ENGINEERING CHANGE NOTICE

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1. ECN No 625760

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 11/16/95
	5. Project Title/No./Work Order No. TANK 241-A-101 TANK CHARACTERIZATION PLAN	6. Bldg./Sys./Fac. No. A-101	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-TP-331 REV 0	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 Deleted flammable gas requirement.			
13a. Justification (mark one) Criteria Change ☒ Design Improvement ☐ Environmental ☐ Facility Deactivation ☐ As-Found ☐ Facilitate Const ☐ Const. Error/Omission ☐ Design Error/Omission ☐			
13b. Justification Details Update flammable gas requirement.			
14. Distribution (Include name, MSIN, and no. of copies) See attached Distribution Sheet			RELEASE STAMP OFFICIAL RELEASE BY WHC DATE NOV 20 1995 <i>Sta 4</i>

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

625760

15. Design Verification Required

☐ Yes
☒ No

16. Cost Impact

ENGINEERING

Additional ☐ \$
Savings ☐ \$

CONSTRUCTION

Additional ☐ \$
Savings ☐ \$

17. Schedule Impact (days)

Improvement ☐
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	☐	IEPD 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

Signature

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OPERATIONS AND ENGINEERING

Cog. Eng. C. S. Nomi

Cog. Mgr. S. J. Eberlein

QA

Safety

Environ.

Other

11/16/95

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Safety

Design

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Other

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval signature

ADDITIONAL

SUPPORTING DOCUMENT		1. Total Pages <i>10</i>
2. Title TANK 241-A-101 TANK CHARACTERIZATION PLAN	3. Number WHC-SD-WM-TP-331	4. Rev No. 0A
5. Key Words CHARACTERIZATION, DQO, HEALTH AND SAFETY VAPOR ISSUE, ORGANIC, FLAMMABLE, SINGLE-SHELL TANK, VAPOR SAMPLING, ROTARY SAMPLING, TANK CHARACTERIZATION PLAN	6. Author Name: C. S. HOMI <i>[Signature]</i> 11/16/95 Signature Organization/Charge Code 75320/E44330	
7. Abstract This document is a plan which identifies the information needed to address relevant issues concerning short-term and long-term safe storage and long-term management of tank 241-A-101.		
8. RELEASE STAMP <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> OFFICIAL RELEASE BY WHC DATE NOV 20 1995 <i>Sta 4</i> </div>		

Tank 241-A-101

Tank Characterization Plan

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Westinghouse Hanford Company

Date Published
November 1995

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

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LIST OF ABBREVIATIONS

A-101	241-A-101
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
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 safe storage and long-term management of tank 241-A-101 (A-101). It should be understood that the various needs and issues surrounding tank A-101 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 A-101. This Tank Characterization Plan will be revised as necessary to reflect those changes or deviations.

Tank A-101 was constructed and put into service in 1956. Activity in tank A-101 began when it was filled with PUREX high-level waste during the first quarter of 1956. During the last three quarters of 1969, the tank was filled with water for leak tests. PUREX waste was again added to the tank in 1970. Beginning in 1973, the tank also received B-Plant waste. Further water additions were made during the fourth quarter of 1975 and the first and second quarters of 1976. Evaporator waste was received during the last two quarters of 1976 and the first two quarters of 1977. During the remaining part of 1977, the waste was classified as residual waste. It was changed to Hanford defense residual liquid during the first quarter of 1978. During the period from the second quarter of 1978 until the time the tank was declared inactive in 1980, the waste was classified as double-shell slurry feed (DSSF). This tank contains DSSF with a total waste volume of 3,610 kL (953 kgal), which is equivalent to 879 cm (346 in) of waste as measured from the bottom of the tank. The surface level is read manually and on a quarterly basis with a tape through riser 6. The surface level reading for tank A-101 as of January 2, 1995 is 871.2 cm (343.0 in). The waste is comprised 11 kL (3 kgal) of sludge, 1,530 kL (403 kgal) of salt slurry, and 2,070 kL (547 kgal) of saltcake (Brevick et al. 1994a). A portion of the waste volume, 1,560 kL (413 kgal), is considered as drainable interstitial liquid (Hanlon 1995).

Tank A-101 was declared inactive in November 1980. It was partially isolated in 1982 and stabilization has yet to be completed. The last solids volume update was obtained on November 21, 1980 and the last photo was taken on August 21, 1985 (Hanlon 1994). Assembled tank photographs show a white to grayish-yellow saltcake surface with no visible liquid.

A list of chemical constituents of the waste in tank A-101, based on the Tank Layering Model (TLM), is given in (Brevick et al. 1994b). Although the total organic carbon (TOC) content of tank A-101, as obtained from the Historical Tank Content Estimates (HTCE) (Brevick et al. 1994a), is listed as 0.22 wt % (wet basis), (Turner 1994) reports a higher laboratory measurement, taken in 1983, of 7.16 wt % TOC (wet basis) for a tank A-101 slurry sample. Converting this TOC value to a "dry basis," the basis used for the 3.0 wt % TOC Watch List criterion, would increase the numerical value above 7.16 wt %. 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. In addition, (Hanlon 1995) lists a TOC level of 10.0 wt % (dry wt % basis) and a waste moisture content of 34.0 wt % H₂O for tank A-101.

There is no record of historical sampling and analysis information for tank A-101. This tank is on both the Flammable Gas and Organic Watch lists. The tank has an Unreviewed Safety Question (USQ) because of the potential consequences of a radiological release resulting from a flammable gas burn. 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.

2.0 PROGRAM ELEMENTS REQUIRING INFORMATION FOR TANK 241-A-101

This section identifies the various program elements, and identifies which of these programs require characterization data from tank A-101.

2.1 GENERAL SAFETY ISSUES

The *Tank Safety Screening Data Quality Objective* (Dukelow 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 a not on the Ferrocyanide Watch List, therefore, no information needs are currently identified for this program element.

2.2.2 Organic

This tank is on the Organics Watch List, but recent work by the Organic Safety Program revealed a question regarding organic complexant salts. A potential problem with regard to the complexed salts exists if all the drainable liquid is pumped from the tank (Webb et al 1995). Sampling and analysis requirements must be performed as per *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 1995). The analyses employed will determine the TOC, energetics, and moisture content.

2.2.3 High Heat

This tank is a not listed as high heat, therefore, no information needs are currently identified for this program element.

2.2.4 Flammable Gas

Tank A-101 is on the Flammable Gas Watch List. The applicable DQO is: *Flammable Gas Safety Program: Data Requirements for the Flammable Gas Safety Issue Developed through the Data Quality Objectives (DQO) Process* (McDuffie et al. 1995). The DQO states that core sampling of the single shell tanks that are part of the Flammable Gas Watch List is not planned at this time.

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 A-101 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 exhaustor used during rotary-mode core sampling.

2.2.6 Criticality

No information separate from that for the general safety issue of tank A-101 are currently identified for this program element. However, if the general safety screening of tank A-101 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 support the organic and flammable gas safety issues. Organic solubility and distribution theories will be evaluated from "Core" samples.

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 A-101 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 A-101.

2.5.2 Pretreatment/Vitrification

Tank A-101 is identified as a bounding tank for pretreatment/disposal process development (Kupfer et 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 A-101 has been identified as a primary bounding tank for salt slurry and salt cake 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 A-101 are scheduled: two vapor sampling events and a rotary sampling event. 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 A-101 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 A-101 solids, as determined from the process records, is 40%; based on the HTCE (Brevick 1994a). Estimates (Toth et al 1995) of water content in tank A-101 saltcake and sludge are 39.1% and 39.5% respectively (generated from a model based on sample data from similar tanks). Moisture data will be used to correct the fuel waste dry basis, if required, to resolve any safety issues. 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. Because of the multiple questions associated with this tank, three core samples have been requested.

The best current information indicates that 3 risers are available for sampling of tank A-101, 12" (30.5 cm) riser R16 and 4" (10.2 cm) risers R6 and R20. 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 3 risers and assessed to determine if more samples are required. Furthermore, the 12" (30.5 cm) riser provides for additional sampling opportunities without compromising the waste, if additional samples are warranted. Presently, there are no additional risers available 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 completed. Rotary mode sampling is scheduled for FY 1996.

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	6 SUMMA® canisters 12 Triple Sorbent Traps 6 Sorbent Trap Systems Completed 6/9/95	Gas Flammability Gas Toxicity -Organic Vapors -Permanent Gases
Rotary Sampling	-Safety Screening DQO -Organic DQO -Historical Model DQO	Core samples from 3 risers separated radially to the maximum extent possible	Energetics, Moisture, Total Alpha, Anions, Cations, Radionuclides, TOC, SpG

5.0 WHEN INFORMATION IS NEEDED

Data are required for Tank A-101 during FY 1996 for safety screening and to prepare a Tank Characterization Report.

6.0 REFERENCES

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