COMPLETE

ENGINEERING CHANGE NOTICE

1. ECN No 625718
Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	C. S. HOMI, 75320, R2-12, 373-1097	[] Yes [X] No	10/04/95
	5. Project Title/No./Work Order No.: TANK 241-C-102 TANK CHARACTERIZATION PLAN	6. Bldg./Sys./Fac. No.: C-102	7. Approval Designator: N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.): WHC-SD-WM-TP-206 REV 1	9. Related ECN No(s).: N/A	10. Related PO No.: N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change
Complete revision.

13a. Justification (mark one)

Criteria Change	[X]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[]

13b. Justification Details
Format change.

14. Distribution (include name, MSIN, and no. of copies)
See attached Distribution Sheet

RELEASE STAMP
OFFICIAL RELEASE BY WHC
DATE OCT 0 5 1995
Sta. 4

A-7900-013-2 (11/94) GEF095

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 625718

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. C. S. Homi C/Homi	10/4/95	PE	
Cog. Mgr. S. J. Eberlein SJEberlein	10/4/95	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other		Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-TP-206, REV 1
Document Title:	Tank 241-C-102 Tank Characterization Plan
Release Date:	10/4/95

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 — 10/4/95

SUPPORTING DOCUMENT

1. Total Pages 12

2. Title	3. Number	4. Rev No.
TANK 241-C-102 TANK CHARACTERIZATION PLAN	WHC-SD-WM-TP-206	1

5. Key Words

CHARACTERIZATION, GENERAL SAFETY ISSUES, SPECIFIC SAFETY ISSUES, INFORMATION REQUIREMENTS, PRIORITY

6. Author

Name: C. S. HOMI

Signature 10/4/95

Organization/Charge Code 75320/N4G6A

7. Abstract

This document is a plan that identifies the information needed to address relevant issues concerning short-term and long-term safe storage and long-term management of Single-Shell Tank (SST) 241-C-102.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE OCT 05 1995
Sta 4

RECORD OF REVISION	(1) Document Number WHC-SD-WM-TP-206	Page 1

(2) Title
TANK 241-C-102 TANK CHARACTERIZATION PLAN

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
		(5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) WHC-SD-WM-TP-206 REV. 0, EDT 609595, December 1, 1994		
1 RS	Complete revision to new format, ECN 625718	CH	S. Rhodes 10/4/95

WHC-SD-WM-TP-206
Revision 1
UC-2070

Tank 241-C-102
Tank Characterization Plan

C. S. Homi
Westinghouse Hanford Company

Date Published
October 1995

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

Westinghouse Hanford Company
P.O Box 1970
Richland, Washington

Management and Operations Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

C-102	Tank 241-C-102
CC	Complexant Concentrate
DQO	Data Quality Objective
HTCE	Historical Tank Content Estimate
DSSF	Double Shell Slurry Feed
NCPLX	Non-complexed
SST	Single-Shell Tank
SUMMA®	Trademark of Molectrics, Inc.
TCP	Tank Characterization Plan
TOC	Total Organic Carbon
USQ	Unreviewed Safety Question
WHC	Westinghouse Hanford Company

1.0 INTRODUCTION

This Tank Characterization Plan (TCP) identifies the information needed to address relevant issues concerning short-term and long-term safe storage and long-term management of Single-Shell Tank (SST) 241-C-102 (C-102). It should be understood that the various needs and issues surrounding tank C-102 are evolving as new information about the tank is uncovered. As a result of this progression, this Tank Characterization Plan addresses only the issues that, to this date, have been identified. It is expected that deviations from this plan may occur as additional issues or needs arise which impact the management of SST C-102. As necessary, this Tank Characterization Plan will be revised to reflect those changes or deviations.

Tank C-102 was constructed between 1943 and 1944 and was put into service in October 1946. Initially tank C-102 received metal waste from the cascade overflow of tank C-101 beginning in May 1946. Tank C-102 contained metal waste from the second quarter of 1946 until the second quarter of 1953. In 1953, the tank was sluiced to a sludge heel to recover uranium from the metal waste. From the third quarter of 1953 until the first quarter of 1954, C-102 received uranium recovery waste. From the third quarter of 1954 until the fourth quarter of 1961, tank C-102 contained U Plant waste. During the second quarter of 1957, the waste in tank C-102 was scavenged and pumped out of the tank. From the third quarter of 1960 until the fourth quarter of 1969, C-102 received PUREX cladding waste. Also, during the third quarter of 1960, the tank received wastewater. C-102 received ^{66}Th high level waste during the second quarter of 1966. From the second quarter of 1968 until the first quarter of 1969, C-102 received PUREX organic wash waste. Presently, the tank waste is classified as dilute complexed waste. This tank currently has a total waste volume of 1,601 kL (423 kgal), which is equivalent to 379.2 centimeters (149.3 inches) of waste as measured from the baseline of the tank. The waste is comprised of 295.3 kL (78 kgal) of unknown and 1,306 kL (345 kgal) of sludge with 71.9 kL (19 kgal) of pumpable liquid remaining (Brevick 1994a).

The tank is sound and was removed from service in 1976 and declared inactive in 1978. Tank C-102 is passively ventilated and has been partially isolated. The last photo was taken on May 18, 1976 (Hanlon 1995). The 1976 photographic montage indicates a black sludge surface with small pockets of liquid (Brevick et al 1994). The last solids volume update was obtained on April 28, 1982 (Hanlon 1995). The tank was saltwell pumped and the level was adjusted after the photographic montage was obtained; therefore, the montage may not represent current tank conditions.

C-102 waste analyses were conducted in October 1975, June 1987 and January 1988. The sample analyzed in 1975 was light brown liquid and did not contain any solids and when cooled to 5°C only 1% was observed. In 1987 the analysis on a partial core encountered numerous problems and; therefore, the results were inconclusive. The 1988 sample was a composite.

This tank is on the Organics Watch List. The tank has an Unreviewed Safety Question (USQ) because of the potential consequences of a radiological release resulting from ignition and/or volatile reaction of the organic constituents contained within the tank. Near-term sampling and analysis activities are focused on either verification of the watchlist tank status, identification of any new safety issues, changing the Watch List status, or resolving the USQ. Should any safety issues be identified additional analysis will occur consistent with the identified issue.

In addition to the resolution of the safety issues, it is intended that all tank waste will be subject to pretreatment and retrieval to prepare for final storage or disposal. Presently, these long-range plans have yet to be fully identified and are, therefore, not included in this document.

2.0 PROGRAM ELEMENTS REQUIRING INFORMATION FOR TANK 241-C-102

This section identifies the various program elements, and identifies which of these programs require characterization data from tank C-102.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Babad et al. 1995) describes the sampling and analytical requirements that are used to screen waste tanks for unidentified safety issues. The primary analytical requirements for the safety screening of a tank are energetics, total alpha activity, moisture content, and flammable gas concentration.

2.2 SPECIFIC SAFETY ISSUES

2.2.1 Ferrocyanide

This tank is not on the Ferrocyanide Watch List; therefore, no information needs are currently identified for this program element.

2.2.2 Organic

This tank is on the Organics Watch List. Sampling and analysis requirements must be performed as per *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue* (Babad 1995). The analyses employed will determine the TOC, presence of a free organic liquid phase, moisture content and tank temperature.

2.2.3 High Heat

This tank is not on the High Heat Watch List; therefore, no information needs are currently identified for this program element.

2.2.4 Flammable Gas

This tank is not on the Flammable Gas Watch List; therefore, no information needs are currently identified for this program element.

2.2.5 Vapor

The tanks currently scheduled to be vapor sampled may be classified into four categories: (1) those tanks which are to be rotary mode core sampled (as a consequence of the rotary sampling system); (2) tanks on the Organic or Ferrocyanide Watch Lists; (3) tanks in C farm; and (4) tank BX-104, due to vapor exposure. Since tank C-102 is categorized in one of the above four groups, information needs must satisfy *Data Quality Objectives for Generic In-Tank Health and Safety Vapor Issue Resolution* (Osborne et al. 1995) and *Rotary Sampling Core Vapor Sampling Data Quality Objective* (Price 1994). Characterization of the tank headspace is needed to: 1) identify those

tanks which can be sampled safely with intrusive equipment without risk of gas ignition; 2) identify and estimate concentrations of toxicologically significant compounds present in the tank headspace to establish worker safety precautions; and 3) support the startup and operation of the portable exhauster used during rotary-mode core sampling.

2.2.6 Criticality

No information separate from that for the general safety issue of tank C-102 are currently identified for this program element. However, if the general safety screening of tank C-102 identifies a potential criticality concern, analyses for fissile materials and neutron absorbers and poisons will be performed as identified in the safety screening data quality objective.

2.2.7 Screening Approach Evaluation

The safety screening approach is currently under review. Information is required from key tanks to determine if a revised approach to screening may be adopted, as proposed in Meacham, 1995.

2.3 CONTINUING OPERATIONS

2.3.1 Compatibility/Stabilization

No information needs are currently identified for this program element.

2.3.2 Evaporator

No information needs are currently identified for this program element.

2.4 DOUBLE-SHELL TANK WASTE ANALYSIS PLAN

This section does not apply because tank C-102 is a single shell tank.

2.5 DISPOSAL

2.5.1 Retrieval

Current retrieval needs (Bloom 1995) do not call for test samples to be taken from tank C-102.

2.5.2 Pretreatment/Vitrification

Tank C-102 has not been identified as a bounding tank for pretreatment/disposal process development (Kupfer 1995).

2.6 HISTORICAL MODEL EVALUATION

Bounding tanks and data requirements for historical model evaluations are found in DQO *Historical Model Evaluation Data Requirements* (Simpson 1995). Tank C-102 has been identified as an alternate bounding tank, but will now be assessed against this DQO.

3.0 HOW INFORMATION WILL BE OBTAINED

The safety screening DQO requires that a vertical profile of the tank waste be obtained from at least two widely spaced risers. This vertical profile may be obtained using core, auger (for shallow tanks), or grab samples. Auger and rotary core sampling events have been scheduled for C-102 of which Auger sampling has been completed. Vapor sampling of this tank has not been scheduled at this time. No other sampling is scheduled through fiscal year 1996 (Stanton 1995). Both the Auger and rotary mode sampling type have been chosen over the Push sampling mode due to the fact that the surface of tank C-102 is comprised of saltcake (which is not conducive to good push mode core sampling recovery). Prior to rotary sampling it is necessary to vapor sample the tank as per requirements of *Rotary Core Vapor Sampling Data Quality Objective* (Price 1994).

The best current estimate of the water content in tank C-102 solids, as determined from the process records, is 68.1%; based on the HTCE (Brevick 1994a). Estimated (Toth et al 1995) water content in tank C-102 sludge is 44.7% (generated from a model based on sample data from similar tanks). If the variance of water in tanks already sampled and a statistical power curve Is used then a minimum of two cores are needed to demonstrate a water content above 17% at 95% confidence. The TOC contained within the sludge is estimated (Toth et al 1995) to be 0.1% (wet basis), which is significantly lower than the level of concern. Two core samples will be requested for this tank. Should the measured mean be lower than anticipated or the measured variance higher, additional samples may be required.

The best current information indicates that 2 risers are available for sampling of tank C-102, 12" (30.5 cm) risers R2 and R3. These are the only risers available at this time. Initial information will be taken from these 2 risers and assessed to determine if more samples are required. Alternate sampling methods, installation of a riser or removal of equipment from risers presently considered unavailable, are possible future options.

4.0 PRIORITY OF INFORMATION REQUIREMENTS

Vapor sampling has not been scheduled at this time. Auger sampling was completed in December of 1994. Rotary mode sampling has been scheduled for FY 1995 (Stanton 1995).

Table 4-1: Integrated DQO Requirements

Sampling Event	Applicable DQO	Sampling Requirements	Analytical Requirements
Vapor Sampling	-Health & Safety Vapor Issue Resolution DQO -Rotary Sampling Core Vapor Sampling DQO	3 SUMMA® canisters 12 Triple Sorbent Traps 6 Sorbent Trap Systems	Gas Flammability Gas Toxicity -Organic Vapors -Permanent Gases
Auger and Rotary Core Sampling	-Safety Screening DQO - Organic DQO	Core samples from a minimum of 2 risers separated radially to the maximum extent possible	Energetics, Moisture, Total Alpha, Total Organic Carbon, SpG

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank C-102 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

6.0 REFERENCES

Babad, H, K. S. Redus, and J. W. Hunt, 1995a, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev 1, Westinghouse Hanford Company, Richland, Washington.

Babad, H., S. M. Blacker, and K. S. Redus, 1995b, *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue*, WHC-SD-WM-DQO-006, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Bloom, G. R., and Q. H. Nguyen, 1995, *Characterization Data Needs for Development, Design, and Operation of Retrieval Equipment Developed Through the Data Quality Objective Process*, WHC-SD-WM-DQO-008, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

Brevick, C. H., 1994a, *Historical Tank Content Estimate for the Northeast Quadrant of the Hanford 200 East Areas*, WHC-SD-WM-ER-349, Rev. 0a, ICF Kaiser Hanford Company, Richland, Washington.

Brevick, C. H., 1994b, *Supporting Document for the Historical Tank Content Estimate for BY Tank Farm*, WHC-SD-WM-ER-312, Rev. 0, ICF Kaiser Hanford Company, Richland, Washington.

Brown, T. M., S. J. Eberlein, D. A. Dodd, T. J. Kunthara, B. C. Simpson, and N. W. Kirch, *Tank Waste Characterization Plan and Basis*, 1995, WHC-SD-WM-TA-164, Rev 0, Westinghouse Hanford Company, Richland, Washington.

Fowler, K.D., 1995, *Data Quality Objectives for the Waste Compatibility Program*, WHC-SD-WM-DQO-001, Rev. 1, April 1995, Westinghouse Hanford Company, Richland, Washington.

Hanlon, B.M., 1995, *Waste Tank Summary for Month Ending May, 1995*, WHC-EP-0182-82, Westinghouse Hanford Company, Richland, Washington.

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

Kupfer, M. J., W. W. Schultz, and J. T. Slankas, 1995, *Strategy for Sampling Hanford Site Tank Wastes for Development of Disposal Technology*, WHC-SD-WM-TA-154, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Meacham, J. E., R. J. Cash, B. A. Pulsipher, and G. Chen, 1995, *Data Requirements for the Ferrocyanide Safety Issue Developed through the Data Quality Objectives Process*, WHC-SD-WM-DQO-007, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Osborne, J.W., J.L. Huckaby, E.R. Hewitt, C.M. Anderson, D.D. Mahlum, B.A. Pulsipher, and J.Y. Young, 1995, *Data Quality Objectives for Generic In-Tank Health and Safety Vapor Issue Resolution*, WHC-SD-WM-DQO-002, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

Price, D. N., 1994, *Rotary Core Vapor Sampling Data Quality Objective*, WHC-SD-WM-SP-003, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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

Stanton, G. A., 1995, Baseline Sampling Schedule, Revision 4.3, (internal memo 74320-95-04, to distribution, March 24), Westinghouse Hanford Company, Richland, Washington.

Toth, J. J., P. G. Heasler, M. E. Lerchen, J. G. Hill, and P. D. Whitney, 1995, *Analysis of Organic Carbon and Moisture in Hanford Single-Shell Tank Waste*, PNL-10360, Pacific Northwest Laboratory, Richland, Washington.

Webb, A. B., J. L. Stewart, D. A. Turner, M. G. Plys, B. Malinovic, J. M. Grigsby, D. M. Camaioni, P. G. Heasler, W. D. Samuels, and J. J. Toth, 1995, *Preliminary Safety Criteria for Organic Watch List Tanks at the Hanford Site*, WHC-SD-SARR-033, Rev. 0, Draft, Westinghouse Hanford Company, Richland, Washington.