COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN № 625757

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	C. S. Homi, 75320, R2-12, 373-1097	10/24/95
	5. Project Title/No./Work Order No.: TANK 241-U-111 TANK CHARACTERIZATION PLAN	6. Bldg./Sys./Fac. No.: 2750/200E
		7. Approval Designator: N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.): WHC-SD-WM-TP-249, REV 0	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

Changed format.

13a. Justification (mark one)							
Criteria Change	[X]	Design Improvement	[]	Environmental	[]	As-Found	[]
Facilitate Const.	[]	Const. Error/Omission	[]	Design Error/Omission	[]		

13b. Justification Details

Format changed as per DOE-RL.

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

See attached Distribution Sheet.

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ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) 625757

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 Hom	10/24/95	PE	
Cog. Mgr. S. J. Eberlein S J Eberlein	10/24/95	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-249, REV 1
Document Title:	Tank 241-U-111 Tank Characterization Plan
Release Date:	10/25/95

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 10/25/95

SUPPORTING DOCUMENT

1. Total Pages 12

2. Title	3. Number	4. Rev No.
TANK 241-U-111 TANK CHARACTERIZATION PLAN	WHC-SD-WM-TP-249	1

5. Key Words

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

6. Author

Name: C. S. HOMI

Signature C Homi 10/24/95

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-111.

8. RELEASE STAMP

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RECORD OF REVISION	(1) Document Number WHC-SD-WM-TP-249	Page 1

(2) Title
TANK 241-U-111 TANK CHARACTERIZATION PLAN

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release	
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Tank 241-U-111
Tank Characterization Plan

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Westinghouse Hanford Company

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS

DQO	Data Quality Objective
DSSF	Double Shell Slurry Feed
HTCE	Historical Tank Content Estimate
SST	Single-Shell Tank
SUMMA®	Trademark of Molectrics, Inc.
TCP	Tank Characterization Plan
TOC	Total Organic Carbon
U-111	Tank 241-U-111
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 241-U-111 (U-111). It should be understood that the various needs and issues surrounding tank U-111 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 U-111. As necessary, this Tank Characterization Plan will be revised to reflect those changes or deviations.

Tank U-111 was constructed between 1943 and 1944 and was put into service in April 1947. Initially tank U-111 received 1C waste (created by the bismuth phosphate ($BiPO_4$) process), from the second quarter of 1947 until the third quarter of 1968. Tank U-111 received and/or contained REDOX waste from the first quarter of 1954 until the second quarter of 1975. From the third quarter of 1974 until the second quarter of 1975, tank U-111 received wastewater. During the third quarter of 1975, U-111 received Battelle Laboratory, N reactor, decontamination and laboratory wastes. from the fourth quarter of 1975 until the second quarter of 1976, the tank received 242-S Evaporator bottoms and recycle wastes. Additionally, U-111 received concentrated evaporator feed during the third quarter of 1976. U-111 contained evaporator feed, residual evaporator liquor or Hanford defense Residual Liquor wastes until the second quarter of 1978. From the second quarter of 1978 until the third quarter of 1980, tank U-111 contained partial neutralized feed or complexed waste. Also, during the third quarter of 1979, U-111 received a $HNO_3/KMnO_4$ solution. Presently, tank U-111 waste is classified as Double-Shell Slurry feed. This tank currently contains waste with a total waste volume of 1,245.5 kL (329 kgal), which is equivalent to 292.3 centimeters (115.1 inches) of waste as measured from the baseline of the tank. The waste is comprised of 98.4 kL (26 kgal) of sludge; 730.6 kL (193 kgal) of saltslurry and 416.4 kL (110 kgal) of saltcake with 374.8 kL (99 kgal) pumpable liquid remaining (Brevick 1994b).

The tank is sound and was removed from service in 1980. Tank U-111 is passively ventilated and was partially isolated in December 1982. The last photo was taken on June 23, 1988. The last solids volume update was obtained on April 28, 1988 (Hanlon 1995). The 1988 photographic montage indicates a waste surface that has a mixture of different components from which all moisture has evaporated and; also, it appears that the tank contents are completely dried out (Brevick 1994b). The surface components appear to be a mixture of white and brown compounds.

An analysis of tank waste was conducted on samples obtained on September 23, 1980. The waste samples from U-111 were obtained from two different tank locations; the surface and one foot above a sludge layer. The surface sample was dark green with suspended particles, while the lower sample was a coarse slurry. Both samples contained nitrates, carbonates, phosphates, hydroxides and aluminum compounds. Also, the surface sample contained nitrites. Additionally, TOC was determined to equal 0.52%. Waste was added to tank U-111 after earlier sampling efforts and; therefore, earlier sample analyses are not representative of tank contents.

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 an ignition and/or volatile reaction 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-111

This section identifies the various program elements, and identifies which of these programs require characterization data from tank U-111.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Dukelow 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 density, energetics, total alpha activity, and flammable gas concentration. Moisture determination is also needed to make correction to the total fuel dry basis criteria.

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-111 is on the Organics Watch List. Sampling and analysis requirements must be performed as per *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 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 and; 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 and; 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 U-111 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-111 are currently identified for this program element. However, if the general safety screening of tank U-111 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 U-111 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-111.

2.5.2 Pretreatment/Vitrification

Tank U-111 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-111 has been identified as a non-primary bounding tank for the S1 saltcake and S2 saltslurry waste types.

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-111 are scheduled: one vapor sampling event and a rotary core sampling event. No other sampling is scheduled through fiscal year 1996 (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-111 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 vapor sampling activity was completed in March of 1995.

The best current estimate of the water content in tank U-111 solids, as determined from the process records, is 45.0%; based on the HTCE (Brevick et al). Estimated (Toth et al 1995) water content in tank U-111 saltcake and sludge is 37.7% and 29.8% respectively (generated from a model based on sample data from similar tanks). Moisture data will be used to correct the fuel waste dry basis and, if required, to resolve any safety issues. The TOC contained within the saltcake and sludge is estimated (Toth et al 1995) to be 0.6% and 0.3% (wet basis) respectively, which is significantly lower than the level of concern. Ideally five core samples will be requested for this tank and this should meet the requirements for the above parameters.

The best current information indicates that 5 risers are available for sampling of tank U-111, 12" (30.5 cm) risers R3, R6, R7 and 4" (10.2 cm) risers R10 and R19. It is recommended that these risers be chosen because, they are risers 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 these 5 risers and assessed to determine if more samples are required. One additional riser is available but, equipment will have to be removed from the riser to utilize it for sampling. 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

Characterization of flammable and toxic vapors is a high priority for this tank. Vapor sampling was completed in March 1995 (Stanton 1995). Rotary core sampling is scheduled for early FY 1996 (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 -Organic Compexant DQO -Historical Model DQO	Core samples from 5 risers separated radially to the maximum extent possible	Energetics, Moisture, Total Alpha, TOC, SpG (Density)

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank U-111 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

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