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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-S-103.

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Tank 241-S-103
Tank Characterization Plan

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LIST OF ABBREVIATIONS

S-103	241-S-103
DQO	Data Quality Objective
DSSF	Double-Shell Slurry Feed
HTCE	Historical Tank Content Estimate
NCPLX	Non-complexed waste
SUMMA®	Trademark of Molectrics, Inc.
TCP	Tank Characterization Plan
TLM	Tank Layering Model
TOC	Total Organic Carbon
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 tank 241-S-103 (S-103). It should be understood that the various needs and issues surrounding tank S-103 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 tank S-103. This Tank Characterization Plan will be revised as necessary to reflect those changes or deviations.

Tank S-103 was put into service in November 1953. Tank S-103 is a type III tank with a diameter of 75-ft and a capacity of 2,870 kL (758 kgal). Tank S-103 is the third tank in a cascade flow series consisting also of tanks 241-S-105 and 241-S-104.

Tank S-103 started receiving waste from the REDOX facility from the fourth quarter of 1953 until the fourth quarter of 1973. REDOX waste (R) was the high-level component of the process waste. From the fourth quarter of 1973 until the second quarter of 1976, the tank received bottoms and recycle streams from the 242-S Evaporator / Crystallizer. In the fourth quarter of 1976, the tank became a low-heat evaporator dump tank containing evaporator feed waste. Between the second quarter of 1978 and the fourth quarter of 1980, the tank was classified as having non-complexed, partial neutralized feed and double-shell slurry feed wastes. From the first quarter of 1978 until the fourth quarter of 1980, the tank received a HNO_3 / $KMnO_4$ solution.

Tank S-103 currently stores 939 kL (248 kgals) of which is equivalent to 247 cm (97 in) of waste as measured from the bottom of the tank. The surface level is monitored with a Food Instrument Corporation gauge which is set in the intrusion mode. From 1991, the surface level readings range from 105.1 to 102.2 in (Brevick 1994a). The waste is comprised 450 kL (119 kgal) of saltcake, 390 kL (103 kgal) of salt slurry, 64 kL (17 kgal) of supernatant and 34 kL (9 kgal) of unknown waste (Brevick 1994a). A portion of the waste volume, 322 kL (85 kgal), is considered as drainable interstitial liquid (Hanlon 1995).

The tank was primary stabilized and removed from service in 1980. It was partially isolated in December 1982. The last solids volume update was obtained on November 20, 1975 and the last in-tank photo was taken on June 01, 1984 (Hanlon 1995).

A list of chemical constituents of the waste in tank S-103, based on the Tank Layering Model (TLM), is given in (Brevick 1994a). Development and refinement of the TLM which is the basis of the HTCE is continuing. At this point, the uncertainty of the TLM estimates is unknown.

Near-term sampling and analysis activities for tank S-103 are focused on identification of any new safety issues. Should any safety issues be identified additional analysis will occur consistent with the identified issue.

In addition to the identification and resolution of any 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-S-103

This section identifies the various program elements, and identifies which of these programs require characterization data from tank S-103.

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

2.2.2 Organic

This tank is not on the Organic Watch List, therefore, no information needs are currently identified for this program element.

2.2.3 High Heat

This tank is not listed as high heat, 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 S-103 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 S-103 are currently identified for this program element. However, if the general safety screening of tank S-103 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 S-103 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 S-103.

2.5.2 Pretreatment/Vitrification

Tank S-103 is identified as a bounding tank for pretreatment/disposal process development (Kupfer el al. 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 S-103 has not been identified as a primary bounding.

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. A vapor sampling event has been scheduled for fiscal year 1996 and a rotary sampling event has been scheduled for the first quarter of fiscal year 1997. No other sampling is scheduled through fiscal year 1997 (Stanton 1994). 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 S-103 is comprised of saltcake (which is not amenable 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 best current estimate of the water content in tank S-103 solids, as determined from the process records, is 41.4%; based on the HTCE (Brevick 1994a). Estimates (Toth et al 1995) of water content in tank S-103 saltcake and sludge are 21.6% and 42.4% respectively (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 in the sludge. Should the measured mean be lower than anticipated or the measured variance higher, additional samples may be required. The TOC contained within the saltcake and sludge are estimated (Toth et al 1995) to be 0.4% and 0.1% (wet basis) respectively, which is significantly lower than the level of concern. Two core samples will be requested for this tank and this should meet the requirements for the above parameters.

Tank S-103 has three 12 inch risers R6, R7 and R8 are available for use (Brevick 1994a). Riser availability and sampling truck access need to be investigated to identify 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 two of these risers and assessed to determine if more samples are required. 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 scheduled for FY 1996. Rotary mode sampling is scheduled for FY 1997.

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 Sampling	-Safety Screening DQO	Core samples from 2 risers separated to the maximum extent possible	Energetics, TOC, Total Alpha, Moisture

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank S-103 during FY 1997 for safety screening and to prepare a Tank Characterization Report.

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