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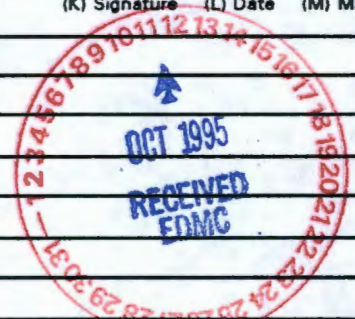
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7. Abstract

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-111.

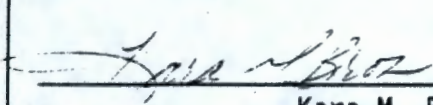
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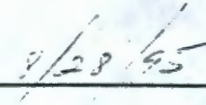
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Tank 241-TX-111 Tank Characterization Plan

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August 1995

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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-111	Tank 241-TX-111
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-111 (TX-111). It should be understood that the various needs and issues surrounding tank TX-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 TX-111. This Tank Characterization Plan will be revised as necessary to reflect those changes or deviations.

Tank TX-111 was constructed between 1947 and 1948 and was put into service in March 1950. Initially tank TX-111 received first cycle decontamination waste in March 1950. Presently, the waste is classified as non-complexed. This tank currently contains non-complexed waste with a total waste volume of 1,400.7 kL (370 kgal), which is equivalent to 360.7 centimeters (142 inches) of waste as measured from the baseline of the tank. The waste is comprised of 1,237.9 kL (327 kgal) of saltcake and 162.8 kL (43 kgal) of sludge with no pumpable liquid remaining (Brevick 1994a).

The tank is sound and was removed from service in 1977. Tank TX-111 is passively ventilated and was interim stabilized in April 1983 with intrusion prevention completed in August 1984. The last photo was taken on November 19, 1987. The 1987 photographic montage provides a very clear picture of the tank interior and indicates that the waste surface is a reasonably uniform light yellow (Brevick 1994b). There is a large area of white material near the center of the tank, there are black areas scattered around the surface, there are a couple of red areas and finally there is a brown depression. The last solids volume update was obtained on September 16, 1980 (Hanlon 1995).

Five waste samples were obtained from September 1965 to February 1981. The most recent sample contained sodium aluminate, sodium hydroxide, sodium nitrite, sodium nitrate, sodium phosphate, sodium carbonate and a TOC concentration. There is a large probability that this last sample is representative of the waste currently contained in tank TX-111 (Brevick 1994b).

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-111 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. 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-TX-111

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

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 has been identified by the Flammable Gas Safety Program as meeting the criteria that may indicate potential for flammable gas generation and retention. For this reason, a vapor sample is warranted (as discussed below). Not all potential flammable gas tanks require core sampling and application of the flammable gas core sampling DQO. The program has not requested application of the DQO for this tank.

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-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 TX-111 are currently identified for this program element. However, if the general safety screening of tank TX-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. 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-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 TX-111.

2.5.2 Pretreatment/Vitrification

Tank TX-111 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 et al. 1995). Tank TX-111 has been identified as a primary bounding tank for the T2 saltcake 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-111 are scheduled: one vapor sampling event and a rotary sampling event. No other sampling is scheduled through fiscal year 1999 (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-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 *Rotary Core Vapor Sampling Data Quality Objective* (Price 1994).

The best current estimate of the water content in tank TX-111 solids, as determined from the process records, is 36.3%; based on the HTCE (Brevick 1994a). Estimates (Toth et al 1995) of water content in tank TX-111 saltcake is 16.9% (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. Should the measured mean be lower than anticipated or the measured variance higher, additional samples may be required. The actual moisture content may be close enough to the threshold that sample analysis cannot provide assurance that it exceeds the threshold. The TOC contained within the saltcake is estimated (Toth et al. 1995) to be 0.5% (wet basis), which is significantly lower than the level of concern. Initially two core samples will be requested for this tank. Tank TX-111 has also been identified as a good example of a tank with homogeneous waste distribution. For this reason, multiple samples may be requested to determine the extent of spatial variability in such a tank.

The best current information indicates that 3 risers are available for sampling of tank TX-111, 4" (10.2 cm) risers R9B, R10A and R12A. 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 2 risers and assessed to determine if more samples are required. Two or three additional risers are available, but equipment will have to be removed from each individual riser to utilize these risers 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 is expected to be performed in fiscal year 1995 or early fiscal 1996 (Stanton 1995). Rotary mode sampling is scheduled for 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 6 Triple Sorbent Traps 8 Sorbent Trap Systems	Gas Flammability Gas Toxicity -Organic Vapors -Permanent Gases
Rotary Core Sampling	-Safety Screening DQO -Historical Model DQO	Core samples from a minimum of 2 risers separated to the maximum extent possible* * See discussion section 3.0	Energetics, Moisture, Total Alpha, Major Anions, Cations, Radionuclides

5.0 WHEN INFORMATION IS NEEDED

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

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