

**Department of Energy**  
Richland Operations Office  
P.O. Box 550  
Richland, Washington 99352

96-WSD-279

NOV 4 1996

Mr. John T. Conway, Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue N.W., Suite 700  
Washington, D.C. 20004

Dear Mr. Conway:

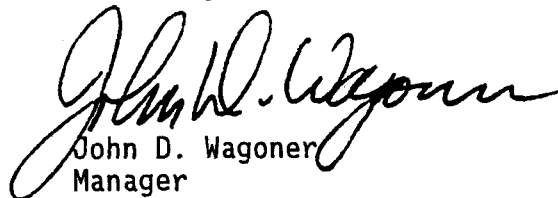
TRANSMITTAL OF THE DEFENSE NUCLEAR FACILITIES SAFETY BOARD (DNFSB)  
RECOMMENDATION 93-5 QUARTERLY REPORT FOR JULY 1, 1996, THROUGH SEPTEMBER 30,  
1996-

The DNFSB Recommendation 93-5 Quarterly Report for July through September 1996, is enclosed (Enclosure 1). This quarterly report addresses issues and milestones as presented in Revision 1 to the Recommendation 93-5 Implementation Plan.

As required by the Recommendation 93-5 Implementation Plan, Revision 1, Section 6.1, Enclosure 2 is Change 1 to the implementation plan. Change 1 documents the substitution of Tank 241-A-101 for 241-U-103 as a tank to be used for testing of the retained gas sampler (Milestone 5.4.3.5k). Since this is not a fundamental change to the plan's strategy or scope, it is being implemented through the enclosed quarterly report. More detail regarding this change is given in Section 3.2.5 of the enclosed quarterly report.

If you have any questions, please contact me or your staff may contact, Jackson Kinzer, Assistant Manager for the Tank Waste Remediation System on (509) 376-7591.

Sincerely,

  
John D. Wagoner  
Manager

WSD:NWW

Enclosures (2)

cc w/encls:

R. D. Izatt, EM-2  
J. C. Tseng, EM-4

K. T. Lang, EM-38  
M. B. Whitaker, S-3.1

DNFSB 93-5 QUARTERLY REPORT, JULY 1 TO SEPTEMBER 30, 1996

EXECUTIVE SUMMARY

Significant accomplishments this Quarter included the acceptance by the Defense Nuclear Facilities Safety Board (DNFSB) of Revision 1 to the Recommendation 93-5 Implementation Plan, submittal to DNFSB of five Implementation Plan Revision 1 milestones due during the quarter, the issuance of Revision 2 to the Tank Waste Characterization Basis, continuing progress in Retained Gas Sampling, a significant improvement in core sampler availability over prior fiscal years, placing of 47 Tank Characterization Reports on the World Wide Web, issuance of a procedure for correction of water intrusion based on the Lithium Bromide tracer, issuance of an updated Organic Safety Issue resolution strategy, organic nitrate propagation tests, and progress toward closure of the Ferrocyanide Safety Issue.

The current issues discussed are transition to the Project Hanford Management Contractor, transition of the vapor analytical laboratory to Special Analytical Services, status of qualifying the Rotary Mode Core Sample System for use in Flammable Gas tanks, necessity to core sample lower priority tanks, Organic-Nitrate Unreviewed Safety Question Justification for Continued Operation incorporated into the Basis for Interim Operations document, continuing review of the Flammable Gas Unreviewed Safety Question and Justification for Continued Operation by the Department of Energy (DOE), transmittal of a minor change to the 93-5 Implementation Plan (see below), a broken drill string occurrence on core drilling Truck #1, and several laboratory radiological occurrences.

The Safety Assessment for core sampling was completed and approved by the DOE during this quarter. However, the milestone for completing the qualification of the Rotary Mode Core Sample system for use in flammable gas tanks, due September 30, 1996, was not completed on time. The DOE Operational Readiness Review found deficiencies in safety-related equipment procurement practices, operating and maintenance procedures, and the depth of DOE Richland Operations Office oversight personnel knowledge concerning these issues. The best case date is November 1996 and the worst case date is December 1996 for correcting these deficiencies and starting rotary core sampling in flammable gas tanks.

A minor change to Recommendation 93-5 Implementation Plan Revision 1 (Change 1) that does not affect scope or schedule of milestones is a second attachment to the forwarding letter for this report. This change replaces tank U-103 with tank A-101 as the Single-Shell Tank to be Retained Gas Sampled for the Flammable Gas Program (Milestone 5.4.3.5k).

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**1 PURPOSE**

This quarterly report covers High Level Waste Tank Characterization activities at the Hanford Site related to the Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 93-5 during the period July 1 to September 30, 1996. This Recommendation dealt with the safe storage and characterization of the Hanford High-Level Tank wastes in both single and double-shell tanks. An Implementation Plan responding to Recommendation 93-5 was transmitted to the DNFSB by the Secretary of Energy in January 1994. The plan was accepted by the DNFSB on March 25, 1994. On June 17, 1996, Revision 1 to the Implementation Plan was submitted to the DNFSB. Revision 1 was accepted by the DNFSB on September 4, 1996 with comments. This report covers only those activities and milestones in Revision 1.

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### 2 QUARTERLY HIGHLIGHTS

- 2.1 Revision 1 to Implementation Plan Accepted - Revision 1 to the Recommendation 93-5 Implementation Plan was accepted by the DNFSB with qualifications on September 4, 1996. The qualifications were accepted by the Secretary of Energy on October 1, 1996. The Department of Energy (DOE) will address the detailed technical comments as the revised plan is implemented. Comment number one, "High Priority Tanks," is addressed in this report (Section 2.3 below).
- 2.2 Revision 1 Milestones Submitted - The following milestone completion reports were submitted to DNFSB during this quarter:
- 2.2.1 5.4.3.5b, Gas Monitoring Instrumentation Upgrade Needs, August 19, 1996.
  - 2.2.2 5.4.3.1b, Report on Lightning Evaluation, August 30, 1996.
  - 2.2.3 5.4.3.2a, Topical Report on Resolution of Ferrocyanide Safety Issue, September 23, 1996
  - 2.2.4 5.4.3.5c, Safety Assessment for Rotary Mode Core Sampling in Flammable Gas Tanks, September 27, 1996.
  - 2.2.5 5.6.3.1a, Comparison Between Truck and Cart Vapor Sampling Systems, September 30, 1996.
- 2.3 Tank Waste Characterization Basis Revision 2 - Consistent with Implementation Plan Milestone 5.6.3.1g and the DNFSB acceptance letter for Revision 1 to the Implementation Plan, this update to the Tank Waste Characterization Basis (WHC-SD-WM-TA-164, Revision 2, issued August 1996) documents the review and evaluation of both new knowledge obtained during the last twelve months and the changing information needs of the customer programs. The tank sampling prioritization list was modified by adding sampling types other than core sampling and by removing those tanks sampled since Revision 1 was issued (August 1995). Tank U-103 is included in this new list, as recommended by the DNFSB in the letter accepting the 93-5 Implementation Plan. This new sampling prioritization list does not replace the High Priority Tank core sampling list included in Revision 1 to the Recommendation 93-5 Implementation Plan, but provides continuing prioritization for sampling activities after the High Priority Tanks are completed. Seventeen of the Implementation Plan core sample High Priority Tanks have been sampled and eleven have been analyzed. Partial cores have been obtained from three other tanks (BY-105, U-107, and S-110). A review of these incomplete sampling events is in progress. The remaining eight tanks require rotary mode cores. In the interim, the sampling schedule has been adjusted to sample those tanks listed in the Tank Waste Characterization Basis, Revision 2.
- 2.4 Retained Gas Sampler Results Update - Core sampling of tanks AW-101, AN-103, AN-104, AN-105, and A-101 (change from U-103, described in section 3.2.5) for Retained Gas Sampling (RGS) is completed. As reported before, the preliminary analysis results of AW-101 shows very good agreement with the void volume measurements taken with the Void Fraction Instrument. Extraction of the gases from AN-105 and A-101 has been completed and extraction of the gases from the AN-104 and AN-103 samples is in progress. The results to date indicate the sampling and extraction systems are performing as planned.
- 2.5 Core Sampler Availability Improvement - An Availability goal of 55% was established for this Fiscal Year for the core sampling systems (trucks and supporting equipment).

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Availability is the percent of time that the systems are available to support sampling when sampling crews are available. The final composite availability for all four sampling systems was 63.8%. This compares with a 17% availability for sampling system #2 during the 103-day period ending in January 1995. Overall core sampling system availability was not formally tracked during the entire Fiscal Year 1995. The improvement in availability was due to equipment modifications that increased the reliability of various components, and to increasing the day-to-day involvement of engineering in modification and repair activities.

- 2.6 Tank Characterization Reports (TCRs) on the World Wide Web - Forty-seven Tank Characterization Reports were placed on the Web in FY-1996.
- 2.7 Lithium Bromide (LiBr) Tracer Correction - The document "Technical Basis and Spreadsheet Documentation for Correcting Waste Tank Core Samples for Water Intrusion Based on a LiBr Trace," WHC-SD-WM-CSMD-081, was issued on July 10, 1996. This document provides the details on how corrections are calculated for the intrusion of hydrostatic head fluid or wash water from sampling operations. It also provides user documentation for two spreadsheets that can be used to make the corrections. Data from core samples taken by the Rotary Mode Core Sampler (RMCS) systems have been flagged in the Tank Characterization Database as needing correction by this method. The sample water content information published in TCRs has been corrected using this method.
- 2.8 Organic Complexant/Solvent Safety Issue Resolution Strategy - The organic strategy document "Strategy for Resolution of the Organic Complexant and Organic Solvent Safety Issues," WHC-EP-908, was submitted by the Contractor during June. This document outlines the current strategy for closing the Organic Safety Issue. Revisions to the Organic Safety Issue Data Quality Objectives (DQOs) are being developed to reflect this strategy.
- 2.9 Organic-Nitrate Propagation Tests - Propagation tests have been conducted on seven tanks (AN-107, BY-108, BY-104, C-201, C-204, BY-105, and U-105) using the Propagating Reactive System Screening Tool (PRSST). The PRSST was specifically designed to test Hanford Site waste for propagation properties. None of the samples tested to date have supported a propagating reaction. In addition, the Fauske and Associates, Incorporated (FAI) report FAI-96/48, "An Update of Requirements for Organic-Nitrate Propagating Reactions Including RSST and Tube Propagation Test Results with Waste Simulants," was completed. This document reports the results of tests on simulants containing trace quantities of possible catalysts for reaction propagation. In all tests the potential catalyst acted as an inhibitor to propagation rather than promoting propagation.
- 2.10 Ferrocyanide Safety Issue - In the acceptance letter for Revision 1 to the Recommendation 93-5 Implementation Plan, the DNFSB agreed with incorporating the remaining work for the ferrocyanide safety issue in the Recommendation 93-5 Implementation Plan, and concurred with closing Recommendation 90-7. The final aging studies report, "Ferrocyanide Safety Project Ferrocyanide Aging Studies Final Report," PNNL-11211, reporting on all aging test work on ferrocyanide simulants at the Pacific Northwest National Laboratory (PNNL) conducted over the last four years was issued by the contractor on schedule June 28, 1996. The final hazard assessment document, "Assessment of the Potential for Ferrocyanide Propagating Reaction Accidents," WHC-SD-WM-SARR-038, Rev. 1, for resolution of the Ferrocyanide Safety Issue was submitted

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by the Contractor in July and forwarded to DNFSB in September. Based on this document, DOE Headquarters authorized removing the remaining fourteen Ferrocyanide tanks from the Watch List. DOE Headquarters is also being asked to close the Ferrocyanide Safety Issue as defined in the letter authorizing the High Level Waste Tank Task Force.



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3 CURRENT ISSUES

3.1 Management/Administration

3.1.1 Project Hanford Management Contractor (PHMC) Transition - On August 6, 1996, DOE selected a contractor team headed by Fluor Daniel Hanford, Incorporated to replace the Westinghouse Hanford Corporation as the primary operating contractor on the Hanford Site. The activities that comprise the Characterization Project will work for several different sub-contractors under this new contract, however, they will remain matrixed together as a project under the Characterization Project Director. This should continue to provide the direction and integration that will make the transition to the PHMC occur smoothly and without a loss of efficiency. The management expertise brought by each of the new contractors is related to the Project activities they have taken control over and should rapidly bring improvement to each of these activities.

3.1.2 Transition of Vapor Analytical Laboratory to Special Analytical Services - DOE has directed the Characterization Project contractor (Westinghouse Hanford Corporation, succeeded by Lockheed Martin Hanford Corporation) to shift the role of "lead vapor laboratory" from PNNL to the Special Analytical Services (SAS) group of Hanford Analytical Services, operated by Numatec Hanford Corporation. This group currently operates the Type 3 Vapor Sampling System and the Type 4 In-Situ Vapor Sampler. This transition was directed based on a lower cost per sample analyzed. A transition plan is under development by the PHMC to complete this change by January 15, 1997. DOE is also planning a "Make-or-Buy" evaluation for all Hanford Site vapor analytical work subsequent to shifting the "lead vapor laboratory" from PNNL to SAS. A shutdown plan for the PNNL vapor analytical laboratory is also under development.

3.2 Technical

3.2.1 Qualification of Rotary Mode Core Sampler (RMCS) for Flammable Gas Tanks - In August, DOE/RL approved a Safety Assessment of Rotary Mode Core Sampling in flammable gas single-shell tanks. This completed Milestone 5.4.3.5c, "Letter reporting approval of safety assessment for rotary mode core sampling in flammable gas tanks and documenting incorporation into the Authorization Basis." Although the Safety Evaluation Report that authorized this Safety Assessment approved use of the RMCS in only four of the flammable gas tanks (AX-101, AX-103, BX-110, and TX-102), this provided the basis for completing the associated Milestone 5.4.3.5d, "Letter reporting qualification of Rotary Mode Core Sampling System for use in Flammable Gas Tanks." Most of the elements of this qualification were completed satisfactorily by the Contractor during this quarter. The rotary mode modifications for the flammable environment have been successfully tested by the Bureau of Mines. The installation of the modifications required to comply with the Safety Assessment were completed on RMCS Truck #4 in August. A Contractor Operational Readiness Review (ORR) was conducted during early September. This was followed by a DOE/RL Independent ORR in late September. However, this review was terminated on September 30, 1996. The principal reasons were the following:

- a) Commercial grade items were installed in RMCS safety class systems, but these items had not been qualified by the Contractor for use in safety systems. The

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contractor had documented these items on Non-Conformance Reports (NCRs) before the ORR and was dispositioning the NCRs when the ORR started.

- b) Maintenance procedures for the RMCS required to show compliance with requirements of the Safety Assessment had not been issued.
- c) Operating procedures were not written according to the Contractor's administrative guidelines.
- d) The depth of the Contractor ORR was questioned.
- e) DOE/RL personnel responsible for Characterization Project activities were not knowledgeable of the WHC safety classification process and were not engaged in RMCS engineering issues.

A recovery plan has been developed by the PHMC and reviewed by DOE/RL. This delay in commencing rotary core drilling will require an adjustment of the current field sampling schedule. It does not currently jeopardize completion of related Implementation Plan milestones.

- 3.2.2 Lower Priority Tank Core Sampling - All of the remaining core sampling High Priority Tanks require rotary mode sampling. The delay in commencing rotary mode core sampling will result in the substitution of some lower priority tanks (BY-111, BY-112, T-201, T-202, T-203, T-204, T-110, and T-112) in the core sampling schedule to permit keeping all sampling crews operating (using Trucks #2 and #3). Other lower priority tanks may be substituted for Truck #1 after four single-shell tanks with primary waste types related to flammable gas (A-101, BY-101, U-103, and S-106) have been sampled using the retained gas sampler. Six other tanks that may require retained gas sampling (BY-109, A-103, SX-106, S-112, S-103, and U-111) are being held in reserve until the results from the first four retained gas sampler tanks have been analyzed.
- 3.2.3 Organic-Nitrate Unreviewed Safety Question (USQ) and Justification for Continued Operation (JCO) - As previously reported, the TWRS Plant Review Committee (PRC) declared that a Discovery USQ existed concerning the potential for an Organic-Nitrate chemical reaction and that a JCO would be submitted to DOE/RL. This JCO has been incorporated into the Basis for Interim Operations (BIO) submitted to DOE by the Contractor on September 30, 1996. The BIO is currently under review for approval by DOE.
- 3.2.4 Flammable Gas USQ/JCO - A JCO for the Flammable Gas USQ was submitted to DOE/RL by the Contractor for approval in July. An Implementation Plan for the JCO was submitted by the Contractor in August. DOE/RL provided comments on the JCO to the contractor in September, and the contractor resubmitted at the end of September. Both the JCO and the Implementation Plan are under review by DOE/RL for approval.
- 3.2.5 Implementation Plan Minor Change - Section 6.1, Change Control, of the Implementation Plan permits changes that are not "fundamental changes to the plan's strategy or scope or schedule" to be "formally documented in quarterly reports, along with the basis for the changes, and appropriate corrective actions." Replacement pages for the Implementation Plan marked as Revision 1, Change 1, October 15, 1996, are included as an attachment to the letter forwarding this quarterly report. A List of Effective Pages is included in this change to permit change control page-checking. This change replaces tank U-103 with

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tank A-101 as the Single-Shell Tank to be Retained Gas Sampled for the Flammable Gas Program (Milestone 5.4.3.5k). In addition, sampling Tank A-101 permits confirming some of the assumptions made in the safety assessment for conducting saltwell pumping in a flammable gas tank. This tank was both the bounding case tank in the safety assessment and the first tank scheduled to be saltwell pumped.

### 3.3 Personnel and Equipment

- 3.3.1 Broken Drill String - While pushing the last segment of a push mode core sample from Tank AN-104 using Truck #1, an abnormal vibration was noted at the end of the stroke. During retrieval of the drill string, the string separated, leaving three sections of drill rod and the sampler core barrel in the tank waste. A review of the event found that, due to a procedural error, the drill string down-force limiter was improperly set. This allowed the drill string to be over stressed. All core sampling operations were suspended until a complete review of both push and rotary mode truck sampling procedures was completed and the corrective actions implemented.
- 3.3.2 Laboratory Radiological Occurrences - Following several events related to inadequate controls on access to high radiation areas and personnel skin contamination in the 222-S Laboratory, a self-assessment of laboratory radiological practices was conducted. The self-assessment concluded that three major areas needed to be addressed to improve radiological work practices: improved pre-job planning, training of personnel, and adherence to requirements by individual workers. The impacts of these occurrences on laboratory output have been minimal. One half day has been devoted to employee safety meetings which focused on radiological work practice improvements as an initial action to improve performance.

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4 STATUS OF REVISION 1 MILESTONES DUE WITHIN SIX MONTHS OR COMPLETED DURING THE REPORTING QUARTER

4.1 Safe Storage of Tank Wastes and Safe Operation of Tank Farms

Commitment  
Number

5.4.3.1 TWRS Manage Tank Waste Function Authorization Basis

Statement: Upgrade the Authorization Basis for the TWRS Manage Tank Waste Function

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

a. Letter reporting completion of Comprehensive Source Terms Report.

Due Date: June 1996

Status: Complete. Forwarded to DNFSB on June 30, 1996.

b. Report on lightning evaluation, and if the probability exceeds  $1 \times 10^{-6}$  per year, evaluate potential mitigating options for lightning strikes.

Due Date: August 1996

Status: Complete. Forwarded to DNFSB on August 30, 1996.

c. Approved BIO.

Due Date: December 1996

Status: On schedule. Submitted by the Contractor to DOE/RL on September 30, 1996.

5.4.3.2 Ferrocyanide

Statement: Analyze selected samples to reduce data uncertainties and issue final report.

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

a. Topical report on resolution of Ferrocyanide Safety Issue. This report will include the evaluation of sample analyses confirming ferrocyanide aging (if the results do not confirm that any remaining ferrocyanide is bounded by least favorable decomposition conditions, this Implementation Plan will be revised).

Due Date: January 1997

Status: Complete. Submitted to DNFSB on September 23, 1996.

5.4.3.3 Organic Complexants

Statement: Complete testing and evaluation confirming simulant results with real waste.

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

a. Letter reporting completion of supporting technical document on Organic Complexant Safety Issue. (This topical report will describe the current understanding of the issue and future work for resolution).

Due Date: December 1996

Status: Submitted by the Contractor in August. Under review by DOE/RL.

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**5.4.3.4 Organic Solvents**

**Statement:** Use vapor samples to identify organic solvent tanks.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Letter reporting completion of safety assessment covering pool and entrained organic solvent fires.**  
**Due Date:** October 1996  
**Status:** Submitted by the Contractor in September. Under review by DOE/RL.
- b. Letter reporting completion of organic speciation of core samples for BY-108 and BY-110, and auger samples for C-102.**  
**Due Date:** October 1996  
**Status:** Submitted by the Contractor in September. Under review by DOE/RL.
- c. Letter reporting completion of supporting technical document for Organic Solvent Safety Issue. (This topical report will describe the current understanding of the issue and future work for resolution).**  
**Due Date:** December 1996  
**Status:** On schedule. The Contractor has issued a draft for internal review.

**5.4.3.5 Flammable Gas**

**Statement:** Complete analytical evaluations and steady-state vapor samples to determine which flammable gas tanks require mitigative actions. Qualify saltwell pumping and rotary-mode core sampling for flammable gas environments.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Report documenting analyses to determine if additional tanks have potential to exceed 25% of the LFL.**  
**Due Date:** June 1996  
**Status:** Complete. Submitted to DNFSB on June 28, 1996.
- b. Letter reporting evaluation of gas monitoring instrumentation upgrade needs for additional tanks with the potential to exceed 25% of the LFL.**  
**Due Date:** August 1996  
**Status:** Complete. Submitted to DNFSB on August 19, 1996.
- c. Letter reporting approval of safety assessment for rotary mode core sampling in flammable gas tanks and documenting incorporation into the Authorization Basis.**  
**Due Date:** September 1996  
**Status:** Complete. Submitted to DNFSB on September 27, 1996.
- d. Letter reporting qualification of Rotary Mode Core Sampling System for use in Flammable Gas Tanks.**  
**Due Date:** September 1996  
**Status:** Milestone missed. Recovery plan has been developed by the Contractor and is under review by DOE/RL. The best case date is November 1996 and the worst case date is December 1996 for completing this milestone.
- e. Letter reporting approval of safety assessment for saltwell pumping in flammable gas tanks and documenting incorporation into the Authorization Basis.**

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Due Date: October 1996

Status: On schedule. Safety Assessment was submitted by the Contractor in August and is under review by DOE/RL.

**f. Letter reporting completion of AN Tank Farm ventilation upgrade.**

**Due Date: November 1996**

Status: On schedule.

**g. Letter reporting completion of flammable gas safety screening of remaining passively ventilated SSTs to determine if steady-state vapors are less than 25% of the LFL. (If any tanks are greater than 25% of the LFL, the letter will include the schedule to evaluate corrective actions).**

Due Date: November 1996

Status: On schedule.

**h. Letter reporting completion of supporting technical document on Flammable Gas Safety Issue. (This topical report will describe the current understanding of the issue and future work for resolution).**

Due Date: December 1996

Status: On schedule.

**i. Letter reporting that external equipment spark sources in flammable gas tanks have been managed by controls or the equipment has been modified.**

Due Date: December 1996

Status: Behind schedule. Flammable Gas Justification for Continued Operation (JCO) will satisfy this milestone. The Contractor submitted the JCO in July and the Implementation Plan in August. DOE/RL provided comments on the JCO to the contractor in September, and the contractor resubmitted at the end of September. Both are under review by DOE/RL. As a minimum, the Implementation Plan "Interim Compensatory Measures" must be completed by the due date.

**j. Letter reporting completion of voidmeter and viscometer readings in tanks AN-103, AN-104, and AN-105.**

Due Date: December 1996

Status: On schedule. Submitted by the Contractor in September and is under review by DOE/RL.

**k. Letter reporting completion of retained gas sampling in tanks AW-101, AN-103, AN-104, AN-105, and A-101. If the retained gas sampling performance is satisfactory, include future deployment schedule.**

Due Date: March 1997

Status: On schedule. Tank A-101 was substituted for U-103 (see section 3.2.5).

**5.4.3.6 High Heat**

Statement: Retrieve wastes from tank C-106.

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

**a. Letter reporting completion of tank C-106 supernatant and sludge sampling and analysis.**

Due Date: October 1996

Status: On schedule.

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5.4.3.7 **Criticality**

Statement: Resolve the Criticality Safety Issue.

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

- a. **Letter reporting completion of topical report to resolve the Criticality Safety Issue.**

Due Date: December 1996

Status: On schedule. Topical report submitted for review to DOE/RL on September 13, 1996 by the contractor.

4.2 **Disposal Program Data Requirements**

Commitment

Number

5.5.6.1 **Disposal Program Characterization**

Statement: Complete sampling and analysis of *Tank Waste Characterization Basis* (Brown et al. 1995) tanks for disposal.

Responsible Manager: Assistant Manager, TWRS

Applicable Facilities and Programs: TWRS

Milestone deliverables/due date:

None

4.3 **Technical Basis for Characterization**

Commitment

Number

5.6.3.1 **Complete Tank Waste Characterization Basis Sampling and Analysis**

Statement: Complete the sampling and analysis specified by the Tank Waste Characterization Basis (approximately 28 tanks) to provide the highest priority information requested by the programmatic DQOs.

Responsible Manager: Assistant Manager, TWRS

Applicable facilities and programs: TWRS

Milestone deliverables/due dates:

- a. **Letter reporting completion of comparison between truck and cart vapor sampling systems.**

Due Date: September 1996

Status: Complete. Submitted to DNFSB on September 27, 1996.

- b. **Letter reporting implementation of FTIR moisture analysis capability in 222-S Laboratory.**

Due Date: November 1996

Status: Ahead of schedule.

- c. **Letter reporting submittal of proposed content and format for tank-by-tank safety status evaluation.**

Due Date: January 1997

Status: On schedule.

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5 APPENDICES

5.1 High Priority Tanks Sampling and Analysis Status

Tank	Rank	Planned Samples	Samples Obtained	Sampling Completed	Lab Analysis Completed	Tank Characterization Report (TCR)
BY-105 <sup>1</sup>	100	2R <sup>5</sup>	1 partial core, under review.			WHC-SD-WM-ER-598
U-105 <sup>1</sup>	93	3R <sup>3</sup>	3 cores	3/18/96	6/25/96	WHC-SD-WM-ER-617
U-109 <sup>1</sup>	91	3R <sup>3</sup>	3 cores	1/18/96	6/29/96	WHC-SD-WM-ER-609
BY-103 <sup>1</sup>	86	2R <sup>5</sup>	need rotary			
U-108 <sup>1</sup>	84	3R <sup>3</sup>	3 cores	5/6/96		
U-107 <sup>1</sup>	76	3R <sup>3</sup>	3 partial cores, need rotary to complete. Under review.			WHC-SD-WM-ER-614
BY-106 <sup>1</sup>	74	2R <sup>3</sup>	2 cores <sup>5</sup>	12/19/95	4/29/96	WHC-SD-WM-ER-616
S-102	74	2R <sup>3</sup>	2 cores	3/8/96	7/12/96	WHC-SD-WM-ER-611
SX-103	67	2R <sup>5</sup>	need rotary			
BY-108 <sup>1</sup>	65 <sup>2</sup>	3R	3 cores	8/18/95	2/12/96	WHC-SD-WM-ER-533
A-101	62	3R <sup>5</sup>	2 cores	7/25/96		
TX-118	61	3R <sup>5</sup>	need rotary			
SX-104	61	3R <sup>5</sup>	need rotary			
BY-110 <sup>1</sup>	52 <sup>2</sup>	3R	6 cores	10/20/95	4/25/96	WHC-SD-WM-ER-591
TX-111	51	2R <sup>5</sup>	need rotary			
BY-104 <sup>1</sup>	51	2R <sup>3</sup>	2 cores	11/15/95	5/2/96	WHC-SD-WM-ER-608
C-104	50	2R <sup>5</sup>	2 cores	7/31/96		
S-107	50	3P	3 cores	9/28/95	3/15/96	WHC-SD-WM-ER-589
S-101	50	2R <sup>3</sup>	2 cores	4/3/96	7/23/96	WHC-SD-WM-ER-613
TY-103 <sup>1</sup>	50	3R <sup>5</sup>	need rotary			
SX-101	49	2R <sup>5</sup>	need rotary			
S-110	47	2R <sup>3</sup>	1 partial core, need rotary to complete			
AW-101	47	2P <sup>4</sup>	2 RGS cores	5/6/96	5/11/96	WHC-SD-WM-ER-470
AN-104	46	2P <sup>4</sup>	2 cores	9/12/96		
AX-101	43	3R <sup>5</sup>	need rotary			
AN-105	37	2P <sup>4</sup>	2 cores	6/28/96		
AN-103	36	2P <sup>4</sup>	2 cores	9/23/96		
B-104	15	2P	2 cores	6/14/95	10/1/95	WHC-SD-WM-ER-552

General Notes:

P = push mode core sample

R = rotary mode core sample

RGS = Retained Gas Sample (RGS). RGS can only be used with truck #1 (push mode truck).



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<sup>1</sup> High Priority Tanks (HPTs) designated for additional laboratory analysis (related to organic aging and organic solubility as well as propagation testing with real waste using the Propagating Reactive System Screening Tool (PRSST)) in the Test Plan for Samples From Hanford Waste Tanks 241-BY-103, BY-104, BY-105, BY-106, BY-108, BY-110, TY-103, U-105, U-107, U-108, AND U-109 (WHC-SD-WM-TP-378).

<sup>2</sup> High Priority Tanks (BY-108 & BY-110) selected for rotary mode core sampling testing to develop rotary mode core sampling procedures (July 1995 - October 1995).

<sup>3</sup> High Priority Tanks originally scheduled for rotary mode core sampling which were push mode sampled using rotary trucks based on the results of the rotary mode core sampling testing conducted in BY-108 & BY-110. This allowed sampling of some HPTs to proceed until authorization for rotary mode core sampling in flammable gas atmospheres is obtained.

<sup>4</sup> High Priority Tanks which require sampling with truck #1 and Retained Gas Sampler. Retained Gas Sampler laboratory extrusion system completed December 1995. Originally, only HPTs AW-101, AN-103, AN-104 and AN-105 required sampling with the RGS. Tank A-101 was determined to require sampling with RGS on 5/20/96.

<sup>5</sup> High Priority Tanks which were determined to require rotary mode core sampling based on the results of the rotary mode core sampling conducted in BY-108 and BY-110 (July - October 1995).

<sup>6</sup> First rotary mode core obtained with nitrogen purge during period October 1994 to January 1995.

**5.2 Tanks Sampled during Fourth Quarter 1996 (July through September)**

SAMPLE	Actual Start	Actual Finish
S-109 Rotary Samples 2 Segments 11 Off Ramp	5/30/96	7/2/96
BY-107 Rotary Samples 2 Segments 6 Off Ramp	6/18/96	7/23/96
C-107 Temporal Vapor Sample (3)	7/1/96	7/2/96
A-101 Push Samples 3 Segments 19 High Priority	7/3/96	8/23/96
BY-108 Temporal Vapor Sample (3)	7/3/96	7/8/96
S-102 Temporal Vapor Sample (3)	7/9/96	7/10/96
AW-101 Grab Sample (Privatization)	7/11/96	7/15/96
BX-104 Temporal Vapor Sample (4)	7/11/96	7/12/96
T-103 Auger Sample 2 Segments 1	7/15/96	7/19/96
C-201 Vapor Sample (4)	7/15/96	7/17/96
C-202 Vapor Sample (4)	7/18/96	7/19/96
C-204 Vapor Sample (4)	7/22/96	7/23/96
U-112 Vapor Sample (4) (Rotary)	7/24/96	7/25/96
S-110 Rotary Samples 2 Segments 8 High Priority	7/25/96	8/27/96
C-104 Rotary Samples 2 Segments 5 High Priority	7/26/96	8/28/96
BY-102 Rotary Samples 2 Segments 5 Off Ramp	7/26/96	8/28/96
AY-102 Grab Sample	7/30/96	8/1/96
U-104 Vapor Sample (4)	8/5/96	8/6/96
T-106 Testing Light Duty Utility Arm	8/8/96	9/25/96
TX-104 Vapor Sample (4) (Rotary)	8/9/96	8/12/96
BY-101 Vapor Sample (4) (Rotary)	8/13/96	8/14/96
AN-107 Grab Sample - (Privatization)	8/14/96	8/16/96
B-202 Vapor Sample (4)	8/15/96	8/16/96
B-107 Vapor Sample (4) (Rotary)	8/19/96	8/20/96
B-105 Vapor Sample (4) (Rotary)	8/21/96	8/22/96
BX-102 Vapor Sample (4) (Rotary)	8/23/96	8/26/96

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SAMPLE	Actual Start	Actual Finish
BX-111 Vapor Sample (4) (Rotary)	8/28/96	8/29/96
AY-102 Grab Sample	9/3/96	9/5/96
SX-108 Vapor Sample (4) (Rotary)	9/16/96	9/17/96
TY-105 Vapor Sample (4) (Rotary)	9/18/96	9/19/96
C-302C Grab Sample	9/20/96	9/24/96
TX-101 Vapor Sample (4) (Rotary)	9/20/96	9/23/96
TX-116 Vapor Sample (4) (Rotary)	9/27/96	9/30/96

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**5.3 Chart of Samples Taken vs. Samples Scheduled**

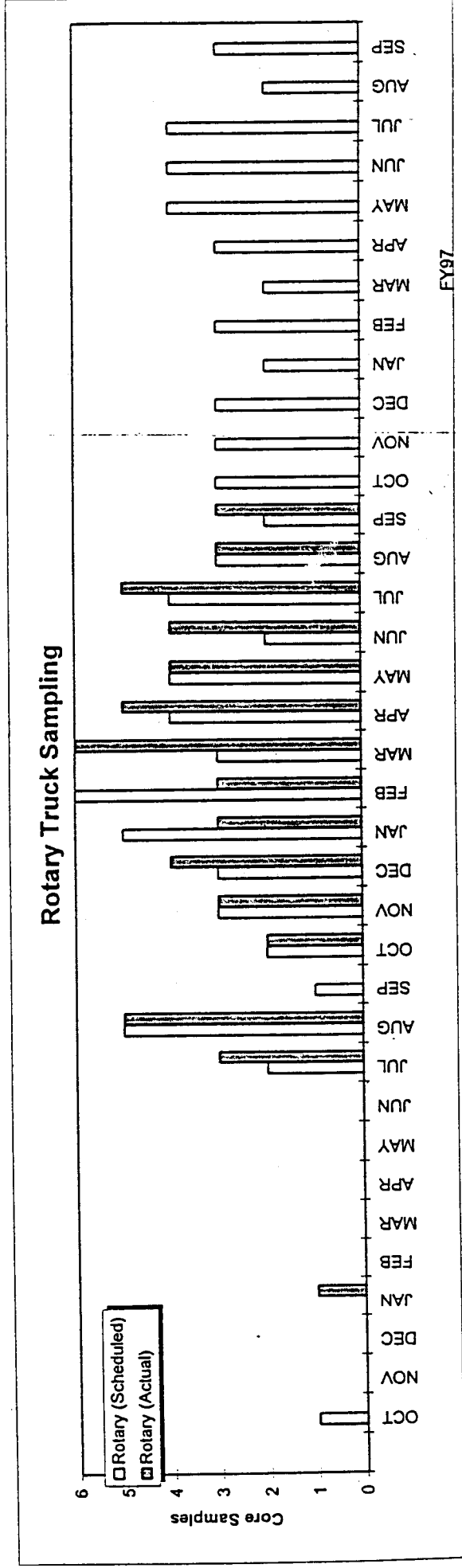
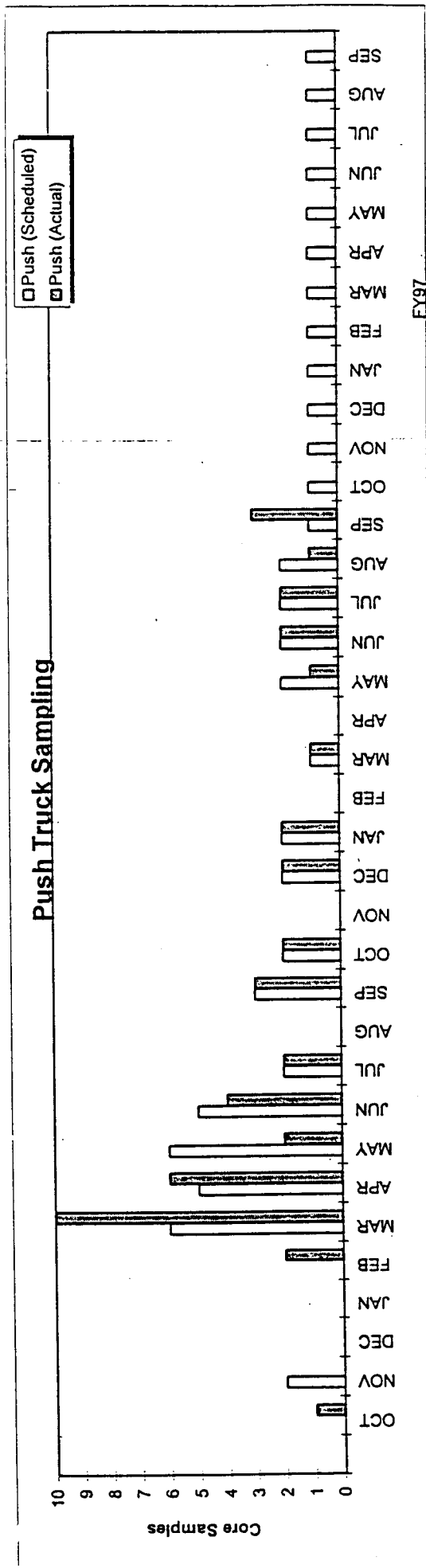
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# Characterization

## Push and Rotary Sampling

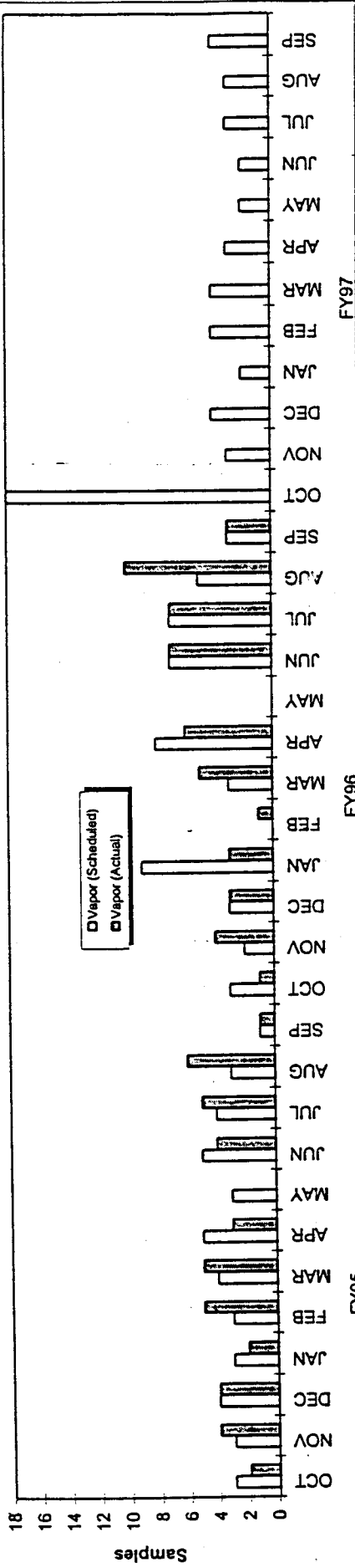




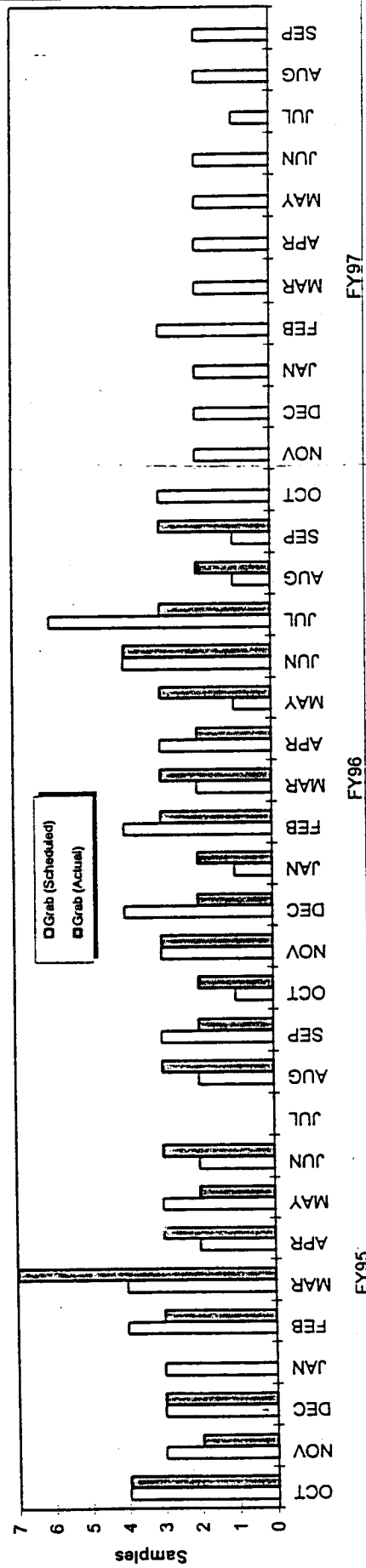
# Characterization

## Vapor and Grab Sampling

Vapor Sampling



Grab Sampling



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5.4 Sampling Schedule for First Quarter 1997 (October through December)

<u>TITLE</u>	<u>Early Start</u>	<u>Early Finish</u>
T-110 Rotary Sample 2 Segments 8	10/2/96	11/4/96
U-103 Push Samples 2 Segments 9 High Priority	10/7/96	11/1/96
B-103 Homogeneity Vapor Sample 6 (4) High Priority	10/7/96	10/11/96
TY-103 Homogeneity Vapor Samples 6 (4) High Priority	10/14/96	10/18/96
TX-244 Grab Sample Compatibility	10/21/96	10/23/96
BY-110 Sample 2 Surface Moisture Monitoring System	10/21/96	11/20/96
U-112 Homogeneity Vapor Samples 6 (4) High Priority	10/21/96	10/25/96
BX-104 Temporal Vapor Sample (4) High Priority	10/31/96	11/1/96
SY-102 Grab Sample Compatibility	11/4/96	11/6/96
BX-110 Rotary Samples 2 Segments 4 High Priority	11/6/96	12/11/96
C-107 Temporal Vapor Sample (3) High Priority	11/7/96	11/11/96
BY-108 Temporal Vapor Sample (3) High Priority	11/14/96	11/18/96
T-112 Rotary Sample 2 Segments 2	11/15/96	12/20/96
AP-108 Campaign 97-2 Grab Sample	11/18/96	11/20/96
S-102 Temporal Vapor Sample (3) High Priority	11/21/96	11/25/96
S-106 Push Samples 2 Segments 10 High Priority	11/25/96	1/2/97
A-106 Vapor Sample (4) (Rotary)	12/2/96	12/3/96
S-112 Grab Sample - (Saltwell)	12/4/96	12/6/96
AX-104 Vapor Sample (4)	12/9/96	12/10/96
TY-102 Rotary Samples 2 Segments 2 High Priority	12/12/96	1/23/97
SX-108 Vapor Sample (4) (Rotary)	12/16/96	12/17/96
AN-107 Grab Sample - (Caustic Add)	12/18/96	12/20/96

5.5 Tank Characterization Plan Completion Schedule

The Tank Characterization Plans for tanks that may be sampled in FY-1997 were submitted to DOE/RL with the Tank Waste Analysis Plan (TWAP) on August 30, 1996. The additional plans listed in Section 5.6 are those with emergent requirements for sampling or those requiring revision. The next planned submittal of Tank Characterization Plans is for FY-1998 in August 1997.

5.6 List of Tank Characterization Plans issued during the Quarter

<u>Tank</u>	<u>Number</u>	<u>Rev</u>	<u>Date</u>
A-101	WHC-SD-WM-TP-331	2	08/08/96
A-102	WHC-SD-WM-TP-358	4	07/23/96
A-103	WHC-SD-WM-TP-497	0	08/08/96
A-106	WHC-SD-WM-TP-501	0	08/08/96
AN-101	WHC-SD-WM-TP-413	3	07/23/96
AN-102	WHC-SD-WM-TP-216	4	07/23/96
AN-103	WHC-SD-WM-TP-383	2	08/08/96
AN-104	WHC-SD-WM-TP-384	2	08/08/96
AN-105	WHC-SD-WM-TP-385	2	08/08/96

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<u>Tank</u>	<u>Number</u>	<u>Rev</u>	<u>Date</u>
AN-106	WHC-SD-WM-TP-407	3	07/23/96
AN-107	WHC-SD-WM-TP-215	4	07/23/96
AP-104	WHC-SD-WM-TP-414	3	07/23/96
AP-108	WHC-SD-WM-TP-419	3	07/23/96
AX-101	WHC-SD-WM-TP-332	2	08/09/96
AX-103	WHC-SD-WM-TP-500	0	08/08/96
AX-104	WHC-SD-WM-TP-243	2 3	07/18/96 08/08/96
AY-101	WHC-SD-WM-TP-406	3	07/23/96
B-101	WHC-SD-WM-TP-350	4	07/23/96
B-104	WHC-SD-WM-TP-349	4	07/23/96
B-105	WHC-SD-WM-TP-502	0	08/08/96
B-106	WHC-SD-WM-TP-353	4	07/23/96
B-108	WHC-SD-WM-TP-421	2	08/08/96
B-109	WHC-SD-WM-TP-505	0	08/08/96
B-203	WHC-SD-WM-TP-354	3	07/23/96
B-204	WHC-SD-WM-TP-355	3	07/23/96
BX-103	WHC-SD-WM-TP-339	4	07/23/96
BX-104	WHC-SD-WM-TP-296	4	07/23/96
BX-106	WHC-SD-WM-TP-240	4	07/24/96
BX-109	WHC-SD-WM-TP-338	4	07/24/96
BX-110	WHC-SD-WM-TP-382	3	07/24/96
BX-111	WHC-SD-WM-TP-504	0	08/09/96
BX-112	WHC-SD-WM-TP-341	3	07/24/96
BY-101	WHC-SD-WM-TP-496	0	08/08/96
BY-102	WHC-SD-WM-TP-446	1	08/08/96
BY-104	WHC-SD-WM-TP-230	3	07/24/96
BY-105	WHC-SD-WM-TP-218	4	07/24/96
BY-106	WHC-SD-WM-TP-217	4	07/24/96
BY-107	WHC-SD-WM-TP-274	2	08/08/96
BY-108	WHC-SD-WM-TP-222 WHC-SD-WM-TP-275	4	07/24/96
BY-109	WHC-SD-WM-TP-498	0	08/08/96
BY-110	WHC-SD-WM-TP-279	4	07/24/96
BY-111	WHC-SD-WM-TP-280	1 2	07/24/96 08/08/96
BY-112	WHC-SD-WM-TP-281	1	08/08/96
C-103	WHC-SD-WM-TP-207	5	07/24/96
C-104	WHC-SD-WM-TP-208	2	08/08/96
C-106	WHC-SD-WM-TP-212	4	07/24/96
C-108	WHC-SD-WM-TP-211	5	07/24/96
C-204	WHC-SD-WM-TP-307	4	07/25/96
S-101	WHC-SD-WM-TP-386	3	07/25/96
S-102	WHC-SD-WM-TP-238	3	07/25/96
S-106	WHC-SD-WM-TP-389	2	08/08/96
S-107	WHC-SD-WM-TP-348	4	07/25/96

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<u>Tank</u>	<u>Number</u>	<u>Rev</u>	<u>Date</u>
S-109	WHC-SD-WM-TP-391	3	08/09/96
S-110	WHC-SD-WM-TP-205	3	08/09/96
S-111	WHC-SD-WM-TP-317	2	08/09/96
S-112	WHC-SD-WM-TP-392	2	08/09/96
SX-101	WHC-SD-WM-TP-450	1	08/09/96
SX-102	WHC-SD-WM-TP-499	0	08/08/96
SX-103	WHC-SD-WM-TP-313	2	08/09/96
SX-104	WHC-SD-WM-TP-321	2	08/09/96
SX-106	WHC-SD-WM-TP-314	1	08/09/96
SX-107	WHC-SD-WM-TP-443	1	08/09/96
SX-108	WHC-SD-WM-TP-405	3	07/25/96
SX-109	WHC-SD-WM-TP-334	2	8/09/96
SX-115	WHC-SD-WM-TP-325	1	05/10/96
SY-103	WHC-SD-WM-TP-197	4	07/25/96
T-106	WHC-SD-WM-TP-366	3	07/25/96
T-108	WHC-SD-WM-TP-367	3	07/25/96
T-109	WHC-SD-WM-TP-368	3	07/25/96
T-110	WHC-SD-WM-TP-511	0	09/19/96
TX-105	WHC-SD-WM-TP-293	2	08/08/96
TX-107	WHC-SD-WM-TP-420	3	07/25/96
TX-111	WHC-SD-WM-TP-399	2	08/09/96
TX-118	WHC-SD-WM-TP-241	2	08/09/96
TY-102	WHC-SD-WM-TP-486	1	08/09/96
U-102	WHC-SD-WM-TP-451	1	08/09/96
U-103	WHC-SD-WM-TP-288	3	08/09/96
U-105	WHC-SD-WM-TP-289	3	07/25/96
U-106	WHC-SD-WM-TP-245	2	08/09/96
U-107	WHC-SD-WM-TP-244	3	07/25/96
U-108	WHC-SD-WM-TP-315	2	08/09/96
U-109	WHC-SD-WM-TP-316	3	07/25/96
Various	WHC-SD-WM-TP-335 (Vapor Sampling and Analysis Plan)	2-B	07/26/96
		2-C	08/13/96
		2-D	09/06/96



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5.7 List of Tank Characterization Reports issued during the Quarter

<u>Tank</u>	<u>Document Number</u>	<u>Rev</u>	<u>Date</u>
A-102	WHC-SD-WM-ER-597	0	07/29/96
AN-101	WHC-SD-WM-ER-578	0	08/08/96
AN-102	WHC-SD-WM-ER-545	1	08/29/96
AN-106	WHC-SD-WM-ER-569	0	08/22/96
AN-107	WHC-SD-WM-ER-600	0	08/15/96
AP-104	WHC-SD-WM-ER-596	0	08/07/96
AP-108	WHC-SD-WM-ER-593	0	07/29/96
AY-101	WHC-SD-WM-ER-605	0	09/23/96
B-106	WHC-SD-WM-ER-601	0	09/23/96
B-203	WHC-SD-WM-ER-587	0	07/03/96
B-204	WHC-SD-WM-ER-581	0	07/22/96
BX-112	WHC-SD-WM-ER-602	0	09/17/96
C-204	WHC-SD-WM-ER-479	0	09/12/96
S-101	WHC-SD-WM-ER-613	0	09/13/96
S-102	WHC-SD-WM-ER-611	0	09/17/96
S-107	WHC-SD-WM-ER-589	0	09/19/96
SX-108	WHC-SD-WM-ER-582	0	07/11/96
SY-103	WHC-SD-WM-ER-471	1	09/11/96
T-109	WHC-SD-WM-ER-559	0	09/24/96
TX-107	WHC-SD-WM-ER-584	0	07/10/96
U-105	WHC-SD-WM-ER-617	0	09/26/96
U-107	WHC-SD-WM-ER-614	0	09/18/96
U-109	WHC-SD-WM-ER-609	0	09/05/96

5.8 List of 45 Day Reports Issued

<u>Tank</u>	<u>Type</u>	<u>Title</u>	<u>Number</u>	<u>Date</u>
241-U-101	Grab	45-Day Safety Screening Results for Tank 241-U-101, Grab Samples 1U-96-1 through 1U-96-4	WHC-SD-WM-DP-190, Rev. 0	7/12/96
241-U-106	Push	45-Day Safety Screening Results for Tank 241-U-106 Push Mode Cores 147 and 148	WHC-SD-WM-DP-191, Rev. 0	7/29/96
241-U-102	Push	45-Day Safety Screening Results for Tank 241-U-102, Push Mode Cores 143 and 144	WHC-SD-WM-DP-189, Rev. 0A	8/14/96
241-S-109	Push	45-Day Safety Screening Results for Tank 241-S-109, Push Mode Cores 158 and 160	WHC-SD-WM-DP-194, Rev. 0	8/16/96

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5.9 Table of DNFSB 93-5 Implementation Plan Revision 1 Commitments Status

<u>Number</u>	<u>Description</u>	<u>Due Date</u>	<u>Submitted to DNFSB</u>
5.4.3.1a	Comprehensive Source Terms Report	6/30/96	6/30/96
5.4.3.1b	Report on Lightning Evaluation	8/31/96	8/30/96
5.4.3.1c	Approved BIO	12/31/96	
5.4.3.1d	Approved FSAR.	6/30/97	
5.4.3.2a	Topical Report on Resolution of Ferrocyanide Safety Issue.	1/31/97	9/23/96
5.4.3.3a	Supporting Technical Document on Organic Complexant Safety Issue	12/31/96	
5.4.3.3b	Confirm Safe Storage Criteria, and Organic Solubility and Aging Effects on Fuel Content	11/30/98	
5.4.3.4a	Safety Assessment Covering Pool and Entrained Organic Solvent Fires	10/31/96	
5.4.3.4b	Organic Speciation of Core Samples for BY-108 and BY-110, and Auger Samples for C-102.	10/31/96	
5.4.3.4c	Supporting Technical Document for Organic Solvent Safety Issue.	12/31/96	
5.4.3.4d	Vapor Sampling of all SSTs.	12/31/99	
5.4.3.4e	Adequate Vent Path in All SSTs Suspected of Containing Organic Solvents	4/30/00	
5.4.3.4f	Letter Reporting Completion of Vapor Sampling of All DSTs.	12/31/00	
5.4.3.5a	Analyses to Determine If Additional Tanks Have Potential to Exceed 25% of the LFL.	6/30/96	6/28/96
5.4.3.5b	Gas Monitoring Instrumentation Upgrade Needs for Additional Tanks with the Potential to Exceed 25% of the LFL.	8/31/96	8/19/96
5.4.3.5c	Safety Assessment for Rotary Mode Core Sampling in Flammable Gas Tanks	9/30/96	9/27/96
5.4.3.5d	Qualification of Rotary Mode Core Sampling System for Use in Flammable Gas Tanks.	9/30/96	
5.4.3.5e	Safety Assessment for Saltwell Pumping in Flammable Gas Tanks	10/31/96	
5.4.3.5f	Letter Reporting Completion of AN Tank Farm Ventilation Upgrade.	11/30/96	
5.4.3.5g	Flammable Gas Safety Screening of Remaining Passively Ventilated SSTs	11/30/96	
5.4.3.5h	Supporting Technical Document on Flammable Gas Safety Issue.	12/31/96	
5.4.3.5i	External Equipment Spark Sources in Flammable Gas Tanks	12/31/96	
5.4.3.5j	Voidmeter and Viscometer Readings in Tanks AN-103, AN-104, and AN-105.	12/31/96	
5.4.3.5k	Retained Gas Sampling in Tanks AW-101, AN-103, AN-104, AN-105, and A-101.	3/31/97	
5.4.3.5l	Refinement of Flammable Gas Generation/Retention Models	5/31/97	
5.4.3.6a	C-106 Supernatant Sampling and Analysis.	10/31/96	
5.4.3.6b	C-106 Retrieval Safety Assessment.	7/31/97	
5.4.3.6c	Initiation of Tank C-106 Waste Retrieval.	10/31/97	
5.4.3.6d	Topical Report to Resolve the High Heat Safety Issue.	5/31/98	
5.4.3.7a	Topical Report to Resolve the Criticality Safety Issue.	12/31/96	
5.5.6.1a	Completion of High Priority Tanks Sampling and Analysis for the Disposal Program	3/31/98	
5.6.3.1a	Comparison Between Truck and Cart Vapor Sampling Systems.	9/30/96	9/27/96
5.6.3.1b	Implementation of FTIR Moisture Analysis Capability in 222-S Laboratory.	11/30/96	

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<u>Number</u>	<u>Description</u>	<u>Due Date</u>	<u>Submitted to DNFSB</u>
5.6.3.1c	Proposed Content and Format of Tank-by-Tank Safety Status Evaluation	1/31/97	
5.6.3.1d	Updated HTCEs	6/30/97	
5.6.3.1e	Verification of Headspace Homogeneity	10/31/97	
5.6.3.1f	Standard Inventory Estimates for All Tanks.	11/30/97	
5.6.3.1g	Completion of High Priority Tanks Sampling and Analysis.	3/31/98	
5.6.3.1h	Tank-by-Tank Safety Status Evaluation.	7/31/98	
5.6.3.1i	Update Tank Content Models	12/31/98	
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Gas Safety Issue is scheduled to be issued in December 1996 (*Milestone 5.4.3.5h*). This topical report will describe the current understanding of the issue and future work for resolution.

**a) Amount and composition of gas retained in the wastes.** Resolution of the Flammable Gas USQ and Safety Issue requires an understanding of the phenomenology with regard to the nature and amount of the stored gas mixture for each tank. Once the information has been obtained, an evaluation is conducted to ascertain if the existing Authorization Basis bounds the noted condition. If conditions are not bounded, the USQ will remain open until additional analyses are completed. The safety analyses used a bounding gas volume calculated with the gas retention model. Actual measurements from tank SY-101 gas releases indicate that the gas retention model conservatively overestimated gas volumes (Brewster et al. 1995).

Gas composition and the energy it can release has a direct influence on the consequences from a deflagration. As with the gas volume, a bounding approach has been used. The approach postulates a gas composition that results in the most energetic burn. As data are obtained on the gas composition for each tank, the analyses can be refined, possibly reducing consequences for the events analyzed in the safety assessment.

Resolution of the Flammable Gas Safety Issue requires verification that the gas retention model bounds the amount of stored gas within the waste. Gas measurement devices include the voidmeter and retained gas sampler. The voidmeter measures the non-dissolved gas content. The retained gas sampler will provide data on the amount and composition of stored gas, including dissolved gas, such as ammonia. Although the voidmeter has been used in selected DSTs, it may not be able to penetrate saltcake or sludge in some SSTs. The retained gas sampler may be the only device capable of measuring retained gas volume and composition in these tanks. This device will be tested in DSTs AW-101, AN-103, AN-104, AN-105, and in SST A-101 (e.g., Hey 1996, Bates 1995) (*Milestone 5.4.3.5k*). The DSTs were selected because they have the most significant episodic releases and A-101 was selected to evaluate the retained gas sampler in an SST. If the retained gas sampler performance is satisfactory, a future deployment schedule will be developed (*Milestone 5.4.3.5k*).

**b) Understanding the mechanisms for gas generation, retention and release.** A gas generation model has been developed (Hopkins 1994). Current efforts are focused on conducting tests on selected tank waste samples to provide data on rates of generation and types of gases produced. Data from tank sample analyses and laboratory experiments will be used to refine the gas generation model (*Milestone 5.4.3.5l*) and should help to set limits on evaporator slurry output to avoid creating future flammable gas tanks and better understand if interim stabilization can resolve the gas problem in selected SSTs.

The physics of gas retention and release for SST waste is not well understood. Modeling efforts indicate that the maximum void volume for SST wastes could range from 14 to 40% of the total waste volume and the releasable fraction of the retained gas could range from zero to 47%. Laboratory tests are in progress to gain more insight into these phenomena.

Additional equipment has been developed to measure waste density and viscosity. Measurements have been conducted on three DSTs (SY-101, SY-103, and AW-101). Data obtained on density, viscosity, and void fraction should help provide an understanding of the SST waste gas retention phenomenon.

**c) Updating the Authorization Basis for the Manage Tank Waste Function.** Results from the evaluations described above will be used to confirm that tank conditions are bounded by the safety analyses. The Flammable Gas USQ will remain open until bounded by safety analyses.



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Safety assessments are in progress for saltwell pumping (interim stabilization) and rotary mode core sampling in flammable gas tanks. These assessments are scheduled to be approved and incorporated into the Authorization Basis in Calendar Year 1996 (*Milestones 5.4.3.5c, e*).

**d) Uncertainties.** Estimates of the retained gas have had fairly large uncertainties, because of inadequate knowledge about the waste physical properties and axial distribution of gas within the waste. However, the estimates are sufficiently conservative to bound anticipated occurrences.

Core sampling and subsequent analyses introduce uncertainties because the waste is altered. Measurements made in the laboratory hot cells do not truly reflect actual gaseous content of the waste. For example, the samples cool down to hot cell temperatures, resulting in changes in the amount and volume of solids. This affects both the density and physical property evaluations. Handling the sample (core sampling, extrusion, sub-sample preparation, and loading of a sample into test equipment) also has an influence on the measured viscosity and shear strength of the waste. To reduce this source of uncertainty, density and viscosity are being measured in-situ and the retained gas sampler was developed.

For the tests conducted to date, the uncertainty of the stored gas volume based on the voidmeter data is approximately  $\pm 25\%$ . As the actual data are obtained, this uncertainty should be reduced.

The gas monitoring instrumentation for hydrogen has a detection limit an order of magnitude below the control limit. Therefore, the sensitivity of the gas monitoring equipment is adequate to detect gas releases well below the control limit.

**e) Characterization needs.** Characterization is focused on understanding the phenomena associated with flammable gas generation/retention, headspace vapor mixing, and variations in vapor concentrations due to tank breathing; and on determining tank headspace flammable gas concentrations.

Retained gas sampling is planned for DSTs AW-101, AN-103, AN-104, AN-105, and in SST A-101. This sample data will be used to demonstrate satisfactory performance of the retained gas sampler (*Milestone 5.4.3.5k*). After the device has been shown to provide the requisite information, a schedule will be prepared for its use in selected SSTs. Data from the retained gas sampler will be used to refine gas generation and retention models (*Milestones 5.4.3.5k, l*) and should help close the Flammable Gas USQ. Data from these samples should improve the understanding of the gas generation and retention phenomena. Voidmeter and viscometer tests will be conducted in selected DSTs to provide basic parameters for calculating the amount of stored gas (*Milestone 5.4.3.5j*). A total of eighteen vapor samples will be analyzed from three tanks to confirm the headspace vapor mixing phenomenon (*Milestone 5.6.3.1e*). In addition, twenty vapor samples will be analyzed from four additional tanks to improve the understanding of phenomenon associated with headspace vapor content variations due to tank breathing (passive ventilation) (*Milestone 5.6.3.1e*). Six of the twenty vapor samples have been completed.

Sampling the headspaces of passively ventilated SSTs for steady-state flammable gas concentrations [via the Safety Screening DQO (Dukelow et al. 1995)] needs to be completed (*Milestone 5.4.3.5g*). The results can then be compared with calculations for steady-state flammable gas concentrations in the headspace.

**f) Summary of approach.** The Flammable Gas Safety Issue will be resolved on a tank-by-tank basis. All passively ventilated SST headspaces will be sampled to determine steady-state flammable gas concentrations (*Milestone 5.4.3.5g*). Measurements of waste density, viscosity, void fraction, gas retention, and composition in selected tanks should allow refinement of gas

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- h. Letter reporting completion of supporting technical document on Flammable Gas Safety Issue. (This topical report will describe the current understanding of the issue and future work for resolution).  
Due Date: December 1996
- i. Letter reporting that external equipment spark sources in flammable gas tanks have been managed by controls or the equipment has been modified.  
Due Date: December 1996
- j. Letter reporting completion of voidmeter and viscometer readings in tanks AN-103, AN-104, and AN-105.  
Due Date: December 1996
- k. Letter reporting completion of retained gas sampling in tanks AW-101, AN-103, AN-104, AN-105, and A-101. If the retained gas sampling performance is satisfactory, include future deployment schedule.  
Due Date: March 1997
- l. Letter reporting refinement of flammable gas generation/retention models using void meter and retained gas sampling data.  
Due Date: May 1997

**5.4.3.6 High Heat**

**Statement:** Retrieve wastes from tank C-106.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Letter reporting completion of tank C-106 supernatant and sludge sampling and analysis.  
Due Date: October 1996
- b. Letter reporting completion of tank C-106 retrieval safety assessment.  
Due Date: July 1997
- c. Letter reporting initiation of tank C-106 waste retrieval.  
Due Date: October 1997
- d. Letter reporting completion of topical report to resolve the High Heat Safety Issue.  
Due Date: May 1998

**5.4.3.7 Criticality**

**Statement:** Resolve the Criticality Safety Issue.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Letter reporting completion of topical report to resolve the Criticality Safety Issue.  
Due Date: December 1996

**5.5 ISSUE: DISPOSAL PROGRAM DATA REQUIREMENTS**

This section describes the approach for acquiring information necessary for the Disposal Program process development.

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- h. Letter reporting completion of supporting technical document on Flammable Gas Safety Issue. (This topical report will describe the current understanding of the issue and future work for resolution).  
Due Date: December 1996
- i. Letter reporting that external equipment spark sources in flammable gas tanks have been managed by controls or the equipment has been modified.  
Due Date: December 1996
- j. Letter reporting completion of voidmeter and viscometer readings in tanks AN-103, AN-104, and AN-105.  
Due Date: December 1996
- k. Letter reporting completion of retained gas sampling in tanks AW-101, AN-103, AN-104, AN-105, and A-101. If the retained gas sampling performance is satisfactory, include future deployment schedule.  
Due Date: March 1997
- l. Letter reporting refinement of flammable gas generation/retention models using void meter and retained gas sampling data.  
Due Date: May 1997

**5.4.3.6 High Heat**

**Statement:** Retrieve wastes from tank C-106.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Letter reporting completion of tank C-106 supernatant and sludge sampling and analysis.  
Due Date: October 1996
- b. Letter reporting completion of tank C-106 retrieval safety assessment.  
Due Date: July 1997
- c. Letter reporting initiation of tank C-106 waste retrieval.  
Due Date: October 1997
- d. Letter reporting completion of topical report to resolve the High Heat Safety Issue.  
Due Date: May 1998

**5.4.3.7 Criticality**

**Statement:** Resolve the Criticality Safety Issue.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable facilities and programs:** TWRS

**Milestone deliverables/due dates:**

- a. Letter reporting completion of topical report to resolve the Criticality Safety Issue.  
Due Date: December 1996

**5.5.6.1 Disposal Program Characterization**

**Statement:** Complete sampling and analysis of *Tank Waste Characterization Basis* (Brown et al. 1995) tanks for disposal.

**Responsible Manager:** Assistant Manager, TWRS

**Applicable Facilities and Programs:** TWRS

**Milestone deliverables/due date:**

- a. Letter report completion of *Tank Waste Characterization Basis* (Brown et al. 1995) High Priority Tanks sampling and analysis for the Disposal Program.  
Due Date: March 1998