RMIS View/Print Document Cover Sheet

This document was retrieved from the Boeing ISEARCH System.

Accession #: D196115700

Document #: SD-WM-TSAP-048

Title/Desc:

TANK 241U105 PUSH MODE CORE SAMPLING & ANALYSIS
PLAN

STA-4 (3)

OCT 04 1995		ENGINEERING DATA TRANSMITTAL	Page 1 of 1
		1. EDT	No 613121

2. To: (Receiving Organization) Distribution	3. From: (Originating Organization) Characterization Plans, Coordination and Reports	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: Tank 241-U-105/Waste Management/CPCR/Technical Basis Characterization	6. Cog. Engr.: Kevin E. Bell	7. Purchase Order No.: N/A
8. Originator Remarks: This document is being released into the supporting document system for retrievability.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks: For release.		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: 09/25/95

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Trans- mittal	Originator Dispo- sition	Receiver Dispo- sition
1	WHC-SD-WM-TSAP-048	N/A	0	Tank 241-U-105 Push Mode Core Sampling and Analysis Plan	Q	2	1	1

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)									
(G)	(H)	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN
2	1	Cog.Eng. K.E. Bell	<i>Kevin Bell</i>	9/25/95					
2	1	Cog. Mgr. J.G. Kristofzski	<i>J.G. Kristofzski</i>	9/29/95					
2	1	QA T.C. Triple	<i>Tom Brand</i>	9-29-95					
		Safety							
		Env.							
		CPO	<i>K. E. Myers</i>	10-3-95					

18. A.E. Young <i>A.E. Young</i> 9-25-95 Signature of EDT Originator	19. N/A Authorized Representative Date for Receiving Organization	20. <i>J.G. Kristofzski</i> 9/29/95 J.G. Kristofzski Cognizant Manager Date	21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments
--	--	--	---

BD-7400-172-2 (04/94) GEF097

PHOTOCOPY
DO NOT RETURN TO RHA

BD-7400-172-1

RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-TSAP-048, REV 0

Document Title: Tank 241-U-105 Push Mode Core Sampling and Analysis Plan

Release Date: 10/3/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara Broz

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy. Available in paper copy. Printed in the United States of America. To obtain copies of this report, contact:

Westinghouse Hanford Company - Document Control Services
P.O. Box 1970, Mailstop H6-08, Richland, WA 99352
Telephone: (509) 372-2420; Fax: (509) 376-4989

SUPPORTING DOCUMENT		1. Total Pages 17
2. Title Tank 241-U-105 Push Mode Core Sampling and Analysis Plan	3. Number WHC-SD-WM-TSAP-048	4. Rev No. 0
5. Key Words Tank 241-U-105, Tank U-105, U-105, Push Mode, Core Sampling, Analysis, Plan	6. Author Name: Kevin E. Bell Signature Organization/Charge Code 75310/N4168	
7. Abstract N/A		
8. RELEASE STAMP <div>OFFICIAL RELEASE BY WHC DATE OCT 04 1995 Sta. 4</div>		

Tank 241-U-105 Push Mode Core Sampling and Analysis Plan

Prepared for the U.S. Department of Energy
Office of Environmental Restoration
and Waste Management

by

Westinghouse Hanford Company
Box 1970
Richland, Washington 99352

TABLE OF CONTENTS

1.0 SAMPLING AND ANALYSIS OBJECTIVES	1
2.0 SAMPLING EVENT REQUIREMENTS	1
3.0 LABORATORY ANALYSIS REQUIREMENTS	2
3.1 ANALYSIS SCHEME	2
3.2 SPECIFIC METHODS AND ANALYSES	3
3.3 INSUFFICIENT SEGMENT RECOVERY	3
4.0 QUALITY ASSURANCE CONTROL	3
4.1 LABORATORY OPERATIONS	3
4.2 SAMPLE COLLECTION	8
4.3 SAMPLE CUSTODY	8
5.0 EXCEPTIONS, CLARIFICATIONS, AND ASSUMPTIONS	9
5.1 EXCEPTIONS TO DQO REQUIREMENTS	9
5.2 CLARIFICATIONS AND ASSUMPTIONS	9
6.0 DELIVERABLES	10
6.1 FORMAT I REPORTING	11
6.2 FORMAT III REPORTING	11
6.3 FORMAT IV REPORTING	11
7.0 CHANGE CONTROL	12
8.0 REFERENCES	12

LIST OF TABLES

1: Tank U-105 Chemical, Radiological, and Physical Analytical Requirements	4
--	---

LIST OF ABBREVIATIONS

U-105	Tank 241-U-105
cm	centimeters
DQO	data quality objective
DSC	differential scanning calorimetry
GEA	gamma energy analysis
GC/MS	gas chromatography/mass spectroscopy

LIST OF ABBREVIATIONS (Cont.)

IC	ion chromatography
ICP	inductively coupled plasma - atomic emission spectroscopy
LiBr	lithium bromide
RSST	reactive system screening tool - adiabatic calorimetry
SAP	Sampling and Analysis Plan
SARP	Safety and Analysis Report for Packaging
TCP	Tank Characterization Plan
TGA	thermogravimetric analysis
TIC	total inorganic carbon
TOC	total organic carbon
WHC	Westinghouse Hanford Company

1.0 SAMPLING AND ANALYSIS OBJECTIVES

This Sampling and Analysis Plan (SAP) will identify characterization objectives pertaining to sample collection, laboratory analytical evaluation, and reporting requirements for vapor samples and two push mode core samples from tank 241-U-105 (U-105). It is written in accordance with the *Tank Safety Screening Data Quality Objective* (Hunt 1995), *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed through the Data Quality Objectives (DQO) Process* (McDuffie and Johnson 1995), *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner 1995), *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* (Meacham 1995), and *Historical Model Evaluation Data Requirements* (Simpson, McCain 1995). These data quality objectives (DQOs) are described in the Tank Characterization Plan (TCP) for tank U-105 (Homi 1995a). This SAP will also identify procedures and requirements for collecting and characterizing push-mode samples from U-105.

2.0 SAMPLING EVENT REQUIREMENTS

Currently there are 1,581 kL of waste in U-105. The waste is comprised of 140 kL of supernatant, 1,320 kL of saltcake, and 121 kL of sludge with 594 kL of pumpable liquid remaining. (The tank is identified on the Hydrogen and Organic Watch Lists, is passively ventilated, and is categorized as sound with partial interim isolation completed. Tank U-105 is equipped to cascade to tank 241-U-106 and is second in the three-tank cascade series. Tank U-105 has 12 risers, two of which (risers 2 and 7) are available for use. (Brevick 1994)

Prior to core sampling, the dome space (below the riser) shall be sampled and analyzed for the presence of flammable gases. The sample shall be taken from within 3 feet of the waste surface and the data reported as a percentage of the lower flammability limit (LFL). The results shall be submitted to the project coordinator within one week of the sampling event. The necessity for recurring sampling of tanks for flammable gas concentrations and the frequency of such sampling will be determined by the Flammable Gas Program.

Tank U-105 is currently scheduled to be core sampled using a push mode core sampling truck. At least 8 segments are expected to be taken from risers 2 and 7. If a different riser is necessary to meet sampling and analysis requirements, this change must be recorded and approved by the sampling cognizant engineer before sampling. The risers used may be recorded on a permanent data sheet or recorded directly in the work package. Segment 1 is expected to be 41 cm in depth, and segments 2 - 8 are expected to be 48 cm in depth. The sampling objective is to obtain a vertical profile of the waste; therefore, more or less segments may need to be taken depending on the accuracy of the current waste volume records. For detailed information regarding the sampling activities, refer to work package WS-95-0206. That document contains the operating procedures and the chain-of-custody records for this sampling event.

One field blank for tank U-105 shall be obtained by filling a sampler with deionized water. This field blank is to accompany the samples to the laboratory hot cell. All collected samples and the field blank shall be shipped to the laboratory following the *Load/Transport Sample Cask(s)*

procedure (TO-080-090). Core samples shall be transported to the laboratory within three calendar days from the time each segment is removed from the tank.

Occasionally, lithium bromide (LiBr) solution may be used to aid in the collection of the core samples. If LiBr solution is used, Sampling Operations must state this in the chain-of-custody form that accompanies the sample to the laboratory, and must provide a LiBr solution blank to the laboratory. The LiBr solution blank shall consist of a container filled with LiBr solution from the same batch of LiBr solution used during the sampling. This blank shall be analyzed for lithium and bromide in order to determine the concentration of the tracer at the time the core was taken. Only one LiBr solution blank per tank is required.

3.0 LABORATORY ANALYSIS REQUIREMENTS

3.1 ANALYSIS SCHEME

In order to comply with the flammable gas, safety screening, organic, and historical DQO documents, as well as the organic test plan, the steps below shall be performed on each sample. Before sample removal and breakdown begins, the Flammable Gas Safety Program shall be contacted by the U-105 Project Coordinator. However, extrusion should not be delayed for more than one half of a work day (4 hours) to accommodate program observers.

For the Core with the Highest Recovery Rate:

- Carefully extrude segments without shaking or mixing the sample.
- Collect adequate sample from both halves of the segment without disturbing the stratification of the segment. These subsamples will be used for the half-segment archives and the safety-screening, organic, and historical DQO analyses.
- Collect adequate sample from any drainable liquid present. Drainable liquid will be used for archiving and the safety-screening, organic, and historical DQO analyses.
- Remove 80 mL from each segment for the shear strength measurements requested by the flammable gas DQO. Samples should be prepared in duplicate, without disturbing the stratification of the core segment.
- Prepare and homogenize the stratum composite samples for the flammable gas DQO analyses identified in Table 1.

For the Second Core:

- Carefully extrude segments without shaking or mixing the sample.

- Divide the segment into two equal sub-segments and remove adequate sample from both halves of the segment. These subsamples will be used for the half-segment archives and the safety-screening, organic, and historical DQO analyses.
- Collect adequate sample from any drainable liquid present. Drainable liquid will be used for archiving and the safety-screening, organic, and historical DQO analyses.
- Collect aliquots of each segment-level liquid to generate a liquid core composite for flammable gas liquid analyses (see Table 1).

As a precautionary measure, the Safety and Analysis Report for Packaging (SARP) in the *Load/Transport Sample Cask(s)* procedure (TO-080-090) has been reviewed for any safety issues involved with transportation of tank U-105 core samples. For core samples from tank U-105, the shipping container must be vented every 47 days to release any accumulated gas.

Any decisions, observations, or deviations made to this work plan or during the sample breakdown and analyses shall be documented in writing with justification. These decisions and observations shall also be reported in the data report. The reporting formats for analyses are contained in Table 1.

3.2 SPECIFIC METHODS AND ANALYSES

The analyses in Table 1 to be performed on tank U-105 core samples are based on the safety-screening, organic, historical, and flammable gas DQO documents, and the organic test plan, referenced in Section 1.0. The laboratory procedure numbers, which shall be used for the analyses, are included in the table.

3.3 INSUFFICIENT SEGMENT RECOVERY

If the amount of material recovered from samples taken from a tank is insufficient to perform the analyses requested in this SAP and permit a minimum 10 mL archive per sample, a prioritization of the analyses shall be provided to the laboratories by the U-105 Project Coordinator. Any analyses prescribed by this SAP, but not performed, shall be identified in the appropriate data report with justification for non-performance.

4.0 QUALITY ASSURANCE CONTROL

4.1 LABORATORY OPERATIONS

Laboratories performing analysis in support of this SAP shall have approved and implemented quality assurance project plans. These QA plans shall meet the *Hanford Analytical Services Quality Assurance Plan* (DOE 1995) minimum requirements as the baseline for laboratory quality systems. Quality requirements for conducting Characterization Project sampling and analysis

Table 1: Tank 241-U-105 Chemical, Radiological, and Physical Analytical Requirements

SOLID ANALYSES												
Project Name		U-105 Push-Mode Core Sample		COMMENTS			REPORTING LEVELS					
Plan Number		WHC-SD-WM-TSAP-048, REV. 0		Homogenization Test - Per Laboratory Discretion			FORMAT I					
				Field Blank - Required			FORMAT II					
PROGRAM		PROGRAM CONTACTS					FORMAT III					
A. Safety Screening		Safety Screening		E. J. Lipke			FORMAT IV					
B. Flammable Gas		TWRS		K. E. Bell			FORMAT V					
C. Organic		Flammable Gas		G. D. Johnson			FORMAT VI					
D. Organic Test Plan		Organic		D. A. Turner			Special					
E. Historical												

Table 1: Tank 241-U-105 Chemical, Radiological, and Physical Analytical Requirements

PROGRAM	SECONDARY ANALYSES				SAMPLE ¹		PREP ²	QUALITY CONTROL ³						CRITERIA			REPORT
	METHOD	ANAL.	WHC PROCEDURE		½ SEG	STRATUM COMP		DUP	SPIKE	BLK	STD	PR	AC	UNITS	NOTIFICATION LIMIT	EXPECTED RANGE	
C	Gravimetry	% H ₂ O ¹⁵	LA-564-101		X		d	ea smpl	N/A	N/A	ea AB	±20	80-120	wt%	none	20 - 30	I, IV
A, B	RSST	Energy ⁷	see ⁸		X		d	N/A	N/A	N/A	ea AB	N/A	90-110	J/g	>480 ⁴	>480	III, IV
C, A	Distillation	CN ²⁰	LA-695-102		X		d	ea smpl	1/mtr	ea AB	ea AB	±20	80-120	µg C/g	none	unknown	IV
E	ICP	full suite ²¹	LA-505-151			X	w	ea smpl	see ⁶	ea PB	ea AB	±10	90-110	µg C/g	none	varies	IV
C	CG/MS	organic speciation ²²	LA-523-437		X		d	ea smpl	N/A	ea AB	ea AB	±20	80-120	µg C/g	none	varies	IV

¹½ SEG - ½ segment, COMP - Composite²d-direct, f-fusion, a-acid, w-water³PR-precision, AC-accuracy, ea-each, DUP-duplicate, AB-analytical batch, PB-preparation blank, mtrx-matrix⁴Dry weight basis.⁵Tracer or carrier may be used in place of a spike and results corrected for recovery.⁶Either serial dilutions or matrix spikes will be performed.⁷Analysis required if DSC exceeds notification limits.⁸The RSST method may be found in WHC-SD-WM-TP-104.⁹Only Li is required on a 1/2 segment basis.¹⁰Only Br is required on a 1/2 segment basis.¹¹Analyze only the bottom half segment of each segment extruded.¹²Measured at ambient and 60 degrees C.¹³Measured at 40, 65, and 90 degrees C.¹⁴Not performed on a routine basis.¹⁵This analysis required if moisture analysis by TGA exceeds 17% H₂O.¹⁶Measured at 40 and 60 degrees C.¹⁷This analysis is to be run on the or half segment that exhibits the highest DSC value for each core.¹⁸Measured at 40 and 90 degrees C.¹⁹Performed on drainable liquids and slurry samples only.²⁰Performed if TOC < 3%.²¹Perform if results of the fingerprint analyses for this waste type are consistent with the historical DQO.²²Perform this analysis if waste exhibits propagation using the RSST.

Table 1: Tank U-105 Chemical, Radiological, and Physical Analytical Requirements

LIQUID ANALYSES																		
Project Name		U-105 Push-Mode Core Sample				COMMENTS								REPORTING LEVELS				
Plan Number		WHC-SD-WM-TSAP-048, REV. 0				Homogenization Test - Per Laboratory Discretion								FORMAT I		Early Notify		
						Field Blank - Required								FORMAT II		Process Control		
PROGRAM		PROGRAM CONTACTS				Hot Cell Blank - Per Laboratory Discretion								FORMAT III		Safety Screening		
A. Safety Screening		Safety Screening		E. J. Lipke		LiBr Solution Blank - Required								FORMAT IV		Waste Management		
B. Flammable Gas		TWRS		K. E. Bell		TANK		#CORES						FORMAT V		RCRA Compliance		
C. Organic		Flammable Gas		G. D. Johnson		U-105		2						FORMAT VI		Special		
D. Organic Test Plan		Organic		D. A. Turner														
PROGRAM	PRIMARY ANALYSES			SAMPLE ¹		PREP ²	QUALITY CONTROL ³						CRITERIA			REPORT		
	METHOD	ANAL.	WHC PROCEDURE	FB & SEG LIQUID	LIQUID COMP		DUP	SPIKE	BLK	STD	PR	AC	UNITS	NOTIFICATION LIMIT	EXPECTED RANGE			
A	Visual	Organic Layer	LA-519-151	X		d	N/A	N/A	N/A	N/A	N/A	N/A	none	presence	0	I, III		
A, B, C	DSC	Energy	LA-514-113	X	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	J/g	> 480 ⁴	0 - 250	I, III, IV		
B, C	TGA	% H ₂ O	LA-560-112	X	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	wt%	< 17	20 - 30	I, III, IV		
B, C, D	Persulfate	TOC	LA-342-100	X	X	d	ea smpl	1/mtrx	ea AB	ea AB	±20	80-120	µg C/g	> 30,000	10E3 - 12E3	I, III, IV		
B	Persulfate	TIC	LA-342-100		X	d	ea smpl	1/mtrx	ea AB	ea AB	±15	85-115	µg C/g	none	unknown	IV		
A, B	ICP	full suite	LA-505-151	X ⁸	X	d ⁷	ea smpl	see ⁹	ea PB	ea AB	±15	85-115	µg/g	Li > 100	varies	I, III, IV		
A, B, D	IC	Br, NO ₂ , NO ₃ , PO ₄ , SO ₄ , Cl, F, oxalate, formate, acetate	LA-533-105	X ⁹	X	d ⁷	ea smpl	1/mtrx	ea PB	ea AB	±15	85-115	µg/g	Br > 1200	varies	I, III, IV		
B	Titration	OH	LA-661-103		X	d ⁷	ea smpl	1/mtrx	ea AB	ea AB	±10	90-110	µg/g	none	1.6E5 - 2.5E5	IV		
A, B	Gravimetry	Specific Gravity	LA-510-112	X	X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	g/mL	none	1.0 - 1.5	III, IV		
B	Centrifugation	Vol. % Solids ¹¹	LA-519-132		X	d	ea smpl	N/A	N/A	ea AB	±10	90-110	%	none	varies	IV		
B	Fluorimetry	Total Uranium	LA-925-009		X	d ⁷	ea smpl	1/mtrx	ea PB	ea AB	±20	80-120	µg/g	none	unknown	IV		
B	Spectroscopy	Cr (VI)	LA-265-101		X	d ⁷	ea smpl	1/mtrx	ea PB	ea AB	±20	80-120	µg/g	none	unknown	IV		
A, B	α counting	Total Alpha	LA-508-101	X ¹⁰	X	d	ea smpl	1/mtrx	ea PB	ea AB	±10	90-110	µCi/g	> 41	0.1 - 0.4	I, III, IV		
B	β counting	Total Beta	LA-508-101		X	d	ea smpl	1/mtrx	ea PB	ea AB	±20	80-120	µCi/g	none	unknown	IV		
B	GEA	Cs-137, Np-237, Co-60, Eu-154	LA-548-121		X	d	ea smpl	N/A	ea PB	ea AB	±20	80-120	µCi/g	none	varies	IV		
B	GEA	I-129	LA-378-103		X	d ⁷	ea smpl	see ⁵	ea PB	ea AB	±20	80-120	µCi/g	none	unknown	IV		
B	Liq. Scintillation	H-3	LA-114-101		X	d	ea smpl	1/mtrx	ea AB	ea AB	±20	80-120	µCi/g	none	unknown	IV		
B	α counting	Am-241, Cm-242, Cm-243/244	LA-548-121		X	d	ea smpl	see ⁵	ea PB	ea AB	±20	80-120	µCi/g	none	unknown	IV		
B	α counting	Pu-239/240	LA-503-156		X	d	ea smpl	see ⁵	ea PB	ea AB	±20	80-120	µCi/g	none	0.005 - 0.02	IV		
B	Liq. Scintillation	Tc-99	LA-438-101		X	d	ea smpl	1/mtrx	ea AB	ea AB	±20	80-120	µCi/g	none	unknown	IV		
B	β counting	Sr-90	LA-220-101		X	d	ea smpl	see ⁵	ea PB	ea AB	±20	80-120	µCi/g	none	15-40	IV		
PROGRAM	SECONDARY ANALYSES			SAMPLE ¹		PREP ²	QUALITY CONTROL ³						CRITERIA			REPORT		
	METHOD	ANAL.	WHC PROCEDURE	FB & SEG LIQUID	LIQUID COMP		DUP	SPIKE	BLK	STD	PR	AC	UNITS	NOTIFICATION LIMIT	EXPECTED RANGE			
A	GC/MS	organic speciation ¹³	LA-523-437	X		d	ea smpl	N/A	ea AB	ea AB	±20	80-120	µg C/g	none	unknown	IV		
C	Distillation	CN ¹²	LA-695-102	X		d	ea smpl	1/mtrx	ea AB	ea AB	±20	80-120	µg C/g	none	unknown	IV		

Table 1: Tank U-105 Chemical, Radiological, and Physical Analytical Requirements

¹FB - Field Blank, COMP - Composite

²d-direct, f-fusion, a-acid, w-water

³PR-precision, AC-accuracy, ea-each, DUP-duplicate, AB-analytical batch, PB-preparation blank, mtrx-matrix

⁴Dry weight basis.

⁵Tracer or carrier may be used in place of a spike and results corrected for recovery.

⁶Either serial dilutions or matrix spikes will be performed.

⁷Direct liquid samples may be diluted in acid or water to adjust to the proper analyte concentration or pH.

⁸Only Li is required on a segment basis.

⁹Only Br is required on a segment basis.

¹⁰Analyze only the bottom half segment of each segment extruded.

¹¹Measured at ambient and 60 degrees C.

¹²Performed if TOC < 3%.

¹³Perform on liquid from waste samples exhibiting propagation using the RSST.

are described in *TWRS Characterization Program Quality Assurance Program Plan* (Whelan 1994), *Fiscal Year 1996 Tank Waste Remediation System Tank Waste Analysis Plan* (Homi 1995b), and in this SAP. Characterization Project sampling and analysis shall comply with these quality requirements.

Sample quality control (duplicates, spikes, standards) are identified in Table 1. If no criteria are provided, the performing laboratory shall perform to its quality assurance plan.

4.2 SAMPLE COLLECTION

Before sampling can be performed on a tank, available risers must be identified and the selected risers must be inspected and prepared. In addition, safety hazards must be identified and special precautions are taken if necessary. The Sampling or Tank Cognizant Engineer may choose video surveillance of the tank interior in order to identify any potential problems that may occur during the sampling event.

Samples are to be taken from tank U-105 and shipped to the performing laboratory by Sampling Operations in accordance with the respective work package. That work package shall also initiate the chain-of-custody for the samples. Approved procedure TO-080-090 ("Load/Transport Sample Cask(s)") is to be used during the sampling event. Samples shall be identified by a unique number before being shipped to the performing laboratory. The sampling team is responsible for documenting any problems and procedural changes affecting the validity of the sample in a field notebook. Sampling Operations shall enter this information in the comment section of the chain-of-custody form for addition to the data reports.

Sampling Operations should transport each sample collected to the performing laboratory within one working day of removing the sample from the tank, but must transport each segment or sample within three calendar days. Sampling Operations is responsible for verbally notifying the WHC 222-S Laboratory (373-2435) at least 24 hours in advance of an expected shipment.

4.3 SAMPLE CUSTODY

The chain-of-custody form is initiated by the sampling team as described in the work package. Samples are shipped in a cask and sealed with a Waste Tank Sample Seal.

WASTE TANK SAMPLE SEAL	
Supervisor	Sample No.:
Date of Sampling:	Time of Sampling:
Shipment No.:	Serial No.:

The sealed and labeled samples are shipped to the laboratory along with the chain-of-custody form. The receipt and control of samples in the WHC 222-S Laboratory are described in laboratory procedure LO-090-101.

5.0 EXCEPTIONS, CLARIFICATIONS, AND ASSUMPTIONS

5.1 EXCEPTIONS TO DQO REQUIREMENTS

The organic DQO document (Turner 1995) requires determination of total organic carbon (TOC) by furnace oxidation if the energy equivalent by TOC (See Section 5.2.) is less than 75% of any differential scanning calorimetry (DSC) exotherm. Determination of TOC by furnace oxidation is only possible on liquid or water-digested samples, therefore analysis of TOC by furnace oxidation will not be performed until funding is provided for method development and/or new instrumentation. Analyses may then be performed on archived samples. The organic DQO also requires analysis for organic acids by liquid chromatography (HPLC) if the waste exhibits propagation during adiabatic calorimetry testing. Selected organic acids will be determined by ion chromatography, however the 222-S Laboratory currently has no procedure for determination by HPLC. The program may request analysis of archive samples at a later date if funding is provided for procedure development.

Analysis for complexants is required in the organic test plan (Meacham 1995), however a procedure at the 222-S Laboratory is not available at this time. Analyses may be performed at a later date on archived samples if funding is provided by the program for procedure development. Likewise, investigation of any propagating reaction using a tube propagation test is not possible at the 222-S Laboratory at this time. Analysis may be performed at a later date after funding is provided for on-site analytical development, or samples may be sent off-site for analysis.

The flammable gas DQO document (McDuffie and Johnson 1995) requires solubility measurements in 2.5 M NaOH and water, and determination of nickel-63 activity. No procedure exists for the solubility tests as requested; they shall be carried out under one of the test plans currently being written. No procedure exists at the 222-S Laboratory for nickel-63 analysis. Analysis shall be performed on archived material at a later date if funding is made available for procedure development or transfer.

5.2 CLARIFICATIONS AND ASSUMPTIONS

A number of clarifications and assumptions relating to the notification limits or decision thresholds identified in the applicable DQO efforts need to be made with respect to the analyses in Table 1. Each of these issues is discussed below:

- ▶ Any exothermic reaction determined by DSC must be reported on a dry weight basis as shown in equation (1) using the weight percent water determined from thermogravimetric analysis (TGA).

$$Exotherm (dry wt) = \frac{[exotherm (wet wt) \times 100]}{(100 - \% \text{ water})} \quad (1)$$

NOTE: A large error in the DSC value may result when the weight percent water value is greater than 90%, however the conversion is still required.

- The safety screening DQO (Hunt 1995) requires that additional analyses be performed if total alpha activity is greater than 1 g/L. Total alpha activity is measured in $\mu\text{Ci/g}$ rather than g/L. To convert the notification limit for total alpha activity into a number more readily usable by the laboratory, it was assumed that all alpha decay originates from Pu-239. The notification limit may then be calculated as shown in equation (2):

$$\left(\frac{1 \text{ g}}{L} \right) \left(\frac{1 \text{ L}}{10^3 \text{ mL}} \right) \left(\frac{1}{\text{density}} \frac{\text{mL}}{\text{g}} \right) \left(\frac{0.062 \text{ Ci}}{1 \text{ g Pu-239}} \right) \left(\frac{10^6 \mu\text{Ci}}{1 \text{ Ci}} \right) = \frac{61.5}{\text{density}} \frac{\mu\text{Ci}}{\text{g}} \quad (2)$$

NOTE: Samples measured for total alpha activity shall also be measured for density. The notification limit shall be 41 $\mu\text{Ci/g}$ unless the measured density exceeds 1.5 g/mL when the notification limit will be adjusted according to equation 2.

- Secondary analyses are required per the organic DQO depending on the comparison between the value of the energy equivalent for TOC and the DSC energetics value. The energy equivalent of TOC, X, is given in equation (3).

$$X = [\text{wt}\% \text{ TOC (dry weight basis)}] * \frac{632 \text{ J/g}}{5} \quad (3)$$

NOTE: 632 J/g represents the energy equivalent of 5 wt% TOC based on a sodium acetate average energetics standard (Turner 1995).

6.0 DELIVERABLES

All data shall be reported in formats I, III, or IV as indicated in Table 1. Additional information regarding reporting formats is given in (Schreiber 1994a).

6.1 FORMAT I REPORTING

Table 1 contains the notification limits for each analyte. Any result exceeding its notification limit shall be reported via telephone by the 222-S Laboratory Shift Manager to the West Tank Farm Operations Shift Manager as soon as the data are obtained and reviewed (Kristofzski 1995). This verbal notification must be followed within one working day by written communication to the Safety Screening Representative, Process Control, and the Characterization Project Office documenting the observations (Schreiber 1994c). Additional analyses for verification purposes may be contracted between the performing laboratory and the contacts above by a revision to this document, or by a memorandum of understanding.

6.2 FORMAT III REPORTING

A Format III report, providing the results of the primary analyses required by the safety screening DQO, shall be issued to the Safety Screening Representative, the Characterization Project, Process Control, the Tank Characterization Resource Center, the Tank Characterization Database, and Historical DQO points of contact (Schreiber 1994c) within 45 days of receipt of the last sample at the laboratory loading dock. The DSC and TGA scans have been requested due to the interpretive nature of those analyses. If analyses for the safety screening secondary analytes are required, the results shall be provided within 90 days of receipt of the last sample at the laboratory loading dock. Detailed information regarding the contents of this reporting format are given in Schreiber (1994a).

6.3 FORMAT IV REPORTING

This report shall include the results of the analyses required by the flammable gas, organic, and historical DQO documents, and the organic test plan. (See Table 1 for delineation of program requests.) The data package shall be provided to the Characterization Project, the Historical DQO point of contact, the Tank Characterization Resource Center, and Tank Characterization Database representatives within 105 days of the sampling event. Detailed information regarding the contents of this reporting format are given in Schreiber (1994a).

In addition to this data package, an electronic version of the analytical results shall be provided to the Tank Characterization Database representative. The data must be available in the Tank Characterization Database within seven days following release of the format IV data report. The electronic version shall be in the standard electronic format specified in Bobrowski et al. (1994).

7.0 CHANGE CONTROL

Under certain circumstances, it may become necessary for the performing laboratory or Project Coordinator to make decisions concerning a sample without review of the data by the customer or the Characterization Project. These changes shall be documented through the use of

internal characterization change notices or analytical deviation reports for minor low-impact changes and documented in applicable laboratory notebooks. All significant changes (such as changes in scope) shall be documented by Characterization Plans, Coordination and Reports via an Engineering Change Notice to this plan. All changes shall also be clearly documented in the final data report.

At the request of the Characterization Project, additional analysis of sample material from this characterization project shall be performed following a revision of this Sampling and Analysis Plan.

8.0 REFERENCES

Hunt, J. W., 1995, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Bobrowski, S.F., S.J. Harris, and J.D. Schwab, 1994, "Standard Electronic Format Specification for Tank Characterization Database Loader, Version 2.0", Pacific Northwest Laboratory, Richland, Washington (Transmitted by PNL Letter TCD-94-002, June 16, 1994, S.F. Bobrowski, PNL, to C.S. Haller, WHC).

DOE, 1994, *Hanford Analytical Services Quality Assurance Plan*, DOE/RL-94-55, Rev.), U.S. Department of Energy, Richland Field Office, Richland, Washington.

Homi, C. S., 1995a, *Fiscal Year 1996 Tank Waste Remediation System Tank Waste Analysis Plan*, WHC-SD-WM-PLN-101, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Homi, C. S., 1995b, *Tank 241-U-105 Tank Characterization Plan*, WHC-SD-WM-TP-289, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Hanlon, B.M., 1995, *Waste Tank Summary for Month Ending May 31, 1995*, WHC-EP-0182-86, Westinghouse Hanford Company, Richland, Washington.

Hill, J.G., W.I. Winters, and B.C. Simpson, 1991, *Waste Characterization Plan for the Hanford Site Single-Shell Tanks*, WHC-EP-0210, Rev. 3, Westinghouse Hanford Company, Richland, Washington.

Kristofzski, J. G., 1995, Letter to G. B. Griffin, "Reestablishment of Immediate Notification System", 75310-95-102, dated September 8, 1995.

McDuffie, N. G. and G. D. Johnson, 1995, *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed Through the Data Quality Objectives (DQO) Process*, WHC-SD-WM-DQO-004, Rev. 2, Westinghouse Hanford Company, Richland Washington.

Meacham, J. E., 1995, *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, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Meznarich, H. K., 1995, *Quality Assurance Plan for the 222-S Laboratories*, WHC-SD-CP-QAPP-016, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Schreiber, R. D., 1994a, Letter to C. S. Haller, "Revised Interim Tank Characterization Plan Guidance", 7E720-94-121, dated May 13, 1994.

Schreiber, R. D., 1994b, Letter to J. G. Kristofzski, "Format I Reporting Requirement", 7E72094-128, dated August 15, 1994.

Schreiber, R. D., 1994c, Letter to J. G. Kristofzski, "Point of Contact/Distribution List", 7E720-94-141, dated October 11, 1994.

Simpson, B. C., D. J. McCain, 1995, *Historical Model Evaluation Data Requirements*, WHC-SD-WM-DQO-018, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Slankas, J. T., ccMail to Ruth Schreiber, "Letter on Samples and Content of TCPs", dated December 19, 1994.

Temer, D., 1994, *Los Alamos National Laboratory Test Plan for Sludge Washing and Caustic Leaching Tests*, Los Alamos National Laboratory, Los Alamos, New Mexico.

Turner, D. A., 1995, *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue*, WHC-SD-WM-DQO-006, Rev. 2, Westinghouse Hanford Company, Richland, Washington.

Whelan, T. E., 1994, *TWRS Characterization Program Quality Assurance Program Plan*, WHC-SD-WM-QAPP-025, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

DISTRIBUTION SHEET

To Distribution	From Characterization Plans and Reports	Page 1 of 2	
		Date	09/25/95
Project Title/Work Order WHC-SD-WM-TSAP-048, Rev. 0, "Tank 241-U-105 Push Mode Core Sampling and Analysis Plan"		EDT No.	EDT-613121
		ECN No.	N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./Appendix Only	EDT/ECN Only
------	------	-----------------------	-----------	-----------------------	--------------

ONSITE

U. S. Department of Energy - Richland Field Office

C. A. Babel	S7-54	X
W. Liou	S7-54	X
N. W. Willis	S7-54	X

ICF KAISER

L. A. Gaddis	S3-09	X
--------------	-------	---

Westinghouse Hanford Company

R. Akita	T6-20	X
K. E. Bell	R2-12	X
R. N. Campeau	S7-04	X
R. J. Cash	S7-15	X
T. F. Dale	T6-20	X
S. J. Eberlein	R2-12	X
G. D. Forehand	S7-31	X
R. K. Fuller	T6-31	X
V. W. Hall	H4-19	X
W. J. Kennedy	S7-03	X
J. G. Kristofzski	R2-12	X
J. S. Lee	S7-03	X
P. M. Morant	S3-30	X
A. D. Olguin	S7-04	X
A. D. Rice	T6-06	X
R. D. Schreiber	R2-12	X
R. H. Stubbs	S7-12	X
C. L. Thomas	H4-19	X
T. C. Tribble	S1-57	X
D. A. Turner	S7-15	X
Central Files	A3-88	X
T.C.R.C. (1)	R2-12	X

DISTRIBUTION SHEET

To Distribution	From Characterization Plans and Reports	Page 2 of 2			
		Date	09/25/95		
Project Title/Work Order WHC-SD-WM-TSAP-048, Rev. 0, "Tank 241-U-105 Push Mode Core Sampling and Analysis Plan"		EDT No.	EDT-613121		
		ECN No.	N/A		
Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only

OFFSITE

U. S. Department of Energy - Headquarters
Office of Environmental Restoration and
Waste Management EM-563
12800 Middlebrook Road
Germantown, MD 20874

K. T. Lang	X
J. A. Poppiti	X

Los Alamos Technical Associates
309 Bradley Blvd.
Richland, WA 99352

T. T. Tran	X
------------	---