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TANK 241BY110 TANK CHARACTERIZATION PLAN

COMPLETE

ENGINEERING CHANGE NOTICE

Page 1 of 21. ECN **No 625707**Proj.
ECN

2. ECN Category (mark one) Supplemental ☐ Direct Revision ☒ Change ECN ☐ Temporary ☐ Standby ☐ Supersedeure ☐ 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
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	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-TP-279 REV <u>1/0</u>		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.				
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1. ECN (use no. from pg. 1)

625707

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	☐		

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Document Number Revision

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Signature

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OPERATIONS AND ENGINEERING

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RELEASE AUTHORIZATION

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Document Title: Tank 241-BY-110 Tank Characterization Plan

Release Date: 10/4/95

**This document was reviewed following the
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SUPPORTING DOCUMENT

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Signature

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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-BY-110.

8.

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Tank 241-BY-110

Tank Characterization Plan

C. S. Homi
Westinghouse Hanford Company

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LIST OF ABBREVIATIONS

BY-110	Tank 241-BY-110
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-BY-110 (BY-110). It should be understood that the various needs and issues surrounding tank BY-110 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 BY-110. As necessary, this Tank Characterization Plan will be revised to reflect those changes or deviations.

Tank BY-110 was constructed between 1948 and 1949 and was put into service in April 1951. Initially tank BY-110 received first cycle waste during the fourth quarter of 1951. During the third and fourth quarters of 1952, the tank received decontamination waste. The tank contained first cycle supernatant until the third quarter of 1954 when it was pumped to a ditch. From the fourth quarter of 1954 until the second quarter of 1957, the tank received in-plant ferrocyanide waste. From the fourth quarter of 1957 until the third quarter of 1958, the tank received U plant waste and coating waste. Also, during the fourth quarter of 1957 the tank received wastewater. In the last quarter of 1968 and the first two quarters of 1969, the tank contained coating waste. From the second quarter of 1969 until the second quarter of 1976, the tank was used for storage of evaporator bottoms waste. The evaporator bottoms waste was from the in-tank solidification process. The tank contained concentrated evaporator feed bottoms waste from the third quarter of 1976 until the fourth quarter of 1977. Presently, the tank waste is classified as non-complexed. This tank currently contains a total waste volume of 1,506.7 kL (398 kgal), which is equivalent to 386.6 centimeters (152.2 inches) of waste as measured from the baseline of the tank. The waste is comprised of 787.4 kL (208 kgal) of saltcake and 719.3 kL (190 kgal) of sludge with no supernatant or pumpable liquid remaining (Brevick 1994a).

The tank is sound and was declared inactive in 1979. Tank BY-110 is passively ventilated and was interim stabilized in January 1985 with intrusion prevention completed. The last solids volume update was obtained on September 10, 1979 and the last photo was taken on July 26, 1984. The 1984 photographic montage of the tank interior indicates white chunks of waste distributed throughout a green matrix (Brevick et al 1994). There is no liquid visible anywhere on the waste surface.

There is no record of historical sampling and analysis information for tank BY-110. This tank is on the Ferrocyanide Watch list. The tank has an Unreviewed Safety Question (USQ) because of the potential consequences of a radiological release resulting from the ignition of the ferrocyanide 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-BY-110

This section identifies the various program elements, and identifies which of these programs require characterization data from tank BY-110.

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 on the Ferrocyanide Watch List. Sampling and analysis requirements must be performed as per *Data Requirements for the Ferrocyanide Safety Issue Developed through the Data Quality Objectives Process* (Meacham 1995). The analyses employed will determine the total fuel concentration and moisture content. Total fuel concentration and moisture content are the primary data requirements. Also, further analyses will be employed to obtain secondary data such as temperature (data will be obtained from tank thermocouple(s)), nickel, total cyanide, TOC, ¹³⁷Cs and ⁹⁰Sr (Meacham 1995).

2.2.2 Organic

This tank is not on the Organics Watch List; 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; 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 BY-110 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 BY-110 are currently identified for this program element. However, if the general safety screening of tank BY-110 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 BY-110 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 BY-110.

2.5.2 Pretreatment/Vitrification

Tank BY-110 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 BY-110 has been identified as a primary bounding tank for the PFeCNl (ferrocyanide) and BY saltcake 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 BY-110 are scheduled: one vapor sampling event and a rotary sampling event. No other sampling is scheduled through fiscal year 1995 (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 BY-110 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 BY-110 solids, as determined from the process records, is 44.2%; based on the HTCE (Brevick et al). Estimates (Toth et al 1995) of water content in tank BY-110 saltcake and sludge are 16.9% and 37.9% respectively (generated from a model based on sample data from similar tanks). The TOC contained within the saltcake and sludge are estimated (Toth et al 1995) to be 0.7% and 0.1% (wet basis) respectively, which is significantly lower than the level of concern. Eight core samples from e 3 risers will be collected for this tank. If the true concentration of water is near the 17% action limit, it may not be possible to demonstrate through core samples that it is above the action limit.

The best current information indicates that 2 risers are available for sampling of tank BY-110, 12" (30.5 cm) riser R12B and 4" (10.2 cm) riser R7. It is recommended that these risers be chosen because, they are risers that are separated radially 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 2 risers and assessed to determine if more samples are required. Two additional riser are available. 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 November 1994 (Stanton 1995). Rotary mode sampling is scheduled for completion in early October 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 -Ferrocyanide DQO -Historical Model DQO -Pretreatment DQO	Eight Core samples from 3 risers separated radially to the maximum extent possible	Energetics, Moisture, Total Alpha, SpG, Total Organic Carbon, Ni, CN

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank BY-110 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

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