COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN No 625723

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-U-103 TANK CHARACTERIZATION PLAN	6. Bldg./Sys./Fac. No. U-103	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-TP-288 REV 1 0 10/5/95 Ecn	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

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

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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
OPERATIONS AND ENGINEERING		
Cog. Eng. C. S. Homi	C S Homi	10/4/95
Cog. Mgr. S. J. Eberlein	S J Eberlein	10-5-95
QA		
Safety		
Environ.		
Other		

	Signature	Date
ARCHITECT-ENGINEER		
PE		
QA		
Safety		
Design		
Environ.		
Other		
DEPARTMENT OF ENERGY		
Signature or a Control Number that tracks the Approval Signature		
ADDITIONAL		

RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-TP-288, REV 1
Document Title:	Tank 241-U-103 Tank Characterization Plan
Release Date:	10/5/95

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 10/5/95

Kara Broz

SUPPORTING DOCUMENT

1. Total Pages 12

2. Title	3. Number	4. Rev No.
TANK 241-U-103 TANK CHARACTERIZATION PLAN	WHC-SD-WM-TP-288	1

5. Key Words

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

6. Author

Name: C. S. HOMI

Signature C S Homi 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-U-103.

8. RELEASE STAMP

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RECORD OF REVISION	(1) Document Number WHC-SD-WM-TP-288	Page 1

(2) Title
TANK 241-U-103 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-288 REV. 0, EDT 610009, January 25, 1995		
1 RS	Complete revision to new format, ECN 625723		

WHC-SD-WM-TP-288
Revision 1
UC-2070

Tank 241-U-103
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

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LIST OF ABBREVIATIONS

DQO	Data Quality Objective
HTCE	Historical Tank Content Estimate
NCPLX	Non-complexed
SST	Single-Shell Tank
SUMMA®	Trademark of Molectrics, Inc.
TCP	Tank Characterization Plan
TOC	Total Organic Carbon
U-103	Tank 241-U-103
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-U-103 (U-103). It should be understood that the various needs and issues surrounding SST U-103 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 tank U-103. As necessary, this Tank Characterization Plan will be revised to reflect those changes or deviations.

Tank U-103 was constructed between 1943 and 1944 and was put into service in 1947. Initially tank U-103 received metal waste from the first quarter of 1947 until the fourth quarter of 1956. Also, during the fourth quarter of 1956, the heel was sluiced and the tank was declared empty the following quarter. The tank received REDOX waste from the first quarter of 1957 until the second quarter of 1975. From the first quarter of 1974 until the second quarter of 1976, U-103 received wastewater. During the second quarter of 1975, U-103 received 242-T bottoms and recycle waste. During the fourth quarter of 1977, U-103 received a $HNO_3/KMnO_4$ solution. From the second quarter of 1978 until the third quarter of 1980, the tank received partial neutralized feed waste. Presently, the waste is classified as non-complexed waste. U-103 currently contains a total waste volume of 1,771.7 kL (468 kgal), which is equivalent to 420.7 centimeters (165.6 in) of waste as measure from the baseline of the tank. The waste is comprised of 49.2 kL (13 kgal) of supernatant; 1,143.3 kL (302 kgal) of saltcake; 458.1 kL (121 kgal) of saltslurry and 121.1 kL (32 kgal) of sludge with 628.4 kL (166 kgal) of pumpable liquid remaining (Brevick 1994b).

The tank is classified as sound and was removed from service and labeled inactive in 1978. Tank U-103 is passively ventilated and was partially isolated in December 1982. The tank is awaiting interim stabilization and the last photo was taken on September 13, 1988 (Brevick 1994a). The 1988 photographic montage indicates that the surface may be partially covered with floating saltcake (Brevick et al 1994). Most of the tank is filled with a dark grey liquid. The last solids update was obtained on April 28, 1982 (Hanlon 1995).

U-103 was a slurry receiver for the 242-S Evaporator and; therefore, samples were obtained and analyzed between September 1965 and December 1978. Boil down studies were conducted on the 1965 sample which showed that 50% of the sample could be boiled away at 135°C and the sample was 100% solid at room temperature. A sample analyzed in 1977 was reported to be grey. Two samples analyzed in 1978 were reported to be dark green; however, a sample analyzed in late 1978 (after the earlier 1978 samples) was grey with granular crystals. All sample salts contained mostly sodium nitrate with other compounds.

Tank U-103 is on the Flammable Gas and Organics Watch list. The tank has an Unreviewed Safety Question (USQ) because of the potential consequences of a radiological release resulting from a flammable gas burn and/or ignition of the organic constituents. 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-U-103

This section identifies the various program elements, and identifies which of these programs require characterization data from tank U-103.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Babad et al. 1995a) 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 and; therefore, no information needs are currently identified for this program element.

2.2.2 Organic

Tank U-103 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 et al. 1995b). 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 and; therefore, no information needs are currently identified for this program element.

2.2.4 Flammable Gas

Tank U-103 is on the Flammable Gas Watch List. Data from core samples are needed to provide an understanding of the mechanisms for gas generation, conditions which cause gas retention, the source terms for dose consequence calculations, and to support tank behavior models needed to 1) develop mitigation methods and 2) make appropriate safety analysis decisions on future operations to prevent the creation of additional flammable gas tanks. In order to achieve these objectives, a multitude of chemical and radionuclide composition and physical property analyses are needed along with supporting operational data. The most reliable information can be obtained from one complete core. The applicable DQO is: *Flammable Gas Tank Safety Program: Data Requirements for Core Sample Analysis Developed through the Data Quality Objectives (DQO) Process* (McDuffie 1995).

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 U-103 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 U-103 are currently identified for this program element. However, if the general safety screening of tank U-103 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

Tank U-103 waste will be sampled to determine compatibility. Sampling and analysis requirements must be performed as per *Data Quality Objectives for the Waste Compatibility Program* (Fowler 1995). analyses employed will be for transuranics (TRUs) such as ^{239}Pu and ^{241}Am, Total Organic Content (TOC), heat generation (by determining the amount of ^{90}Sr and ^{137}Cs) and measuring the "pumpability" of the waste (i.e. density, viscosity, percent of volume composed of solids...etc).

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 U-103 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 U-103.

2.5.2 Pretreatment/Vitrification

Tank U-103 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 U-103 has not been identified as a primary bounding tank.

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. Several sampling events of tank U-103 are scheduled: one vapor sampling events, a grab sampling and a rotary sampling event. No other sampling is scheduled through fiscal year 1997 (Stanton 1995). The rotary mode sampling type has been chosen over other sampling modes due to both the depth of the tank (making auger sampling inadequate) and the fact that the surface of tank U-103 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 (Price 1994).

The best current estimate of the water content in tank U-103 solids, as determined from the process records, is 41.3%; based on the HTCE (Brevick 1994a). Estimates (Toth et al 1995) of water content in tank U-103 saltcake and sludge are 43.1% and 29.8% respectively (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 three cores are needed to demonstrate a water content above 17% at 95% confidence. The TOC contained within the saltcake and sludge is estimated (Toth et al 1995) to be 0.7% and 0.1% (wet basis) respectively, 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.

Presently, there is no information on the availability of tank U-103 risers. It is recommended that risers be chosen that are separated radially to the maximum extent possible and; therefore, will provide a larger amount of data about the vertical and horizontal waste layers within the tank. Initial information will be taken from 3 risers and assessed to determine if more samples are required. Alternate sampling methods, installation of a riser or removal of equipment from risers are possible future options.

4.0 PRIORITY OF INFORMATION REQUIREMENTS

Characterization of flammable and toxic vapors is a high priority for this tank. Vapor sampling was completed in February 1995 (Stanton 1995). Rotary mode sampling is scheduled for February 1998 (Stanton 1995). Grab sampling was completed in May 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
Rotary Core Sampling	-Safety Screening DQO -Flammable Gas DQO -Organics DQO	Core samples from a minimum of 2 risers separated to the maximum extent possible	Energetics, Moisture, Total Alpha, Total Organic Carbon, SpG, Cations, Anions, Radionuclides
Grab Sampling	-Compatibility DQO	3 grab samples	Energetics, Moisture, Major Anions, Cations & Radionuclides,SpG & pH, Separable Organics

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank U-103 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

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