AUG 28 1995 START 9613457.0739

ENGINEERING DATA TRANSMITTAL

0042251

Page 1 of 1

1. EDT No 613365

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
DISTRIBUTION	TWRS/TECHNICAL BASIS INTEGRATION	N/A
5. Proj./Prog./Dept./Div.:	**6. Cog. Engr.:**	**7. Purchase Order No.:**
TWRS ENG/CHAR SUPPORT	C. S. HOMI	N/A
8. Originator Remarks:		**9. Equip./Component No.:**
N/A		N/A
		10. System/Bldg./Facility:
		2750E/200E
11. Receiver Remarks:		**12. Major Assm. Dwg. No.:**
		N/A
		13. Permit/Permit Application No.:
		N/A
		14. Required Response Date:
		08/28/95

OCT 1995 RECEIVED EDMC

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(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Approval Designator	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-WM-TP-395		0	TANK 241-TX-104 TANK CHARACTERIZATION PLAN	N/A	1	1	

16. KEY

Approval Designator (F)	Reason for Transmittal (G)	Disposition (H) & (I)
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)	1. Approval 2. Release 3. Information 4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment 4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

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BD-7400-172-2 (04/94) GEF097

BD-7400-172-1

RELEASE AUTHORIZATION

Document Number:	WHC-SD-WM-TP-395, REV 0
Document Title:	Tank 241-TX-104 Tank Characterization Plan
Release Date:	8/28/95

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 M. Broz 8/28/95

9613457.0740

SUPPORTING DOCUMENT

1. Total Pages 10

2. Title	3. Number	4. Rev No.
TANK 241-TX-104 TANK CHARACTERIZATION PLAN	WHC-SD-WM-TP-395	0

5. Key Words

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

6. Author

Name: C. S. HOMI

Signature 8/25/95

Organization/Charge Code 75320/N4169

7. Abstract

This document is a plan 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-TX-104.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE AUG 28 1995
Sta. 4

A-6400-073 (08/94) WEF124

WHC-SD-WM-TP-395
Revision 0
UC-2070

Tank 241-TX-104
Tank Characterization Plan

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Date Published
August 1995

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

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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
SUMMA®	Trademark of Molectrics, Inc.
SST	Single-Shell Tank
TCP	Tank Characterization Plan
TOC	Total Organic Carbon
TX-104	Tank 241-TX-104
WHC	Westinghouse Hanford Company

1.0 INTRODUCTION

This Tank Characterization Plan (TCP) identifies the information needed to address relevant issues concerning short-term safe storage and long-term management of Single-Shell Tank (SST) 241-TX-104 (TX-104). It should be understood that the various needs and issues surrounding tank TX-104 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 TX-104. This Tank Characterization Plan will be revised as necessary to reflect those changes or deviations.

Tank TX-104 was constructed between 1947 and 1948 and was put into service in November 1950 when tank TX-104 received metal waste. During July of 1954, the tank received metal waste from tank TX-103. In the fourth quarter of 1956 the tank was declared empty. From the second quarter of 1957 until the second quarter of 1973, tank TX-104 received REDOX waste. Also, during the fourth quarter of 1971 the tank received wastewater. From the third quarter of 1973 until the first quarter of 1975, the tank received B Plant low level waste, PUREX organic wash waste, REDOX ion exchange waste, REDOX waste and tributyl phosphate waste. From the second quarter of 1975 until the second quarter of 1976, tank TX-104 received 242-T Evaporator bottoms waste. This tank currently contains a total waste volume of 246.1 kL (65 kgal), which is equivalent to 79 centimeters (31.1 inches) of waste as measured from the baseline of the tank. The waste is comprised of 68.1 kL (18 kgal) of metal waste, 174.1 kL (46 kgal) of saltcake and 3.8 kL (1 kgal) of supernatant with no pumpable liquid remaining (Brevick 1994a).

The tank is sound and was labelled inactive in 1977. Tank TX-104 is passively ventilated and was interim stabilized in September 1979 with intrusion prevention completed in August 1984. The last photo was taken on October 16, 1984. The 1984 photographic montage presents a waste surface that is half black and half light brown (Brevick 1994a). Therefore, the tank waste is not homogenous. Also, there appears to be a small amount of liquid in the center of the tank. The waste appears to be black. The last solids volume update was obtained on April 6, 1984 (Hanlon 1995).

Three waste samples were obtained from tank TX-104, with the most recent in September 1976. This sample was dark brown and contained approximately 10% solids. The primary constituents were sodium nitrates and hydroxide with lesser amounts of nitrites, carbonates, sulfates and aluminates (Brevick 1994b). A significant amount of chloride ion was also detected. Previous samples, obtained in September 1965 and September 1974, were mostly or entirely liquid and contained mostly sodium nitrate.

This tank is presently not on a 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 the addition of TX-104 to a Watch List. 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.

2.0 PROGRAM ELEMENTS REQUIRING INFORMATION FOR TANK 241-TX-104

This section identifies the various program elements, and identifies which of these programs require characterization data from tank TX-104.

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 and; therefore, no information needs are currently identified for this program element.

2.2.2 Organic

This tank 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 (a prerequisite to rotary sampling); (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 TX-104 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 TX-104 are currently identified for this program element. However, if the general safety screening of tank TX-104 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. Sampling of this tank is required to confirm the non-Watch List status.

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 TX-104 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 TX-104.

2.5.2 Pretreatment/Vitrification

Tank TX-104 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 et al. 1995). Tank TX-104 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. Several sampling events of tank TX-104 are scheduled: one vapor sampling event and a rotary sampling event. No other sampling is scheduled through fiscal year 1998 (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 TX-104 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 TX-104 solids, as determined from the process records, is 38.5%; based on the HTCE (Brevick 1994b). Estimates (Toth et al 1995) of water content in tank TX-104 saltcake is 21.6% (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. Should the measured mean be lower than anticipated or the measured variance higher, additional samples may be required. The TOC contained within the saltcake is estimated (Toth et al 1995) to be 0.4% (wet basis), which is significantly lower than the level of concern. Two core samples have been requested.

Presently there is no information on the availability of tank TX-104 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 2 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 is expected to be performed in fiscal year 1996 (Stanton 1995). Rotary mode sampling is scheduled for FY 1997 (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 6 Triple Sorbent Traps 8 Sorbent Trap Systems	Gas Flammability Gas Toxicity -Organic Vapors -Permanent Gases
Rotary Core Sampling	-Safety Screening DQO	Core samples from a minimum of 2 risers separated to the maximum extent possible	Energetics, Moisture, Total Alpha

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank TX-104 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

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