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7. Abstract

This document is a plan which serves as the contractual agreement between the Characterization Program, Sampling Operations, WHC 222-S Laboratory, and PNL 325 Analytical Chemistry Laboratory. The scope of this plan is to provide guidance for the sampling and analysis of samples from tank 241-C-102.

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WHC-SD-WM-TP-206
Revision 0

Tank 241-C-102 Tank Characterization Plan

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

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LIST OF ABBREVIATIONS

C-102	tank 241-C-102
CC	complexant concentrate waste
DQO	data quality objective
DST	double-shell tank
OSD	operational safety design
QA	quality assurance
SST	single-shell tank
TWRS	Tank Waste Remediation System
WHC	Westinghouse Hanford Company

1.0 INTRODUCTION

The Defense Nuclear Facilities Safety Board has advised the DOE to concentrate the near-term sampling and analysis activities on identification and resolution of safety issues (Conway 1993). The data quality objective (DQO) process was chosen as a tool to be used to identify the sampling and analytical needs for the resolution of safety issues. As a result, a revision in the Federal Facility Agreement and Consent Order (Tri-Party Agreement) milestone M-44-00 has been made, which states that "A Tank Characterization Plan (TCP) will also be developed for each double shell tank (DST) and Single-shell tank (SST) using the DQO process...Development of TCPs by the DQO process is intended to allow users (e.g., Hanford Facility user groups, regulators) to ensure their needs will be met and that resources are devoted to gaining only necessary information." This document satisfies that requirement for the tank 241-C-102 (C-102) fiscal year 1995 sampling activity.

2.0 TANK, WASTE, AND SAMPLING INFORMATION

This section summarizes some of the available information for tank C-102. Discussions of the process history, recent sampling events for the tank, and general information about the tank are included.

2.1 AGE AND PROCESS HISTORY OF TANK C-102

241-C Tank Farm was constructed between 1943 and 1944. The tanks were constructed with ASTM A283 Grade C Steel Liners. There are four 200-series 55,000 gallon, 20-ft diameter single shell tanks (SSTs). In addition, there are twelve 100-series, 530,000 gallon, 75-ft diameter SSTs (Anderson 1992). Built as one of the first generation tank farms, the C Tank Farm was designed for non-boiling waste with a maximum fluid temperature of 220°F. The cascade overflow lines connect three tanks together. All twelve 530,000 gallon and all four 55,000 gallon tanks in the C Tank Farm are out of service. As of July 1993, nine are categorized sound and seven are assumed leakers. Six tanks in the C Tank Farm are identified on a watch list.

Tank C-102 is a 530,000 gallon SST in the 241-C Tank Farm. It has been declared sound and has been partially interim isolated. This tank is classified as nonstabilized. C-102 currently contains dilute complexed waste (DC) with a total waste volume of 423,000 gal (149 inches). All of the waste is sludge with 37,000 gal of drainable interstitial liquid. There is no supernatant liquid. Dilute complexed waste is characterized by a high content of organic carbon including organic complexants: ethylenediaminetetra-acetic acid (EDTA), citric acid, and hydroxyethyl-ethylenediaminetriacetic acid (HEDTA), being the major complexants used.

The last solids update was 28-Apr-82 and the last photo taken was 18-May-76 (Hanlon 1994). It shows a black sludge with small pockets of liquid. Figure 1 and Table 1 depict the fill history of C-102 since it began filling in May 1946.

Figure 1: Tank C-102 Fill History

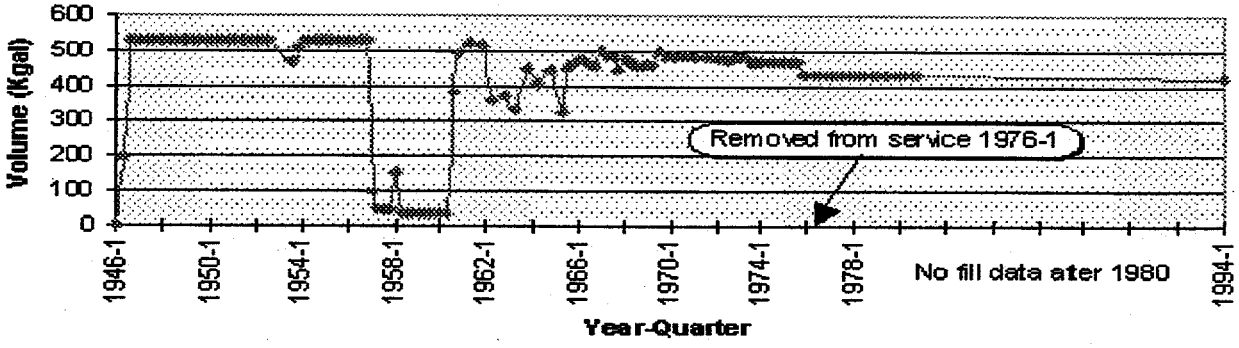

Table 1: Waste Status Summary for Tank C-102

Qtr.-Year	Type Waste	Total Vol.	Liquid in Storage	Solids in Storage	Rec'd from:	Vol. rec'd:	Moved to:	Vol. moved:	6 month report	Remarks
1946-2	MW	195	---	---						Cascade, began filling in May 1946
1946-3	MW	528	---	---						Filed in August 1946
1946-4	MW	528	---	---						Cascade full in October 1946
1952-4	MW		---	---						984 in Cascade, proc. for feed to TBP plant
1953-1	MW		---	---			CR1218	1651		1507 in 101 thru 106-C
1953-2	MW		---	---						Small sludge heel
1953-3	TBP	467	---	---						Received TBP waste
1953-4	TBP	508	---	---						Received TBP waste
1957-1	TBP	98	---	---						Latest electrode reading
1957-2	DWW	48	---	---						Soavenged during month
1957-3	TBP	48	---	---						
1957-4	TBP	48	---	---						
1958-1	TBP	150	52	98						Latest electrode reading
1958-2	TBP	37	37	---						Latest electrode reading
1959-3	TBP	34	34	---						Latest electrode reading
1960-3	TBP CW	378	34-344	---		344				SS, CW & Dilution Rec'd
1960-4	TBP CW	491	34-457	---		140				previous readings were incorrect
1961-2	TBP CW	521	34-487	---					X	
1961-4	TBP CW	519	34-485	---					X	
1962-2	CW	356	356						X	
1962-4	CW	370	370	---		986	BX	1142	X	
1963-2	CW	334	334	---		829			X	Rec'd CW
1963-4	CW	450	450	---		854			X	Rec'd CW
1964-2	CW	407	407	---	A-202	881				Rec'd CW
1964-4	CW	442	442	---		1065		1030		
1965-2	CW	326	88	238	C-108	1256				Rec'd CW
1965-3	CW	447	209	238		350	BY & T	232		
1965-4	CW	461	223	238		278	BY-112	264		
1966-1	CW	472	234	238		429	BY-112	418		Rec'd CW
1966-2	CW	472	234	238	C-108	556	BY-111	556		Rec'd CW
1966-3	CW	464	226	238		282	BY	290		
1966-4	CW	453	215	238		444	BY	474		Rec'd CW
1967-1	CW	499	261	238		370	BY & T	324		
1967-2	CW	486	248	238		387	BY & T	400		
1967-3	CW	486	248	238		513	BY	513		Rec'd PUREX CW
1967-4	CW	444	206	238		362	BY	404		Rec'd PUREX CW
1968-1	CW	476	238	238		731				Rec'd CW
1968-2	CW-OWW	466	28-200	238		559	BX-103,105	599		Rec'd PUREX OWW & CW
1968-3	CW-OWW	455	147-70	238		786	BX-103	765		Rec'd PUREX OWW & CW
1968-4	CW-OWW	457	89-61	307		885	BX-103	883		Rec'd PUREX waste
1969-1	CW-OWW	462	52-78	332		483	BX-103	478		Rec'd PUREX waste
1969-2	CW-OWW	458	52-37	369		872				Rec'd PUREX waste
1969-3	CW-OWW	501	41-109	351		780	BX-103	738		Rec'd PUREX waste
1969-4	CW-OWW	486	42-99	345	C-108	925	BX-103	94		Rec'd PUREX waste
1975-4	CW-OWW	431	25-74	332			C-103	111		
1976-1	CW-OWW	431	30	62						Removed fr service
1976-2	---	431	0	431						Removed fr service
1977-2	---	431	0	431						Salt Well Pumped
1977-3	---	431	0	431						Salt Well Pumped
1977-4	---	431	0	431						Inactive Current Salt Well Installed
1978-1	-	431	0	431						Inactive
1994-1	DC	423								37 interstitial liquid, 0 supernate

2.2 EXPECTED TANK CONTENTS

Samples of the supernate from tank C-102 were collected in 1991, and analyses were performed. A summary of the information resulting from this characterization effort can be found in Table 2.

Table 2: Historical Waste Constituents of Tank C-102[c]

Analyte	Result		Analyte	Result	
Al	2,800	μg/g	Sn	63	μg/g
As	2.00	μg/g	CN	79	μg/g
Ca	1.51	μg/g	CO_3	18,000	μg/g
Cr	48	μg/g	NO_2	16,000	μg/g
Fe	29	μg/g	NO_3	31,000	μg/g
K	760	μg/g	SO_4	650	μg/g
Mg	4.5	μg/g	TOC	2,800	μg/g
Mn	0.30	μg/g	^{60}Co	0.13	μCi/g
Mo	3.8	μg/g	^{137}Cs	14	μCi/g
Na	54,000	μg/g	$^{239/240}Pu$	0.0051	μCi/g
Se	0.035	μg/g	$^{89/90}Sr$	0.016	μCi/g
Si	23	μg/g	^{99}Tc	0.014	μCi/g

[c](Edrington 1991)

REFERENCES

Anderson, J. D., 1992, *A History of the 200 Area Tank Farms*, WHC-MR-0132, Westinghouse Hanford Company, Richland, Washington.

Conway, J. T., Letter to H. R. O'Leary, DOE, "DNFSB Recommendation 93-5 to the Secretary of Energy," 9400070, dated July 19, 1993.

Edrington, R. S., June 3, 1991, *BY and C Tank Farm Supernate Sample Analyses (Revision of 16220-PCL90-117)*, Internal letter 28110-PCL91-048, Westinghouse Hanford Company, Richland, Washington.

Hanlon, B. M., 1994, *Tank Farm Surveillance and Waste Status Summary Report for March 1994*, WHC-EP-0182-72, Westinghouse Hanford Company, Richland, Washington.

ICF Kaiser Hanford Company, 1994. *Historical Tank Content Estimate for the Northeast Quadrant of the Hanford 200 East Areas*, WHC-EP-0759, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR AUGER SAMPLING IN FISCAL YEAR 1995

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CONTENTS

SAMPLING AND ANALYSIS PLAN FOR AUGER SAMPLING IN FISCAL YEAR 1995

LIST OF TABLES

LIST OF ABBREVIATIONS

C-102	241-C-102
C-103	241-C-103
DQO	data quality objective

1.0 SPECIFIC TANK OBJECTIVES

Tank 241-C-102 (C-102) is to be sampled for process development purposes. Since process development data needs are rarely ever defined such that they can be incorporated into a Data Quality Objectives effort, a test plan (Campbell 1994) has been written to administer analytical guidance to the 222-S Laboratory for this sampling event. This Tank Characterization Plan will reference that test plan, and is focused on providing guidance to Sampling Operations personnel.

1.1 RELEVANT SAFETY ISSUES

Large quantities of organic solvents (mostly TBP and NPH) have been disposed to single-shell underground storage tanks (SSTs) from various Hanford Site chemical processing facilities. When disposed to the SSTs, it is anticipated that the organic solvent formed a separate (floating) organic layer on the aqueous supernate since the density of the organic solvent is less than that of the aqueous supernate (less than 1.0 g/mL versus approximately 1.37 g/mL).

Many of the SSTs have been or are in the process of being interim stabilized, where the free aqueous supernate is removed by pumping from the bottom of the tanks. As the interim stabilization pumping occurs, any organic solvent present eventually contacts the solid waste surface and has an opportunity to permeate into the waste solids. Since the porosities of the waste solids typically range from about 20% to 60% of the bulk volume, the organic solvent could occupy a significant fraction of the waste solids pure space.

The safety concern which arises from this possible scenario could be stated as follows:

- Does entrainment of organic solvents in waste solids constitute a flammability hazard?

Unfortunately, the phenomenology of organic solvents permeating waste solids, and thereby constituting a potential flammability hazard, is not adequately understood and therefore must be investigated through waste simulant studies. These waste simulant studies will focus on determining if organic solvent permeates into waste solvents during interim stabilization, and will assess the conditions required to support combustion. Of particular emphasis will be the determination of whether a localized combustion event could spread into a larger deflagration.

To satisfactorily understand the phenemenology in question, the physical properties of the simulant must bound the relevant physical properties of actual tank waste. In order to produce a simulant, therefore, waste samples from selected tanks known to contain, or to formerly have contained, separate (floating) organic solvent are being requested.

1.1.1 C-102 Characterization Objectives

Tank 241-C-102 (C-102) formerly contained a separate (floating) organic layer. As well, a portion of the waste material in tank C-102 was pumped to tank C-103. Tank C-102 was subsequently interim stabilized, presumably with some quantity of organic solvent floating on the aqueous supernate during the pumping operations. Therefore, in order to determine if organic solvent is entrained in waste solids during interim

stabilization, auger samples from the surface of the waste in tank C-102 shall be retrieved and analyzed per (Campbell 1994).

1.1.2 Applicable Data Quality Objectives

Currently, there are no applicable Data Quality Objectives (DQOs) for this specific sampling event. Since this sampling event is for process development purposes only, no safety screening will be performed on the waste (this will be performed when the tank is rotary-mode core sampled). In lieu of a DQO, a test plan (Campbell 1994) shall be used.

2.0 SAMPLING INFORMATION

2.1 SAMPLE COLLECTION

A total of two auger samples are to be taken, from risers 3 and 6, using the nine inch auger. The auger samples are to be shipped to the 222-S Laboratory by Sampling Operations in accordance with work package ES-93-02194. That work package shall also initiate the chain-of-custody for the samples.

Samples shall be identified by a unique number before being shipped to the 222-S 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.

For this sampling event, no field blank shall be taken. The C-102 samples to be taken during this activity are not for any RCRA regulatory purposes. Therefore, no field blank is necessary (Zuroff 1994).

Sampling Operations should send the auger samples to the laboratory within one business day of removing each sample from tank C-102, but must send each sample within three calendar days. Sampling Operations is responsible for verbally notifying the shift manager at the laboratory (373-2435) at least 24 hours in advance of an expected shipment. If samples are going to be delivered after 3:00 pm, the laboratory shall be notified at least four hours in advance of actual sample shipment so that proper shift operations can be planned.

2.2 SAMPLE CUSTODY

The chain-of-custody form is initiated by the sampling team as described in the work package. Auger samples are shipped in a cask and sealed with a Waste Tank Sample Seal. All sample shipments are to be labeled with the following information:

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, which identifies the tank and riser information. The receipt and control of samples in the Westinghouse Hanford 222-S Laboratory is described in procedure LO-090-101.

3.0 LABORATORY INSTRUCTIONS

3.1 TEST PLAN GUIDANCE

Analytical guidance for this process development effort will be administered through a test plan. "Analytical Plan for Single-Shell Tank Waste Samples: 241-C-102, 241-C-103, and 241-BY-108" (Campbell 1994) explains the testing to be performed on the auger samples from tank C-102. This test plan explains in detail the experiments to be run on the waste from the tank, and also includes information regarding quality assurance and scheduling.

Since the Characterization Program is responsible for the taking of tank samples, the Characterization Program and TWRS Programs Quality Assurance will need to approve the test plan. This approval will not only ensure that the DQO process has been used in the generation of the test plan and that there is justification for the samples, but also that the facility receiving the sample is in a position to adequately handle radioactive material. At such time that the test plan is approved, the Characterization Program will direct either the shipment of the sample material or, if it is already in the possession of the performing laboratory, the start of analytical work.

It should be noted that in accordance with the Safety and Analysis Report for Packaging (SARP), auger samples from tank C-102 must be vented every 15 days from the time of the cask sealing to allow any retained gas to escape.

4.0 ORGANIZATION

The organization and responsibility of key personnel involved in this tank C-102 characterization project are listed in Table 1.

Table 1: Tank C-102 Project Key Personnel List.

Individual	Organization	Responsibility
K. B. Wehner	WHC 222-S Process Chemistry Laboratories	Manager, Organic Chemistry Group
J. A. Campbell	PNL 329 Laboratory, Advanced Organic Analytical Methods Group	PNL Point of Contact for C-102 Process Development work
R. D. Schreiber	TWRS Characterization Support	C-102 Tank Characterization Plan Cognizant Engineer
D. A. Turner	Organic Safety Program	Manager, Organic Safety Program
J. L. Deichman	Analytical Services	Manager, Program Management and Integration

REFERENCES

Campbell, J. A., 1994, *Analytical Plan for Single-Shell Tank Waste Samples: 241-C-102, 241-C-103, and 241-BY-108*, draft, Pacific Northwest Laboratory, Richland, Washington.

Zuroff, W. F., 1994, *Auger Trip Blanks*, (cc:Mail to R.D. Schreiber, T. E. Whelan, and G. D. Johnson, February 10), Westinghouse Hanford Company, Richland, Washington.