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TANK 241BX109 TANK CHARACTERIZATION PLAN

COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 21. ECN **No 625711**Proj.
ECN

2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedure ☐ Cancel/Void ☐	3. Originator's Name, Organization, MSIN, and Telephone No. C. S. HOMI, 75320, R2-12, 373-1097	3a. USQ Required? ☐ Yes ☒ No	4. Date 10/04/95
	5. Project Title/No./Work Order No. TANK 241-BX-109 TANK CHARACTERIZATION PLAN	6. Bldg./Sys./Fac. No. BX-109	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN ¹⁴⁷²³ (includes sheet no. and rev.) WHC-SD-WM-TP-338 REV ^{10/} 10A	9. Related ECN No(s). N/A	10. Related PO No. N/A
11a. Modification Work ☐ Yes (fill out Blk. 11b) ☒ No (NA Blks. 11b, 11c, 11d)	11b. Work Package No. N/A	11c. Modification Work Complete N/A _____ Cog. Engineer Signature & Date	11d. Restored to Original Condition (Temp. or Standby ECN only) N/A _____ Cog. Engineer Signature & Date
12. Description of Change Complete revision.			
13a. Justification (mark one) Criteria Change ☒ 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 <div style="border: 1px solid black; padding: 5px; text-align: center;"> OFFICIAL RELEASE BY WHC DATE OCT 05 1995 <i>Sta 4</i> </div>

ENGINEERING CHANGE NOTICE

Page 2 of 2

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

625711

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
☐ Yes	Additional	☐ \$	Additional	☐ \$	Improvement	☐
☒ 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

<u>SIGNATURE</u>	<u>DATE</u>	<u>SIGNATURE</u>	<u>DATE</u>
<u>OPERATIONS AND ENGINEERING</u>		<u>ARCHITECT-ENGINEER</u>	
Cog. Eng. C. S. Homi <i>[Signature]</i>	<i>10/4/95</i>	PE _____	
Cog. Mgr. S. J. Eberlein <i>[Signature]</i>	<i>10/4/95</i>	QA _____	
QA _____	_____	Safety _____	
Safety _____	_____	Design _____	
Environ. _____	_____	Environ. _____	
Other _____	_____	Other _____	

	_____	<u>DEPARTMENT OF ENERGY</u>	
	_____	Signature or a Control Number that tracks the Approval Signature	

	_____	<u>ADDITIONAL</u>	

RELEASE AUTHORIZATION

Document Number: WHC-SD-WM-TP-338, REV 1

Document Title: Tank 241-BX-109 Tank Characterization Plan

Release Date: 10/4/95

**This document was reviewed following the
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WHC Information Release Administration Specialist:

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SUPPORTING DOCUMENT1. Total Pages *10*

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3. Number

WHC-SD-WM-TP-338

4. Rev No.

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5. Key Words

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Name: C. S. HOMI

Signature *CSH* *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-BX-109.

8. RELEASE STAMP

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(2) Title
TANK 241-BX-109 TANK CHARACTERIZATION PLAN

(2) Title
TANK 241-BX-109 TANK CHARACTERIZATION PLAN

CHANGE CONTROL RECORD

[illegible]

Tank 241-BX-109

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
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TABLE OF CONTENTS

1.0	INTRODUCTION	1
2.0	PROGRAM ELEMENTS REQUIRING INFORMATION FOR 241-BX-109	2
2.1	GENERAL SAFETY ISSUES	2
2.2	SPECIFIC SAFETY ISSUES	2
2.2.1	Ferrocyanide	2
2.2.2	Organic	2
2.2.3	High Heat	2
2.2.4	Flammable Gas	2
2.2.5	Vapor	2
2.2.6	Criticality	2
2.2.7	Screening Approach Evaluation	3
2.3	CONTINUING OPERATIONS	3
2.2.1	Compatibility/Stabilization	3
2.2.2	Evaporator	3
2.4	DOUBLE-SHELL TANK WASTE ANALYSIS PLAN	3
2.5	DISPOSAL	3
2.5.1	Retrieval	3
2.5.2	Pretreatment/Vitrification	3
2.6	HISTORICAL MODEL EVALUATION	3
3.0	HOW INFORMATION WILL BE OBTAINED	4
4.0	PRIORITY OF INFORMATION REQUIREMENTS	4
5.0	WHEN INFORMATION IS NEEDED	4
6.0	REFERENCES	5

LIST OF TABLES

Table 4-1: Integrated DQO Requirements	4
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LIST OF ABBREVIATIONS

BX-109	Tank 241-BX-109
DQO	Data Quality Objective
HTCE	Historical Tank Content Estimate
DSSF	Double Shell Slurry Feed
NCPLX	Non-complexed
SST	Single-Shell Tank
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 241-BX-109 (BX-109). It should be understood that the various needs and issues surrounding tank BX-109 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 BX-109. As necessary, this Tank Characterization Plan will be revised to reflect those changes or deviations.

Tank BX-109 was constructed between 1946 and 1947 and was put into service in November 1950. Initially tank BX-109 received first cycle waste from November 1950 until the fourth quarter of 1952. The tank received through first cycle waste from BX-108 via the cascade line from the first quarter of 1953 until the third quarter of 1968, the tank received U Plant waste. The tank was pumped to a heel in the first quarter of 1953. After which the tank was utilized as a ferrocyanide scavenging process feed tank and; also, BX-109 received uranium recovery waste from the first quarter of 1953 until the third quarter of 1954. In the fourth quarter of 1957, the in-farm scavenged waste was sent to tank C-101. BX-109 contained coating waste from the fourth quarter of 1964 until the third quarter of 1968. From the fourth quarter of 1967 until the first quarter of 1969, BX-103 received cesium recovery waste. The tank contained ion exchange waste from the first quarter of 1969 through the first quarter of 1976. Tank BX-103 received wastewater during the second quarter of 1973. Presently, BX-109 contains non-complexed waste. This tank currently contains waste with a total waste volume of 730.6 kL (193 kgal), which is equivalent to 166.7 centimeters (65.6 inches) of waste as measured from the baseline of the tank. The waste is comprised entirely 730.6 kL (193 kgal) of sludge 30 kL (8 kgal) with no pumpable liquid remaining (Brevick 1994a).

The tank is categorized as sound and was declared inactive in 1978. Tank BX-109 is passively ventilated and interim stabilized in September 1990 with intrusion prevention completed. The last photo was taken on September 11, 1990. The 1990 montage indicates a pock marked sludge surface with pools and rivulets of clear brown liquid (Brevick 1994b). Waste level changes were made because of this montage and; therefore, this montage description may not be representative of current tank contents. The last solids volume update was obtained on September 17, 1990 (Hanlon 1995).

In May 1975 a liquid sample of BX-109 waste was analyzed. The sample contained soluble ^{239}Pu with a concentration greater than the maximum permissible concentration in water. Soluble ^{237}Np and ^{241}Am were below or near the maximum permissible concentration.

This tank is not on any Watch list. Near-term sampling and analysis activities are focused on either verification of the non-watchlist tank status, identification of any new safety issues or changing the non-Watch List status. 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-BX-109

This section identifies the various program elements, and identifies which of these programs require characterization data from tank BX-109.

2.1 GENERAL SAFETY ISSUES

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

2.2.2 Organic

Tank BX-109 is not on the Organics Watch List and; therefore, no information needs are currently identified for this program element.

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 BX-109 is not categorized in one of the above four groups, vapor sampling is not required for this tank.

2.2.6 Criticality

No information separate from that for the general safety issue of tank BX-109 are currently identified for this program element. However, if the general safety screening of tank BX-109 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 BX-109 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 BX-109.

2.5.2 Pretreatment/Vitrification

Tank BX-109 has 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 BX-109 has not been identified as a primary bounding tank for any waste type.

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. Only a push mode sampling event is scheduled and required. No other sampling is scheduled through fiscal year 1997 (Stanton 1995). The push 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 BX-109 is comprised of supernatant and sludge.

The best current estimate of the water content in tank BX-109 solids, as determined from the process records, is 57.9%; based on the HTCE (Brevick 1994a). Estimated (Toth et al 1995) water content in tank BX-109 sludge is 38.2% (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 sludge is estimated (Toth et al 1995) to be 0.2% (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 3 risers are available for sampling of tank B-108, 12" (15.2 cm) risers R2, R3 and R6. It is recommended that two of 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 2 risers and assessed to determine if more samples are required. Two Push Mode samples with 4 segments each was collected in May 1995.

4.0 PRIORITY OF INFORMATION REQUIREMENTS

Vapor sampling is not required for this tank. Push mode sampling was completed in May 1995 (Stanton 1995).

Table 4-1: Integrated DQO Requirements

Sampling Event	Applicable DQO	Sampling Requirements	Analytical Requirements
Push Mode Sampling	-Safety Screening DQO -Pretreatment DQO	Core samples from 2 risers separated radially to the maximum extent possible	Energetics, Moisture, Total Alpha, SpG

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank BX-109 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

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