



The Secretary of Energy

Washington, DC 20585

October 29, 1999

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Recommendation 93-5 encouraged acceleration of the sampling and evaluation of Hanford tank wastes in support of safe operation. The Department has completed the commitments identified under its implementation plan for this recommendation, and proposes closure of the recommendation.

A summary of responsive actions is provided in enclosure one. The second enclosure identifies the documentation of technical resolution for each commitment in the Department's current Implementation Plan. The third enclosure identifies documentation of closure for commitments from the previous revision of the Implementation Plan. The Department has completed the commitments identified under its implementation plan for this recommendation, and proposes closure of the recommendation.

Hanford tank waste characterization will continue for tank monitoring, tank waste movements, and for planning waste disposition. The Department's Office of River Protection is functioning effectively using Integrated Safety Management to support safe disposition of the tank wastes. Sampling and analysis processes have been institutionalized and integrated with work planning. The intent of this recommendation is met.

The Department is pleased with the constructive efforts of the Defense Nuclear Facilities Safety Board in focusing on risk reduction for the Hanford tanks. If you have any questions, please contact me or have your staff contact Ms. Carolyn L. Huntoon, Assistant Secretary for Environmental Management, at (202) 586-7710 or Mr. Mark W. Frei, Acting Deputy Assistant Secretary for Waste Management, Environmental Management, at (202) 586-0370.

Yours sincerely,

A handwritten signature in black ink that reads "Bill Richardson".

Bill Richardson

Enclosures



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**Summary Justification for Closure of
DNFSB Recommendation 93-5**

The Defense Nuclear Facilities Safety Board Recommendation 93-5 of July 19, 1993, refocused Department of Energy efforts to characterize wastes stored in tanks at the Hanford Tank Farms. The Board's recommendation cited the slow pace of progress at tank waste characterization and expressed concerns about the sampling efforts themselves. It stated, "... DOE needs to take action to accelerate and strengthen the management of the characterization effort. ..." The Department's Implementation Plan, as revised, identified the specific actions determined to be responsive to the recommendation and to satisfy the underlying safety concerns. All actions of the Implementation Plan are completed, and appropriate documentation is identified in enclosures two and three. Enclosure two identifies documentation of closure for milestones in the current version of the department's Implementation Plan. Enclosure three identifies documentation of closure for milestones in the earlier version of the Implementation Plan. Enclosure three is excerpted from the current Implementation Plan. Specific Board recommendations are quoted below in bold type. Each is followed by a summary of how the Department addressed the concern.

"1. Undertake a comprehensive reexamination and restructuring of the characterization effort with the objective of accelerating sample schedules, strengthening technical management of the effort, and completing safety-related sampling and analysis of watch list tanks within a target period of two years, and the remainder of the tanks by a year later;"

Comprehensive Reexamination and Restructuring

Management of the characterization project was strengthened. In 1994 DOE established the Characterization Program Office to centralize tank characterization project planning, tracking, financial management, and reporting. The Characterization Project was established in 1995 to bring together all assets required to carry out tank characterization under one senior manager. This project organization has effectively improved the efficiency of sampling and laboratory operations. In 1999, to further promote integration with other Office of River Protection programmatic efforts, responsibility for characterization supporting retrieval planning and the tank farms ground water and vadose programs were added to the Characterization Program Office.

The characterization project is budgeted and managed separately from the tank farm projects it supports, but project plans and schedules for these related projects are integrated in the Multi-Year Work Plan and schedules. These integrated plans are under baseline controls to ensure that formal and integrated decisions are made based upon integrated priorities and resource needs. Specific characterization plans are prepared and documented annually.

Accelerating Sample Schedules

Enclosure 1

By October 1998, all tanks had been vapor sampled and 132 tanks had been fully sampled and analyzed for safety screening. As documented in Technical Basis for the Determination That Current Characterization Data and Processes Are Sufficient to Ensure Safe Storage and to Design Waste Disposal Facilities, HNF-4232, Rev. 0, June 1999, the data obtained were sufficient to support safe storage of the waste and design of the retrieval of waste for vitrification feed.

Management processes for determining sample needs were restructured in support of prioritization of tank characterization, e.g., identifying chemical and radiological analyses required to resolve operational and safety concerns, and performing sample analyses by priority while saving samples for future and lower priority analyses.

Strengthening Technical Management

Characterization project personnel were trained in program management, systems engineering procedures, operating procedures, safety processes and safety requirements. New project personnel with chemistry backgrounds were selected and assigned to enhance technical management of the project.

The technical expertise supporting the Characterization Program was improved using outside technical resources, including Los Alamos National Laboratory (LANL), University of Washington, Oak Ridge National Laboratory (ORNL), Pacific Northwest National Laboratory (PNNL), ICF Kaiser Hanford Co., the Tank Characterization Advisory Panel, the Tank Sampling Advisory Panel, Management Systems Inc., Nuclear Utility Services, Sonalyst Corp., and workshops for senior scientists in relevant fields.

Completing Safety Related Sampling and Analysis

Of the 177 large tanks at the Tank Waste Remediation System, all have been vapor sampled and 132 have been adequately sampled and safety evaluations performed based upon sample characterization of contents. The remaining tanks have been characterized based upon knowledge of waste sources and past operations, past characterization data including characterization of other tanks with the same waste sources, and some limited sampling and analysis. All tanks are sufficiently characterized to support safety of storage and planning for Phase One of waste retrieval and vitrification. See enclosure two, commitment 5.6.3.1j.

All available data on waste generation, storage and processing history were collected to provide characterization information and to target sampling and analysis priorities and needs. Data were assembled in an electronic data base to enable ease of access and use. New sample data is added, as it is completed.

The tank farms' safety analysis was revised and safety systems and monitoring equipment were upgraded, based in part on waste characterization, hazard analysis, waste and tank monitoring, and characterization dynamics as waste ages and decomposes or decays. Operating controls were

Enclosure 1

implemented to assure that risks and uncertainties are acceptable. A revised Basis for Interim Operations and Technical Safety Requirements (operational controls) were implemented.

An Integrated Safety Management system responsive to DNFSB Recommendation 95-2 was developed and implemented. Implementation was verified.

Safety issues identified before the recommendation and included in the implementation plan were resolved. Tank watch lists were revised and closed based on characterization and safety analyses. Safety concerns were resolved as follows:

1. Ferrocyanide waste concentrations were too low to pose a reaction hazard, and no plausible concentration mechanism exists. See enclosure two, commitment 5.4.3.2a.
2. Flammable gas hazards have been identified and are monitored for specific tanks. Controls are imposed to prevent development or ignition of explosive mixtures. See enclosure two, commitments 5.4.3.1c, 5.4.3.5g, 5.4.3.5h, 5.4.3.5i and 5.4.3.5l.
3. Organic complexant tanks were identified, and concentrations determined to be too low to sustain a propagating exothermic reaction. Characterization information was used to prioritize liquid waste retrieval from single shell tanks. See enclosure two, commitment 5.4.3.3a.
4. Organic solvent tanks were identified, vapor space monitoring and controls imposed to assure safety. See enclosure two, commitments 5.4.3.4a, and 5.4.3.4c.
5. High heat generation in one single shell tank (C-106) from radioactive decay of sludge was evaluated and cooling requirements confirmed pending sludge removal. Sufficient sludge was removed (4 feet of what was originally a 6 feet sludge layer) to resolve the concern, which was based upon need to add water for evaporative cooling. See enclosure two, commitment 5.4.3.6d. Removal of remaining sludge continues. More than five feet seven inches of sludge has been removed, leaving approximately 5 inches of sludge currently in the tank (September 22, 1999, status). The highest measured temperature in this tank is below 125 degrees Fahrenheit.
6. Fissile material characterization confirmed the absence of a sufficient quantity of fissionable material or a mechanism for concentrating any such material in the tanks to pose a criticality hazard. See enclosure two, commitment 5.4.3.7a.

“1.a. In accordance with the above, give priority in the schedule of tanks to be sampled to the watch list tanks and others with identified safety problems, and priority to the chemical analyses providing information important to ensuring safety in the near term during the period of custodial management. Other analyses, required by statutes such as the Resource Conservation and Recovery Act prior to final disposition of the waste, should not be cause

for delay of safety-related analyses. In most cases, analyses needed for long-term disposition may be postponed until more pressing safety-related analyses are completed.”

Prioritize Characterization Sample and Analysis Schedules

Characterization information needs are integrated into a single prioritized sampling plan which is updated annually. Twenty-eight high priority tanks were selected for characterization. Twenty-one were fully sampled and evaluated, and remaining tanks were characterized based on partial samples and other characterization information. Results were evaluated from a safety perspective and reported. Safety watch list tanks were given priority. They were sampled, analyzed and safety assessments were conducted and documented.

Part of the understanding of tank wastes and the safety hazards they might pose was derived from experimentation using wastes in laboratory quantities to evaluate reaction rates, heat generation rates, and bounding quantities which were the minimum amounts or concentrations capable of creating or sustaining adverse reactions. This information helped to prioritize tank sampling, eliminate safety concerns where lesser quantities of reactants were present, and helped identify controls to prevent problems.

Single shell tank stabilization schedules were revised based upon characterization to accelerate removal of organic complexant waste, reducing more rapidly the risk of possible future tank leaks to the environment.

“1.b. Reexamine protocols for gaining access to the tanks for sampling with the objective of simplifying documentation and approval requirements.”

Reexamine protocols

Standardized methods and work packages were developed to streamline and improve the safety requirements for entry into the tanks for sampling. This included establishing consistent ignition control standards for sampling activities while on or in the dome space of the tanks. These standardized requirements were reviewed and approved by DOE and included in the administrative controls associated with the Tank Farms Authorization Basis.

“1.c. Increase the laboratory capacity and activities dedicated to tank sampling analysis.”

Increase laboratory capacity

Site labs were able to expand capacity to keep up with the sampling program. Analytical laboratory capacity has increased 42% and laboratory output 400% since mid 1994. Technicians were trained and two laboratories outfitted to carry out tank vapor phase analysis. New instrumentation was developed (e.g., viscometer and void fraction meter) and new instrumentation purchased (e.g., mass spectrometers, X-ray units).

Initial studies concluded that the Characterization Program would require extensive use of off-site laboratories to keep up with the analytical load. Laboratory facilities at INEEL and LANL were expanded to accommodate Hanford tank sample analysis. Subsequent review and reduction in the analyses required to support project goals rendered use of these facilities unnecessary. PNNL vapor analytic laboratory facilities, and Hanford laboratories in Buildings 222S and 325 were initially used for this project, but as sample demands were completed, the laboratory in 325 was no longer needed. ORNL provides limited specialized sorbent traps and spectrographic analyses.

Accelerate sampling and analysis activities

Tank sampling and analyses were completed and reported with the following accelerated results by fiscal years:

TANK SAMPLING BY YEAR

SAMPLE TYPE	FY94	FY95	FY96	FY97	FY98
core	4	39	61	42	30
auger	7	46	9	0	0
vapor	36	40	46	42	10
grab	11	30	27	13	34
year total	58	155	143	97	74
cumulative total	58	213	356	453	527

A report was issued June 23, 1999, which documented the technical basis and determination that characterization data and processes are sufficient to assure safe storage and to design waste disposal facilities (see enclosure two, commitment 5.6.3.1j).

“1.c.i. Expedite efforts to obtain and begin utilizing additional sampling and analytical equipment now being procured, and the training of personnel needed for an enlarged throughput capacity.”

Use Additional Sampling Systems

Three Rotary Mode Core Sampling Systems were placed in service. Modifications were completed that improved rotary mode core sampling truck availability from 17% to more than

60%. Three new drilling crews were hired and all drilling crews trained and certified. Push mode sample recovery was increased to more than 90%. An improved auger design enhanced near surface sample recovery. X-ray units were added to the core sampling systems to provide real time determination of sample recovery. Vapor monitoring equipment was placed on all flammable gas tanks.

“1.c.ii. Explore availability and utility of laboratory services on- and off-site, such as Hanford’s Fuel Materials and Examination Facility and the INEL and LANL laboratories, for accelerating the waste characterization effort.”

Use Additional Lab Facilities

See 1.c. above. Use of off-site laboratories was initially hindered by unavailability of shipping casks that could accommodate core samples. PAS-1 casks were purchased, but by the time they were delivered, on-site laboratory capacity had increased enough to accommodate the analysis load.

“2. Integrate the characterization effort into the systems engineering effort for the Tank Waste Remediation System:”

Systems Integration

A TWRS System Engineering Management Plan (1996), a Baseline System Description (1996), Mission Analysis (1995), a Functions and Requirements (1996), a Risk Management List (1995), and a Risk Management Plan (1995) were issued.

Characterization managers and personnel were trained in systems engineering. Processes were implemented which integrated characterization project planning and resource programming with the operations and project planning for safety issue resolution including watch list tank issues, with safety analyses and facility/activity safety evaluations and controls development, with tank upgrade project planning and execution, single shell tank interim stabilization plans and operations, tank waste retrieval and vitrification feed plans and feed specification development, environmental regulatory negotiations, etc.

2.a. Schedule tank sampling consistent with engineering and planning for removal, pre-treatment, and vitrification of the tank wastes.

Integrate sampling schedules

Responsibility for the Retrieval Program rests with the same ORP Division Director who has responsibility for the Characterization Program and the TWRS Ground water and Vadose Zone Program. Data Quality Objectives (DQOs) have been developed by the Retrieval Program and integrated into the characterization planning. The Privatization Contractor is responsible for

Enclosure 1

determining sampling and analysis requirements (DQOs) for pretreatment and vitrification. These needs are also factored into the characterization planning. Sampling for all programs is scheduled and planned by a single, centralized characterization planning group. Sampling schedules are developed yearly and are updated consistent with changing program needs. Sampling schedules are maintained under configuration control.

Among the objectives for organization of characterization efforts as a project were to employ processes which integrate characterization plans with needs of supported projects, to develop integrated sampling schedules and analysis requirements, to allocate needed personnel resources and financial support, to prioritize sampling and analysis, and to develop data bases which are useful for all related efforts. Tank characterization has contributed to the definition of vitrification feed specifications and has enabled multi attribute analysis of the most efficient plans for waste retrieval and feed. Annual characterization schedules are developed and updated as necessary for this purpose. This enables review by related projects and managers, including regulatory and oversight bodies.

2.b. Critically examine the list of chemical analyses done on samples to establish the smallest set needed to satisfy safety requirements.

Reevaluate chemical analysis requirements

Systematic processes for identifying specific characterization data requirements and objectives are used to ensure that all essential samples and analyses are performed. The DQO process is used to develop sampling and analysis requirements for each program including tank safety. A limited set of screening analyses was determined to be sufficient for initial identification of potential safety problems. Individual DQOs were developed for each safety issue. Historical data and the screening analyses were used to determine which safety DQOs might be applicable to a given tank. It was determined that many analyses previously performed were unnecessary to support safe operations, and that elimination of unnecessary analyses accelerated attainment of the safety objectives. Requirements for both sampling and for analyses are prioritized and limited to optimize use of resources. Sample procedures also provide for excess sample materials to be preserved to enable analysis prioritization (delayed analysis) and potentially to permit analyses in response to evolving needs.

2.c. Strengthen the management and conduct of the sampling operations.

Management of sampling operations

See above under 1, 1.c, and 1.c.i. Contractor incentives and clear lines of responsibility and accountability have facilitated acceleration of the objective resolution for safety of storage and operational needs. Concurrent and related safety and environmental technical evaluations have reduced the uncertainty and enabled more rapid reduction of the risks associated with waste characterization and controls. The current characterizations are sufficient to assure safety of

Enclosure 1

storage. Characterization status and protocols are sufficient to enable efficient planning and safe execution of waste retrieval and processing operations.

The implementation of the Integrated Safety Management System has institutionalized integration of sampling operations with work planning, hazard assessment, and safe work execution. Integrated Safety Management Verification(Phase Two) has been completed for TWRS.

A listing of numerous reports and documents follow in enclosures two and three. These documents describe in detail the resolution of the Department's commitments made in response to the DNFSB Recommendation.

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

COMMITMENT NUMBER AND TITLE	DESCRIPTION	DOE CLOSURE PROPOSED	TECHNICAL DOCUMENT TITLE	TECHNICAL DOCUMENT NUMBER
5.4.3.1a Comprehensive Source Terms Report	Letter reporting completion of Comprehensive Source Terms Report.	DOE/RL letter 96-MSD-114 dated June 30, 1996.	Development of Radiological Concentrations and Unit Liter Doses for Tank Waste Remediation System Final Safety Analysis Report Radiological Consequence Calculations	WHC-SD-WM-SARR-037, Rev. 0
5.4.3.1b Report on Lightning Evaluation	Report on lightning evaluation, and if the probability exceeds 1×10^{-6} , evaluate potential mitigating options for lightning strikes.	DOE/RL letter 96-WDS-173 dated August 30, 1996.	Probability, Consequences, and Mitigation for Lightning Strikes to Hanford Site High-Level Waste Tanks	WHC-SD-WM-ES-387, Rev. 1
5.4.3.1c Approved BIO	Approved BIO	DOE/RL letter 96-MSD-391 dated December 30, 1996.	Tank Waste Remediation System Basis for Interim Operation	WHC-SD-WM-BIO-001, Rev. 0
5.4.3.1d Approved FSAR.	TWRS FSAR and TSR approved by DOE approval authority (RL Manager).	DOE/ORP letter 99- TSD-028 dated April 6, 1999	1) Final Safety Analysis Report (FSAR) 2) FSAR Technical Safety Requirements	(1) HNF-SD-WM-SAR-067, Rev. 0 (2) HNF-SD-WM-TSR-006, Rev. 0S
5.4.3.2a Topical Report on Resolution of Ferrocyanide Safety Issue.	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).	DOE/RL letter 96- WSD-198 dated September 23, 1996	Assessment of the Potential for Ferrocyanide Propagating Reaction Accidents	WHC-SD-WM-SARR-038, Rev. 1
5.4.3.3a Supporting Technical Document on Organic Complexant Safety Issue	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).	Letter 97-WSD-169 dated June 27, 1997	1) Safety Criteria for Organic Watch List Tanks at the Hanford Site 2) Organic Complexant Topical Report	1) WHC-SD-WM-SARR-033, Rev. 1 2) HNF-SD-WM-CN-058, Rev. 1

ENCLOSURE 2

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5.4.3.3b Confirm Safe Storage Criteria, and Organic Solubility and Aging Effects on Fuel Content	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.	DOE/RL letter 99-SCD-004 dated November 25, 1998.	Organic Complexant Topical Report	HNF-3588 Rev. 0
5.4.3.4a Safety Assessment Covering Pool and Entrained Organic Solvent Fires	Letter reporting completion of safety assessment covering pool and entrained organic solvent fires.	DOE/RL letter 96-WSD-267 dated October 21, 1996	1) Excerpts from Chapter 3 of the draft Final Safety Analysis Report (FSAR) 2) Analysis and Consequences of Postulated Solvent Fires in Hanford Site Waste Tanks	1) None 2) WHC-SD-WM-CN-032, Rev. 0
5.4.3.4b Organic Speciation of Core Samples for BY-108 and BY-110, and Auger Samples for C-102.	Letter reporting completion of organic speciation of core samples for BY-108 and BY-110, and auger samples for C-102.	DOE/RL letter 96-WSD-268 dated October 21, 1996	Comparison of Organic Constituents Found in the Condensed and Vapor Phases of Tanks 241-BY-108, 241-BY-110, and 241-C-102	WHC-EP-0919
5.4.3.4c Supporting Technical Document for Organic Solvent Safety Issue.	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).	DOE/RL letter 96-WSD-344 dated December 23, 1996	Organic Solvent Topical	WHC-SD-WM-SARR-036, Rev. 0
5.4.3.4d Vapor Sampling of all SSTs.	Letter reporting completion of vapor sampling of all SSTs.	DOE/ORP letter 99-PDD-023 dated April 15, 1999	Organic Solvent Topical Report	HNF-4240, Rev. 0
5.4.3.4e Adequate Vent Path in All SSTs Suspected of Containing Organic Solvents	Letter reporting adequate vent path in all SSTs suspected of containing organic solvents.	DOE/ORP letter 99-PDD-023 dated April 15, 1999	Organic Solvent Topical Report	HNF-4240, Rev. 0
5.4.3.4f Letter Reporting Completion of Vapor Sampling of All DSTs.	Letter reporting completion of vapor sampling of all DSTs.	DOE/ORP letter 99-PDD-023 dated April 15, 1999	Organic Solvent Topical Report	HNF-4240, Rev. 0

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

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5.4.3.5a Analyses to Determine If Additional Tanks Have Potential to Exceed 25% of the LFL.	Report documenting analyses to determine if additional tanks have potential to exceed 25% of the LFL.	DOE/RL letter 96-WSD-267 dated October 21, 1996.	(1) Methodology for Flammable Gas Evaluations (2) Evaluation of Hanford Tanks for Trapped Gas (3) Evaluation of Recommendation for Addition of tanks to the Flammable Gas Watch List	(1) WHC-SD-WM-TI-724, Rev. 1 (2) WHC-SD-WM-ER-526, Rev. 1 (3) WHC-SD-WM-ER-594, Rev. 0
5.4.3.5b Gas Monitoring Instrumentation Upgrade Needs for Additional Tanks with the Potential to Exceed 25% of the LFL.	Letter reporting evaluation of gas monitoring instrumentation upgrade needs for additional tanks with the potential to exceed 25% of the LFL.	DOE/RL letter 96-WSD-268 dated October 21, 1996.	Flammable Gas Program: Strategy for Continuous Gas Monitoring	Attachment
5.4.3.5c Safety Assessment for Rotary Mode Core Sampling in Flammable Gas Tanks	Letter reporting approval of safety assessment for rotary mode core sampling in flammable gas tanks and documenting incorporation into the ISB.	DOE/RL letter 96-WSD-234 dated September 27, 1996	1) A Safety Assessment of Rotary Mode Core Sampling in Flammable Gas Single Shell Tanks: Hanford Site, Richland, Washington. 2) Single Shell Tank Interim Operational Safety Requirements. 3) Hanford Site Tank Farm Facilities Interim Safety Basis	1) WHC-SD-WM-SAD-035, Rev. 0-A 2) WHC-SD-WM-OSR-005, Rev 0-E 3) WHC-SD-WM-ISB-001, Rev 0-K
5.4.3.5e Safety Assessment for Saltwell Pumping in Flammable Gas Tanks	Letter reporting approval of safety assessment for saltwell pumping in flammable gas tanks and documenting incorporation into the Authorization Basis.	DOE/RL letter 96-WSD-293 dated October 31, 1996	A Safety Assessment for Salt Well Jet Pumping Operations in Tank 241-A-101: Hanford Site, Richland, Washington	WHC-SD-WM-SAD-036, Rev. 0
5.4.3.5f Letter Reporting Completion of AN Tank Farm Ventilation Upgrade.	Letter reporting completion of AN Tank Farm ventilation upgrade.	DOE/RL letter 97-WSD-011 dated January 30, 1997	Data sheets	Attachment

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

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5.4.3.5g Flammable Gas Safety Screening of Remaining Passively Ventilated SSTs	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).	DOE/RL letter 96-WSD-301 dated November 12, 1996	Results of Vapor Phase Sampling of the Hanford Passively Ventilated Single-Shell Tanks	Attachment
5.4.3.5h Supporting Technical Document on Flammable Gas Safety Issue.	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).	DOE/RL letter 97-WSD-012 dated January 30, 1997	Flammable Gas Program Topical Report	WHC-SP-WM-1193, Rev. 2
5.4.3.5i External Equipment Spark Sources in Flammable Gas Tanks	Letter reporting that external equipment spark sources in flammable gas tanks have been managed by controls or the equipment has been modified.	DOE/RL letter 96-WSD-348 dated December 24, 1996	1) Flammable Gas/Slurry Growth Unreviewed Safety Question: Justification for Continued Operation for the Tank Farms at the Hanford Site 2) Tank Farms Justification for Continued Operations 007 Implementation Plan 3) Flammable Gas/Slurry Growth Unreviewed Safety Question: Justification for Continued Operation for the Tank Farms at the Hanford Site	1) WHC-SD-WM-JCO-007, Rev. 0 2) WHC-SD-WM-IMP-003, Rev. 0 3) WHC-SD-WM-JCO-007, Rev. 0A
5.4.3.5j Void meter and Viscometer Readings in Tanks AN-103, AN-104, and AN-105.	Letter reporting completion of void meter and viscometer readings in tanks AN-103, AN-104, and AN-105.	DOE/RL letter 96-WSD-334 dated December 18, 1996.	In Situ Rheology and Gas Volumes in Hanford Double-Shell Waste Tanks	PNNL-11296

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

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5.4.3.5k Retained Gas Sampling in Tanks AW-101, AN-103, AN-104, AN- 105, and A-101. 5.4.3.5l Refinement of Flammable Gas Generation/ Retention Models	Letter reporting completion of retained gas sampling in tanks AW- 101, AN-103, AN-104, AN-105, and U-103. If the retained gas sampling performance is satisfactory, include future deployment schedule.	DOE/RL letter 97-WSD-084 dated March 28, 1997	1) Preliminary Retained Gas Sampler Measurement Results for Hanford Waste tanks 241- AW-101, 241-A-101, 241-AN- 104, and 241-AN-103 2) Composition and Quantities of Retained Gas Measured in Hanford Waste Tanks 241-AW- 101, A-101, AN-105, AN-104, and AN-103.	1) PNNL letter report TWSFG 97.13. 2) PNNL-11450, Rev. 1
	Letter reporting refinement of flammable gas generation/retention models using void meter and retained gas sampling data.	97-WSD-127 dated May 27, 1997	Gas Retention and Release Behavior in Hanford Double- Shell Waste Tanks	PNNL-11536, Rev. 1
5.4.3.6a C-106 Supernatant Sampling and Analysis.	Letter reporting completion of tank C-106 supernatant sampling and analysis.	DOE/RL letter 96-WDD-171 dated October 30, 1996	Chemical and Chemically- Related Considerations Associated with Sluicing Tank C-106 Waste to Tank AY-102	WHC-SD-WM-TI-756, Rev. 1
5.4.3.6b C-106 Retrieval Safety Assessment.	Letter reporting completion of tank C-106 retrieval safety assessment.	DOE/RL letter 97-WSD-216 dated October 3, 1997.	1) Basis for Interim Operation, Addendum 1 2) Technical Safety Requirements, TSR-006 3) Waste Retrieval Sluicing System Project W-320 4) Unreviewed Safety Question Determination	1) HNF-SD-WM-BIO-001, ECN 640409 2) HNF-SD-WM-TSR-006, ECN 640410 3) HNF-SD-WM-IMP-005, Rev 0 4) TF-95-0105
5.4.3.6c Initiation of Tank C-106 Waste Retrieval.	Letter reporting initiation of tank C- 106 waste retrieval.	DOE/RL letter 99-WSD-004 dated November 25, 1998.	Letter	None Attached
5.4.3.6d Topical Report to Resolve the High Heat Safety Issue.	Letter reporting completion of topical report to resolve the High Heat Safety Issue.	DOE/RL letter 99-TSD-088 Dated September 23, 1999	Tank 241-C-106 High-Heat Safety Issue Resolution	HNF-3460
5.4.3.7a Topical Report to Resolve the Criticality Safety Issue.	Letter reporting completion of topical report to resolve the Criticality Safety Issue.	DOE/RL letter 96-WSD-320 dated December 18, 1996	Tank Farm Nuclear Criticality Review	WHC-SD-WM-TI-725, Rev 0

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

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5.5.6.1a Completion of High Priority Tanks Sampling and Analysis for the Disposal Program	Letter report completion of Tank Waste Characterization Basis (Brown et al. 1995) High Priority Tanks sampling and analysis for the Disposal Program.	DOE/RL letter 98-SCD-041 dated March 27, 1998.	High Priority Tank Sampling and Analysis Report	HNF-2337, Rev. 0
5.6.3.1a Comparison Between Truck and Cart Vapor Sampling Systems.	Letter reporting completion of comparison between truck and cart vapor sampling systems.	DOE/RL letter 96-WSD-249 dated September 27, 1996	Comparison of Vapor Sampling System (VSS) and In Situ Vapor Sampling (ISVS) Methods on Tanks C-107, BY-108, and S-102	PNNL-11186, Rev.1
5.6.3.1b Implementation of FTIR Moisture Analysis Capability in 222-S Laboratory.	Letter reporting implementation of FTIR moisture analysis capability in 222-S Laboratory.	DOE/RL letter 96-WSD-305 dated November 19, 1996	Letter	None Attached
5.6.3.1c Proposed Content and Format of Tank-by-Tank Safety Status Evaluation	Letter reporting submittal of proposed content and format for tank-by-tank safety status evaluation.	DOE/RL letter 97-WSD-004 dated January 30, 1997	Proposed Content and Format for Tank-by-Tank Safety Status Evaluation	Attachment
5.6.3.1d Updated HTCEs	Updated HTCEs	DOE/RL letter 97-WSD-136 dated June 6, 1997	(1) Historical Tank Content Estimate for the Northeast Quadrant of the Hanford 200 East Area (2) Historical Tank Content Estimate for the Southeast Quadrant of the Hanford 200 Areas (3) Historical Tank Content Estimate for the Northwest Quadrant of the Hanford 200 West Area (4) Historical Tank Content Estimate for the Southwest Quadrant of the Hanford 200 West Area	(1) WHC-SD-WM-ER-349, Rev. 1b (2) HNF-SD-WM-ER-350, Rev. 1 (3) HNF-SD-WM-ER-351, Rev. 1 (4) HNF-SD-WM-ER-352, Rev. 1

ENCLOSURE 2

Status of DNFSB 93-5 Implementation Plan Commitments

COMMITMENT NUMBER AND TITLE	DESCRIPTION	DOE CLOSURE PROPOSED	TECHNICAL DOCUMENT TITLE	TECHNICAL DOCUMENT NUMBER
5.6.3.1e Verification of Headspace Homogeneity and Temporal Variations	Letter reporting verification of headspace homogeneity and evaluation of variations in headspace vapor concentrations in passively ventilated tanks with changing atmospheric temperatures.	DOE/RL letter 97-SCD-034 dated October 22, 1997.	(1) Homogeneity of Passively Ventilated Waste Tanks (2) Seasonal Changes in the Composition of Passively Ventilated Waste Tank Headspaces	(1) PNNL-11640 (2) PNNL-11667
5.6.3.1f Standard Inventory Estimates for All Tanks.	Standard inventory estimates for all tanks.	DOE/RL letter 97-SCD-032 dated October 31, 1997.	Letter with data disk enclosure and Internet address information	None
5.6.3.1g Completion of High Priority Tanks Sampling and Analysis.	Letter report completion of Tank Waste Characterization Basis (Brown et al. 1995) High Priority Tanks sampling and analysis.	DOE/RL letter 98-SCD-041 dated March 27, 1998.	High Priority Tank Sampling and Analysis Report	HNF-2337, Rev. 0
5.6.3.1h Tank-by-Tank Safety Status Evaluation.	Letter reporting completion of tank-by-tank safety status evaluation.	DOE/RL letter 98-SCD-088 dated July 22, 1998.	Tank-by-Tank Safety Status Evaluation	HNF-2177, Rev. 0B
5.6.3.1i Update Tank Content Models	Update Tank Content Models or define limitations of the models.	DOE/RL letter 99-SCD-015 dated December 28, 1998.	Hanford Defined Waste Limitations and Improvements	HNF-3273, Rev. 0B
5.6.3.1j Completion of Core Sampling of All Tanks	Letter reporting completion of core sampling of all tanks (assumes no repeat sampling).	DOE/ORP letter 99-PDD-052 dated July 8, 1999	Technical Basis for the Determination that Current Characterization Data and Processes are Sufficient to Ensure Safe Storage and to Design Waste Disposal Facilities	HNF-4232, Rev. 0

DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1

APPENDIX E

RECOMMENDATION 93-5 COMPLETED ACTIONS

The table below documents those completed actions that are credited to each Recommendation 93-5 element and sub-element. Where the sub-element is noted to be "Closed," the completion of the commitments listed are considered to be adequate to close that sub-element. Where the sub-element is noted to be "Open," the commitments listed and the completion of the milestones listed in Section 5 of this document are considered adequate to close this sub-element.

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
Primary Element 1. (Open) - Undertake a comprehensive reexamination and restructuring of the characterization effort with the objectives of accelerating sampling schedules, strengthening technical management of the effort, and completing safety-related sampling and analysis of watch list tanks within a target period of two years, and the remainder of the tanks by a year later;		
1.1	Enhance Westinghouse Hanford Company (WHC) Characterization Program Management Staff.	DOE-RL letter 94-OCH-055 dated June 27, 1994
1.2	Reduce number of management layers in WHC TWRS to improve lines.	DOE-RL letter 94-OCH-056 dated June 30, 1994
3.1	Initiate construction of second and third rotary-mode core sampling trucks.	Reported closed as of November 1993 in the original Implementation Plan.
3.3	Complete qualification of first push-mode crew.	DOE-RL letter 94-OCH-021 dated June 30, 1994
3.5	Cognizant Engineer Training: Complete training and qualification requirements for sampling cognizant engineers.	DOE-RL letter 94-OCH-078 dated August 11, 1994
3.7	Complete qualification of first rotary-mode crews and vapor/grab/auger sampling crew.	DOE-RL letter 94-OCH-021 dated June 30, 1994
3.9	Develop detailed plans for acquiring and training additional crews for sampling trucks.	DOE-RL letter 94-OCH-021 dated June 30, 1994

**DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1**

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
3.11	<p>Deploy additional Rotary-Mode Core Sampling systems. Fabricate and/or procure new core sampling trucks and support equipment as indicated by Characterization Program needs. Current planning entails developing one complete system, and procuring one additional base drill rig. A design specification document and drawings, based on the design of the rotary-mode core sampling system, will be prepared. Documentation to initiate fabrication of equipment will be issued. Equipment for the Rotary Mode Core Sampling System includes a core sampling truck, nitrogen purge gas trailer, generator, support trailer, cask truck, and other ancillary equipment.</p>	<p>DOE-RL letter 95-CHD-089 dated October 4, 1995</p>
<p>Sub-Element 1.a (Open) - In accordance with the above, give priority in the schedule of tanks to be sampled to the watch list tanks and others with identified safety problems, and priority to the chemical analyses providing information important to ensuring safety in the near term during the period of custodial management. Other analyses, required by statutes such as the Resource Conservation and Recovery Act prior to final disposition of the waste, should not be cause for delay of safety-related analyses. In most cases, analyses needed for long term disposition may be postponed until more pressing safety-related analyses are completed.</p>		

DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
1.21	Complete DQOs for all TWRS program elements that may need data.	<ol style="list-style-type: none"> 1. Ferrocyanide Safety Issue DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 2. C-103 Vapor DQO Draft Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 3. C-103 Dip Sample DQO Final Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 4. C-106 High Heat DQO Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 5. Organic Safety Issue DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 6. Safety Screening Module DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 7. Waste Compatibility DQO Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 8. In-tank Generic Vapor DQO Final Draft Report: DOE-RL letter 95-TSD-123 dated September 29, 1995 9. Vapor Rotary Core DQO Final Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 10. Hydrogen Generating DQO Final Draft Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 11. Pretreatment DQO Draft Report: DOE-RL letter 94-CHD-113, dated November 4, 1994 12. HLW Immobilization DQO Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 13. LLW Immobilization DQO Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995
2.1	Complete DQOs for all six safety issues.	DOE-RL letter 95-TSD-116 dated September 12, 1995
2.2	Complete the safety screening DQO.	DOE-RL letter 95-TSD-116 dated September 12, 1995
<p>Sub-Element 1.b (Closed) - Re-examine protocols for gaining access to the tanks for sampling with the objective of simplifying documentation and approval requirements.</p>		

DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
4.1	Issue approved broad-based Environmental Assessment.	The Assessment, dated February 10, 1994, was signed out by Tara O'Toole, Assistant Secretary, on February 25, 1994
4.2	DOE-RL to submit a request for delegation of authority to DOE-HQ.	Request was submitted by DOE-RL on January 10, 1994. Approval was signed by Thomas Grumbly and Tara O'Toole on July 28, 1994
4.3	Obtain delegation of authority for DOE-RL to approve safety and environmental documentation for TWRS.	Request was submitted by DOE-RL on January 10, 1994. Approval was signed by Thomas Grumbly and Tara O'Toole on July 28, 1994
<p>Sub-Element 1.c (Closed) - Increase the laboratory capacity and activities dedicated to tank sample analysis:</p> <p>(i) Expedite efforts to obtain and begin utilizing additional sampling and analytical equipment now being procured, and the training of personnel needed for an enlarged through-put capacity.</p> <p>(ii) Explore availability and utility of laboratory services on- and off-site, such as Hanford's Fuel Materials and Examination Facility and the INEL and LANL laboratories, for accelerating the waste characterization effort.</p>		
5.3	New Extruder Operability.	DOE-RL letter 94-OCH-110 dated October 26, 1994
5.6	Evaluate Laboratory Staff Training.	DOE-RL letter 94-OCH-064 dated July 13, 1994
5.7	Develop and Implement Enhanced Training Plan for laboratory staff.	DOE-RL letter 94-OCH-064 dated July 13, 1994
5.9	Issue plan to upgrade INEL laboratory to ready-to-serve mode.	DOE-RL letter 94-OCH-046, dated June 28, 1994
5.10	Issue plan to upgrade Los Alamos National Laboratory (LANL) laboratory to ready-to-serve mode.	DOE-RL letter 94-OCH-045, dated June 30, 1994
5.12	Upgrade INEL Laboratory to ready-to-serve mode.	DOE-RL letter 94-CHD-127, dated November 4, 1994
5.13	Upgrade LANL Laboratory to ready-to-serve mode.	DOE-RL letter 95-CHD-025 to DNFSB dated April 10, 1995

**DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1**

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
Primary Element 2. (Open) - Integrate the characterization effort into the systems engineering effort for the Tank Waste Remediation System:		
1.12	All WHC Characterization Program management staff will complete Systems Engineering training.	DOE-RL letter 94-OCH-015, dated May 25, 1994
1.13	Detailed Functional Analysis Report.	DOE-RL letter 94-OCH-027, dated June 1, 1994
1.14	Complete characterization portions of the initial system engineering analysis result.	DOE-RL letter 94-OCH-066, dated June 30, 1994
Sub-Element 2.a (Open) - Schedule tank sampling consistent with engineering and planning for removal, pre-treatment, and vitrification of the tank wastes.		
	None	
Sub-Element 2.b (Closed) - Critically examine the list of chemical analyses done on samples to establish the smallest set needed to satisfy safety requirements.		

DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
1.21	Complete DQOs for all TWRS program elements that may need data.	<ol style="list-style-type: none"> 1. Ferrocyanide Safety Issue DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 2. C-103 Vapor DQO Draft Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 3. C-103 Dip Sample DQO Final Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 4. C-106 High Heat DQO Report: DOE-RL letter 95-TSD-115 dated September 12, 1995 5. Organic Safety Issue DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 6. Safety Screening Module DQO Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 7. Waste Compatibility DQO Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 8. In-tank Generic Vapor DQO Final Draft Report: DOE-RL letter 95-TSD-123 dated September 29, 1995 9. Vapor Rotary Core DQO Final Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 10. Hydrogen Generating DQO Final Draft Report: DOE-RL letter 95-TSD-116 dated September 12, 1995 11. Pretreatment DQO Draft Report: DOE-RL letter 94-CHD-113, dated November 4, 1994 12. HLW Immobilization DQO Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995 13. LLW Immobilization DQO Draft Report: DOE-RL letter 95-CHD-078 dated September 18, 1995.
2.1	Complete DQOs for all six safety issues.	DOE-RL letter 95-TSD-116 dated September 12, 1995
2.2	Complete the safety screening DQO.	DOE-RL letter 95-TSD-116 dated September 12, 1995
Sub-Element 2.c (Closed) - Strengthen the management and conduct of the sampling operations.		
1.1	Enhance WHC Characterization Program Management Staff.	DOE-RL letter 94-OCH-055 dated June 27, 1994

**DOE/RL 94-0001
RECOMMENDATION 93-5 IMPLEMENTATION PLAN, REVISION 1**

Table E-1: Recommendation 93-5 Original Implementation Plan Completed Actions Credited for Closure of the Recommendation

Commitment		Closure Document
#	Description	
1.2	Reduce number of management layers in WHC TWRS to improve lines of communication.	DOE-RL letter 94-OCH-056, dated June 30, 1994
1.3	Improve DOE-RL Oversight.	DOE-RL letter 94-OCH-023 dated May 26, 1994
1.6	Define responsibilities of key WHC managers associated with Characterization Program.	DOE-RL letter 94-OCH-068 dated June 12, 1994