START 9613456.2042 0042084 PAGE 1 of 2

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN № 623837

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	3a. USQ Required?	4. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	L. M. Sasaki/Characterization Plans, Coordination and Reports/R2-12/373-1027	[] Yes [X] No	09/01/95
	5. Project Title/No./Work Order No. Tank 241-SX-113	6. Bldg./Sys./Fac. No. N/A	7. Approval Designator N/A
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-480, Rev. 0	9. Related ECN No(s). N/A	10. Related PO No. N/A

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	N/A	N/A Cog. Engineer Signature & Date	N/A Cog. Engineer Signature & Date

12. Description of Change

Results of tank vapor sampling are being incorporated into the document.

13a. Justification (mark one)

Criteria Change	[]	Design Improvement	[]	Environmental	[]	Facility Deactivation	[]
As-Found	[]	Facilitate Const	[]	Const. Error/Omission	[]	Design Error/Omission	[X]

13b. Justification Details

Tank vapor flammability assessment is required to satisfy the safety screening requirements for this tank.

14. Distribution (include name, MSIN, and no. of copies)

See attached distribution sheet.

OCT 1995 RECEIVED EDMC

RELEASE STAMP

OFFICIAL RELEASE BY WHC

DATE AUG 31 1995

15 Sta #19

A-7900-013-2 (11/94) GEF095

A-7900-013-1

9615456.2043

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) ECN-623837

15. Design Verification Required	16. Cost Impact				17. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] 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	[]		[]

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
N/A		

20. Approvals

Signature	Date	Signature	Date
OPERATIONS AND ENGINEERING		ARCHITECT-ENGINEER	
Cog. Eng. L.M. Sasaki L M Sasaki	8/31/95	PE	
Cog. Mgr. J.G. Kristofzski John Kristofzski	8/31/95	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other		Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

9613456.2044

SUPPORTING DOCUMENT

1. Total Pages 48 (JWB 8/31/95)

2. Title	3. Number	4. Rev No.
Tank Characterization Report for Single-Shell Tank 241-SX-113	WHC-SD-WM-ER-480	0-A

5. Key Words	6. Author
Waste Characterization, Single-Shell Tank, SX-113, Tank Characterization Report, SX Farm, Waste Inventory, TPA Milestone M-44	Name: Leela M. Sasaki LM Sasaki Signature Organization/Charge Code 75310/N4162

7. Abstract

N/A

8. RELEASE STAMP

OFFICIAL RELEASE BY WHC
DATE AUG 31 1995
15
Sta #19

A-6400-073 (08/94) WEF124

9613456.2045

RECORD OF REVISION	(1) Document Number WHC-SD-WM-ER-480	Page A

(2) Title
Tank Characterization Report for Single-Shell Tank 241-SX-113

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	(6) Cog. Mgr. Date
0	(7) Initially released 08/04/95 on EDT-613107.	J.H. Baldwin	J.G. Kristofzski
0-A RS	Incorporate per ECN-623837.	L.M. Sasaki L M Sasaki	J.G. Kristofzski John Kristofzski 8/31/95

A-7320-005 (08/91) WEF168

The sampling and analysis were performed in accordance with the *Tank Safety Screening Data Quality Objective*.[3] Consequently, only total alpha activity, percent water, and energetics were evaluated. Samples were archived in accordance with the *Interim Data Quality Objectives for Waste Pretreatment and Vitrification*.[4]

No safety screening notification thresholds were exceeded. No exothermic reactions were observed in the samples, all samples contained over 17 wt% water, and all total alpha activities were well below the 41-microcurie per gram limit. A calculated tank heat load was not possible because only total alpha activity was measured. The flammable gas concentration measurement in the tank vapor space was 0 percent of the lower flammability limit. The Historical Tank Content Estimate for heat load is 45.6 watts (156 British thermal units per hour).[5] Based on the safety screening analyses, it appears that tank 241-SX-113 poses no immediate safety concerns.

The lower portion of the waste containing the REDOX waste should have substantial concentrations of aluminum, iron, chromium, sodium, and nitrates. REDOX waste also contained significant amounts of cesium and strontium.

---

[3]Babad, H. and K.S. Redus, 1994, *Tank Safety Screening Data Quality Objective*, WHC-SD-WM-SP-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

[4]Kupfer, M.J., J.M. Conner, R.A. Kirkbridge, and J.R. Mobley, 1994, *Interim Data Quality Objectives for Waste Pretreatment and Vitrification*, WHC-SD-WM-DQO-011, Rev. 1, Westinghouse Hanford Company, Richland, Washington.

[5]Brevick, C.H., L.A. Gaddis, and W.W. Pickett, 1995, *Historical Tank Content Estimate for the Southwest Quadrant of the Hanford 200 West Areas*, ICF Kaiser Hanford Company, WHC-SD-WM-ER-352, Rev. 1, ICF Kaiser Hanford Company, Richland, Washington.

1.0 INTRODUCTION

This tank characterization report provides an overview of single-shell tank 241-SX-113 and its waste contents based on evaluation of historical information and sampling and analysis results. The chemical concentrations and inventories presented are based on estimates from the Tank Layer Model (TLM) (Agnew et al. 1995) and reported in the Historical Tank Content Estimate (Brevick et al. 1995). Evaluation of the model has not been completed, and the quantification of the tank contents is limited by the accuracy of the model. The May 1995 analysis of auger samples was used to evaluate safety screening criteria (Babad and Redus 1994) for the tank and does not provide detailed chemical and radiochemical information about the tank contents. Interim stabilization and intrusion prevention have been completed. Therefore, it is unlikely that the tank contents will change until pretreatment activities commence. The information presented in this report represents the best estimate of the present waste composition based on historical knowledge and the May 1995 sampling and analysis event. This report supports the requirements of the *Hanford Federal Facility Agreement and Consent Order*, Milestone M-44-08 (Ecology et al. 1994).

1.1 PURPOSE

This report summarizes the information on the use and contents of tank 241-SX-113. When possible, this information will be used to address issues associated with safety, operations, environmental, and process development activities. This report also provides an initial reference point for more detailed information on tank 241-SX-113.

1.2 SCOPE

The auger samples collected in May of 1995 were obtained and analyzed to satisfy the requirements of the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). The following three types of analyses, required by the data quality objective, were performed: differential scanning calorimetry to determine fuel content and energetics, thermogravimetry to measure percent moisture, and total alpha activity analysis to evaluate criticality. Samples were also archived in accordance with the *Interim Data Quality Objectives for Waste Pretreatment and Vitrification* (Kupfer et al. 1994).

Because of the limited analyses completed on the waste material collected in May of 1995, the chemical and radiochemical concentrations for most components are estimated from the TLM (Agnew et al. 1995).

5.5 COMPARISON OF RESULTS TO PROGRAM REQUIREMENTS

The 1995 auger sampling of tank 241-SX-113 was performed to meet the requirements of the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). This data quality objective (DQO) defines data needs used to screen the 177 Hanford Site underground waste tanks for unidentified safety issues and to determine if the tanks have been placed into the appropriate safety category. The DQO establishes decision criteria or notification limits for concentrations of analytes of concern. If results from one of the primary analyses exceed any of the decision criteria, the tank is not classified as "safe" and further analyses are conducted to ensure the safety of the tank (Babad and Redus 1994). Table 5-1 tabulates the decision criteria required by the safety screening DQO and compares them to the recent analytical results. There are insufficient data to evaluate operational, environmental, or process development program requirements.

Also specified in the safety screening DQO are the sampling intervals and desired precision. The DQO requirement that the sampling interval be every half segment was achieved by the 222-S Laboratory. One TGA analysis sample exceeded the plus or minus 10 percent DQO precision threshold, measured by RPD. RPDs were not given for the DSC results because no exothermic reactions were observed. The calculated total alpha activity RPDs were within the plus or minus 10 percent criterion.

The tank vapor space was sampled on August 18, 1995 in accordance with work package WS-95-00184 to determine the flammability of the vapor space gasses. Sampling was done through riser 7 at approximately 3 feet above the waste surface (47 feet below the top of the riser). The combustible gas meter reading was 0 percent of the lower flammability limit (LFL), indicating no flammability concerns with this tank. Although the safety screening DQO specifies the determination of gas composition to estimate the percent of LFL, the Safety Program has determined that a combustible gas meter reading will satisfy the requirements of the DQO for concentrations less than 5 percent of the LFL.

As can be seen in Table 5-1, none of the safety screening notification limits were exceeded. No exothermic reactions were observed in the DSC analyses, the TGA analysis results were all above the required 17 weight percent water, and the total alpha activity results were well below the safety screening notification limit of 41 μCi/g (Sasaki 1995b).

The amount of heat generated in the tank by radioactive decay is not available because radiochemical analyses other than total alpha activity were not performed. An estimated heat load of 45.6 watts (156 Btu/hr) from the Historical Tank Content Estimate (Brevick et al. 1995) was presented previously in Section 2.0.

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Table 5-1. Safety Screening Data Quality Objective Decision Variables and Criteria (2 sheets).

Safety issue	Primary decision variable	Decision criteria threshold	Auger location	Analytical value	RPD (%)
Riser 7 (continued)					
Flammable gas	Flammable gas	25% lower flammability limit for all flammable gases	Vapor sample	0% lower flammability limit	NA

Notes:

RPD = relative percent difference
cal/g = calories per gram
wt% = weight percent
DSC = differential scanning calorimetry
μCi/g = microcuries per gram
g/L = grams per liter
NA = not applicable
No data = TCP does not address

[a]Although the actual decision criterion listed in the DQO is 1g/L, the total alpha is measured in μCi/g rather than g/L. To convert the notification limit for total alpha into a value more readily usable by the laboratory, it was assumed that all alpha decay originates from Plutonium-239. Using the specific activity of Plutonium-239 (0.0615 curies per gram [Ci/g]) and assuming a tank density of 1.5, the decision criterion may be converted to 41 μCi/g as follows:

$$\left(\frac{1g}{L}\right)\left(\frac{1L}{10^3 mL}\right)\left(\frac{1}{density}\frac{mL}{g}\right)\left(\frac{0.0615 Ci}{1g}\right)\left(\frac{10^6 \mu Ci}{1 Ci}\right) = \frac{61.5}{density}\frac{\mu Ci}{g}$$

6.0 CONCLUSIONS AND RECOMMENDATIONS

The solid waste in tank 241-SX-113 has been sampled and analyzed for the purposes of safety screening in accordance with the requirements listed in *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). The May 1995 auger sampling is the only recorded sampling event for this tank. As mandated by the safety screening DQO, analyses for weight percent water, energetics, and total alpha activity were performed. Because only these properties have been measured, the chemical and radiochemical composition of the waste must be approximated solely from estimates based on the tank waste history (Brevick et al. 1995). Prior to waste retrieval, a full suite of analyses should be conducted.

All analytical results satisfied the specifications of the safety screening DQO. No exothermic reactions were observed. All of the percent water values were above the 17-percent criterion. None of the total alpha activity results came close to approaching the 41 microcurie per gram limit. Tank vapor sampling demonstrated that the vapor space gases satisfy the criterion for gas flammability. No heat load determination was available from analytical data, but a heat load estimate of 45.6 watts (156 Btu/hr) was made in the Historical Tank Content Estimate (Brevick et al. 1995). As discussed in section 5.5, these estimates should be used with caution. Based on the analytical results and the safety screening requirements, the waste in tank 241-SX-113 does not appear to pose any immediate safety concerns.

9613456.2051

DISTRIBUTION SHEET

To	From	Page 1 of 4
Distribution	Characterization Plans, Coordination and Reports	Date 09/01/95
Project Title/Work Order		EDT No. EDT-613107
Tank Characterization Report for Single-Shell Tank 241-SX-113, WHC-SD-WM-ER-480, Rev. 0-A		ECN No. ECN-623837

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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9613456.2053

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W. L. Cowley	H4-65	X	
M. L. Dexter	R1-51	X	
R. A. Dodd	S5-07	X	
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S. J. Eberlein	R2-12	X	
D. B. Engelman	R1-49	X	
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G. D. Forehand	S7-21	X	
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J. D. Guberski	R2-06		X
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M. S. Waters	S6-30	X	
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TFIC (Tank Farm Information Center)	R1-20	X	

9613456.2054

Central Files	A3-88	X
EDMC	H6-08	X
OSTI (2)	A3-36	X
TCRC	R2-12	X