER.	09/30/98	
M-51-03	INITIATE HOT OPERATIONS OF THE HLW VITRIFICATION FACILITY.	12/31/09	
M-51-03-T01	SUBMIT CONCEPTUAL DESIGN OF HLW VITRIFICATION FACILITY.	09/30/98	
M-51-03-T02	INITIATE DEFINITIVE DESIGN OF THE HLW VITRIFICATION FACILITY.	12/31/98	
M-51-03-T03	INITIATE CONSTRUCTION OF THE HLW VITRIFICATION FACILITY.	06/30/02	

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-51-04A-T01	SUBMIT TO ECOLOGY A DOE APPROVED DQO(s) THAT HAS BEEN DEVELOPED AND/OR REVISED WITH ECOLOGY'S ACTIVE PARTICIPATION, FOR HLW FEED STAGING BASED UPON AVAILABLE INFORMATION, THAT IDENTIFY THE TANK WASTE CHARACTERIZATION INFORMATION NEEDS, IN SUPPORT OF THE TWRS PRIVATIZATION PHASE I CONTRACT(S). ECOLOGY WILL ACCEPT OR REJECT THE DQO FOR M-51-04A-T01 WITHIN ONE MONTH OF THE FINAL DQO BEING APPROVED AND SUBMITTED TO DOE.	05/31/98	Added by Change Request 51-97-01
M-51-04B-T01	SUBMIT TO ECOLOGY A DOE APPROVED DQO(s) THAT HAS BEEN DEVELOPED AND/OR REVISED WITH ECOLOGY'S ACTIVE PARTICIPATION, FOR HLW FEED STAGING BASED UPON AVAILABLE INFORMATION, THAT IDENTIFY THE TANK WASTE CHARACTERIZATION INFORMATION NEEDS, IN SUPPORT OF THE TWRS PRIVATIZATION PHASE II CONTRACT(S). ECOLOGY WILL ACCEPT OR REJECT THE DQO FOR M-51-04B-T01 WITHIN ONE MONTH OF THE FINAL DQO BEING APPROVED AND SUBMITTED TO DOE.	05/31/99	Added by Change Request 51-97-01
M-60-00	COMPLETE PRETREATMENT AND IMMOBILIZATION OF HANFORD LOW ACTIVITY TANK WASTE (LAW).	12/31/24	Changed title and date by Change Request 60-95-03
M-60-04	INITIATE CONSTRUCTION OF THE LLW VITRIFICATION FACILITY.	12/31/97	Deleted

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-60-10	SELECT TWO (2) COCO CONTRACTORS AND ISSUE AUTHORIZATION TO PROCEED WITH PART B WORK FOR LAW PRETREATMENT AND IMMOBILIZATION.	07/31/98	Added by Change Request 60-95-03
M-60-11	START OF CONSTRUCTION FOR TWO (2) PHASE I LAW PRETREATMENT AND IMMOBILIZATION FACILITIES.	30 DAYS FROM M-60-10	Added by Change Request 60-95-03
M-60-12	START OF HOT OPERATIONS OF TWO (2) COCO PHASE I LAW PRETREATMENT AND IMMOBILIZATION FACILITIES.	12/31/02	Added by Change Request 60-95-03
M-60-13	INITIATE NEGOTIATIONS ON PHASE 2 LAW PRETREATMENT AND IMMOBILIZATION MILESTONE. THE PARTIES ANTICIPATE COMPLETION OF THESE NEGOTIATIONS WITHIN 6 MONTHS.	12/31/03	Added by Change Request 60-95-03
M-60-15-T01	SUBMIT TO ECOLOGY A DOE APPROVED DQO(s) THAT HAS BEEN DEVELOPED AND/OR REVISED WITH ECOLOGY'S ACTIVE PARTICIPATION, FOR LAW FEED STAGING BASED UPON AVAILABLE INFORMATION, THAT IDENTIFY THE TANK WASTE CHARACTERIZATION INFORMATION NEEDS, IN SUPPORT OF THE TWRS PRIVATIZATION PHASE I CONTRACT(S). ECOLOGY WILL ACCEPT OR REJECT THE DQO FOR M-60-15-T01 WITHIN ONE MONTH OF THE FINAL DQO BEING APPROVED AND SUBMITTED TO DOE.	05/31/98	Added by Change Request 60-97-01

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-60-16-T01	SUBMIT TO ECOLOGY A DOE APPROVED DQO(s) THAT HAS BEEN DEVELOPED AND/OR REVISED WITH ECOLOGY'S ACTIVE PARTICIPATION, FOR LAW FEED STAGING BASED UPON AVAILABLE INFORMATION, THAT IDENTIFY THE TANK WASTE CHARACTERIZATION INFORMATION NEEDS, IN SUPPORT OF THE TWRS PRIVATIZATION PHASE II CONTRACT(S). ECOLOGY WILL ACCEPT OR REJECT THE DQO FOR M-60-16-T01 WITHIN ONE MONTH OF THE FINAL DQO BEING APPROVED AND SUBMITTED TO DOE.	09/30/98	Added by Change Request 60-97-01
M-61-00	COMPLETE PRETREATMENT AND IMMOBILIZATION OF HANFORD LOW ACTIVITY TANK WASTE (LAW).	12/31/28	Added by Change Request 60-95-03
M-61-01	START CONSTRUCTION OF PHASE 1 LAW PRETREATMENT AND IMMOBILIZATION FACILITY.	TBD	Added by Change Request 60-95-03
M-61-02	INITIATE HOT OPERATIONS OF PHASE 1 LAW PRETREATMENT AND IMMOBILIZATION FACILITY.	12/31/03	Added by Change Request 60-95-03
M-61-03	INITIATE NEGOTIATIONS ON PHASE 2 LAW PRETREATMENT AND IMMOBILIZATION MILESTONE. THE PARTIES ANTICIPATE COMPLETION OF THESE NEGOTIATIONS WITHIN 6 MONTHS.	12/31/04	Added by Change Request 60-95-03
M-90-00	COMPLETE ACQUISITION OF NEW FACILITIES, MODIFICATION OF EXISTING FACILITIES, AND/OR MODIFICATION OF PLANNED FACILITIES AS NECESSARY FOR STORAGE OF HANFORD SITE IHLW AND ILAW, AND DISPOSAL OF ILAW.	TBD	Added by Change Request 90-96-01

Table A-1. Applicable TPA Milestones. (13 Sheets)

Milestone Number	Title	Due Date	Comments
M-90-01	SUBMIT INTERIM STORAGE AND DISPOSAL ILAW AND INTERIM STORAGE IHLW PROJECT MANAGEMENT PLANS TO ECOLOGY PURSUANT TO AGREEMENT SECTION 11.5.	12/31/97	Added by Change Request 90-96-01
M-90-02-T01	COMPLETE ILAW INTERIM STORAGE FACILITY CONCEPTUAL DESIGN.	06/30/98	Added by Change Request 90-96-01
M-90-03	INITIATE ILAW INTERIM STORAGE FACILITY CONSTRUCTION.	06/30/01	Added by Change Request 90-96-01
M-90-04-T01	COMPLETE ILAW INTERIM STORAGE FACILITY DETAILED DESIGN.	06/30/01	Added by Change Request 90-96-01
M-90-05-T01	SUBMIT ILAW DISPOSAL FACILITY PERFORMANCE ASSESSMENT TO ECOLOGY FOR REVIEW.	12/31/01	Added by Change Request 90-96-01
M-90-06	INITIATE HOT OPERATIONS OF ILAW INTERIM STORAGE FACILITY.	12/31/02	Added by Change Request 90-96-01
M-90-07-T01	COMPLETE ILAW DISPOSAL FACILITY CONCEPTUAL DESIGN.	06/30/00	Added by Change Request 90-96-01
M-90-08	INITIATE ILAW DISPOSAL FACILITY CONSTRUCTION.	06/30/03	Added by Change Request 90-96-01
M-90-09-T01	COMPLETE ILAW DISPOSAL FACILITY DETAILED DESIGN.	03/31/03	Added by Change Request 90-96-01
M-90-10	INITIATE HOT OPERATIONS - ILAW MODULE I.	12/31/05	Added by Change Request 90-96-01
M-90-11	COMPLETE CANISTER STORAGE FACILITY CONSTRUCTION.	12/31/02	Added by Change Request 90-96-01
M-90-12	SUBMIT REVISED CANISTER STORAGE FACILITY PART A DANGEROUS WASTE PERMIT APPLICATION TO ECOLOGY PURSUANT TO CHAPTER 173-303 WAC.	06/30/99	Added by Change Request 90-96-01

Table A-2. Applicable DNFSB Milestones. (2 Sheets)

Milestone Number	Milestone Title	Due Date
DNFSB 5.4.3.3.B	LETTER REPORTING RESULTS OF TESTING COMPLETION (USING REAL WASTE SAMPLES) TO CONFIRM SAFE STORAGE CRITERIA, AND ORGANIC SOLUBILITY AND AGING EFFECTS ON FUEL CONTENT. IF MODELS ARE CONFIRMED, AN ASSESSMENT OF TANK WASTES COMPARED TO SAFE STORAGE CRITERIA WILL BE SCHEDULED.	11/30/98
DNFSB 5.4.3.4.D	LETTER REPORTING COMPLETION OF VAPOR SAMPLING OF ALL SSTs.	12/31/99
DNFSB 5.4.3.4.E	LETTER REPORTING ADEQUATE VENT PATH IN ALL SST'S SUSPECTED OF CONTAINING ORGANIC SOLVENTS.	4/31/00
DNFSB 5.4.3.4.F	LETTER REPORTING COMPLETION OF VAPOR SAMPLING OF ALL DSTs	12/31/00
DNFSB 5.4.3.6.C	LETTER REPORTING INITIATION OF TANK C-106 WASTE RETRIEVAL TO DNFSB	10/31/97
DNFSB 5.4.3.6.D	LETTER REPORTING COMPLETION OF TOPICAL REPORT TO RESOLVE HIGH HEAT SAFETY ISSUE.	5/31/98
DNFSB 5.5.6.1.A	LETTER REPORT COMPLETION OF TANK WASTE CHARACTERIZATION BASIS (BROWN ET AL. 1995) HIGH PRIORITY TANKS SAMPLING AND ANALYSIS FOR THE DISPOSAL PROGRAM.	3/31/98
DNFSB 5.6.3.1.E	LETTER REPORTING VERIFICATION OF HEADSPACE HOMOGENEITY AND EVALUATION OF VARIATIONS IN HEADSPACE VAPOR CONCENTRATIONS IN PASSIVELY VENTILATED TANKS WITH CHANGING ATMOSPHERIC TEMPERATURES.	10/31/97
DNFSB 5.6.3.1.F	STANDARD INVENTORY ESTIMATES FOR ALL TANKS.	11/30/97
DNFSB 5.6.3.1.G	LETTER REPORT COMPLETION OF TANK WASTE CHARACTERIZATION BASIS (BROWN ET AL. 1995) HIGH PRIORITY TANKS SAMPLING AND ANALYSIS.	3/31/98

Table A-2. Applicable DNFSB Milestones. (2 Sheets)

Milestone Number	Milestone Title	Due Date
DNFSB 5.6.3.1.H	LETTER REPORTING COMPLETION OF TANK-BY-TANK SAFETY STATUS EVALUATION.	7/31/98
DNFSB 5.6.3.1.I	UPDATE TANK CONTENT MODELS OR DEFINE LIMITATIONS OF THE MODELS.	12/31/98
DNFSB 5.6.3.1.J	LETTER REPORTING COMPLETION OF CHARACTERIZATION OF ALL TANKS (ASSUMES NO REPEAT SAMPLING).	12/31/02

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