

# START

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PAGE

**ENGINEERING CHANGE NOTICE**Page 1 of 21. ECN No **625682**Proj.  
ECN

2. ECN Category (mark one)  Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Standby <input type="checkbox"/> Supersedeure <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. L. M. Sasaki/Characterization Plans, Coordination and Reports/R2-12/373-1027		3a. USQ Required? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	4. Date 09/01/95
	5. Project Title/No./Work Order No. Tank 241-TY-106		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-482, Rev. 0		9. Related ECN No(s). N/A	10. Related PO No. N/A
11a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 11b) <input checked="" type="checkbox"/> 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

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

## 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.


## RELEASE STAMP

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 BY WHC  
 DATE AUG 31 1995

15

Sta #19

# ENGINEERING CHANGE NOTICE

Page 2 of 2

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

ECN-625682

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	<input type="checkbox"/>	Seismic/Stress Analysis	<input type="checkbox"/>	Tank Calibration Manual	<input type="checkbox"/>
Functional Design Criteria	<input type="checkbox"/>	Stress/Design Report	<input type="checkbox"/>	Health Physics Procedure	<input type="checkbox"/>
Operating Specification	<input type="checkbox"/>	Interface Control Drawing	<input type="checkbox"/>	Spares Multiple Unit Listing	<input type="checkbox"/>
Criticality Specification	<input type="checkbox"/>	Calibration Procedure	<input type="checkbox"/>	Test Procedures/Specification	<input type="checkbox"/>
Conceptual Design Report	<input type="checkbox"/>	Installation Procedure	<input type="checkbox"/>	Component Index	<input type="checkbox"/>
Equipment Spec.	<input type="checkbox"/>	Maintenance Procedure	<input type="checkbox"/>	ASME Coded Item	<input type="checkbox"/>
Const. Spec.	<input type="checkbox"/>	Engineering Procedure	<input type="checkbox"/>	Human Factor Consideration	<input type="checkbox"/>
Procurement Spec.	<input type="checkbox"/>	Operating Instruction	<input type="checkbox"/>	Computer Software	<input type="checkbox"/>
Vendor Information	<input type="checkbox"/>	Operating Procedure	<input type="checkbox"/>	Electric Circuit Schedule	<input type="checkbox"/>
OM Manual	<input type="checkbox"/>	Operational Safety Requirement	<input type="checkbox"/>	ICRS Procedure	<input type="checkbox"/>
FSAR/SAR	<input type="checkbox"/>	IEFD Drawing	<input type="checkbox"/>	Process Control Manual/Plan	<input type="checkbox"/>
Safety Equipment List	<input type="checkbox"/>	Cell Arrangement Drawing	<input type="checkbox"/>	Process Flow Chart	<input type="checkbox"/>
Radiation Work Permit	<input type="checkbox"/>	Essential Material Specification	<input type="checkbox"/>	Purchase Requisition	<input type="checkbox"/>
Environmental Impact Statement	<input type="checkbox"/>	Fac. Proc. Samp. Schedule	<input type="checkbox"/>	Tickler File	<input type="checkbox"/>
Environmental Report	<input type="checkbox"/>	Inspection Plan	<input type="checkbox"/>		<input type="checkbox"/>
Environmental Permit	<input type="checkbox"/>	Inventory Adjustment Request	<input type="checkbox"/>		<input type="checkbox"/>

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
<u>OPERATIONS AND ENGINEERING</u>			<u>ARCHITECT-ENGINEER</u>		
Cog. Eng.	L.M. Sasaki <i>L.M. Sasaki</i>	<u>8/31/95</u>	PE		
Cog. Mgr.	J.G. Kristofzski <i>J.G. Kristofzski</i>	<u>8/31/95</u>	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other			Other		

DEPARTMENT OF ENERGY  
 Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

9513583.0461

**SUPPORTING DOCUMENT**

1. Total Pages 69 (JKP 43/95)

2. Title

Tank Characterization Report for Single-Shell Tank 241-TY-106

3. Number

WHC-SD-WM-ER-482

4. Rev No.

0-A

5. Key Words

Waste Characterization, Single-Shell Tank, TY-106, Tank Characterization Report, TY Farm, Waste Inventory, TPA Milestone M-44

6. Author

Name: Leela M. Sasaki

*L M Sasaki*  
Signature

Organization/Charge Code 75310/N4162

7. Abstract

N/A

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The auger samples taken in 1995 were obtained in accordance with the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994). Sampling and analysis activities are focused on either verification of the non-Watch List tank status or identification of any unknown safety issues associated with the tank.

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40,000 Btu/hr (10,000 watts) criterion for a high-heat load tank classification. The temperature of the tank has ranged from 12.2 and 30 °C (54 and 86 °F) during the period from June 1975 to January 1995. The total alpha activity in the tank is less than 0.03 microcuries per gram, which is four orders of magnitude lower than the criticality safety criterion. The flammable gas concentration measurement in the tank vapor space was 0 percent of the lower flammability limit, which satisfies the safety screening criterion. Based on this information, the waste does not appear to have immediate safety concerns.

The characteristics of tank 241-TY-106, physical properties, best estimates for the chemical and radiochemical composition, and the total tank inventory of the sludge in the tank are summarized in Table E-1 and Table E-2. These estimates are from 1995 and 1985 sampling events. The sludge contains high concentrations of iron, sodium, silicon, and uranium. Concentrations of nitrate and sulfate are also high. These results are consistent with the expected composition of the waste based on its history, which included transfers of uranium recovery waste and additions of diatomaceous earth (SiO<sub>2</sub>).

## REFERENCES

- 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.
- Babad, H., S. M. Blacker, and K. S. Redus, 1994, *Data Quality Objective to Support Resolution of the Organic Fuel Rich Tank Safety Issue*, WHC-SD-WM-DQO-006, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- Brevick, C. H., L. A. Gaddis, and L. A. Johnson, 1995, *Historical Tank Content Estimate for the Northwest Quadrant of the Hanford 200 West Areas*, ICF Kaiser Hanford



The potential for criticality can be assessed from total alpha data. The average total alpha activity in the tank based on 1995 data was estimated at 0.0183  $\mu\text{Ci/g}$ , with the highest possible value being 0.0270  $\mu\text{Ci/g}$ . The result from the 1985 sampling was 0.196  $\mu\text{Ci/g}$ . These are approximately 200 to 2,000 times below the level of concern and the established criteria of 1 grams per liter (g/L) specified in the *Tank Safety Screening Data Quality Objective*. Using the equation below and the 1985 density result of 1.37 g/ml, the 1 g/L criteria translates into 45  $\mu\text{Ci/g}$ .

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

The flammability of the gas in the tank head space of the tank is another safety screening consideration. 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 ft above the waste surface (40 ft 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.

### 5.5.2 Operational Evaluation

The tank was sampled to evaluate safety concerns and to confirm its non-Watch List status. There are currently no liquids in the tank, and because it is an assumed leaker, liquid waste will not be transferred into it in the future. Therefore, waste compatibility issues do not apply to this tank.

### 5.5.3 Environmental Evaluation

Tank 241-TY-106 was not characterized to evaluate environmental compliance issues. No specific organic (volatile or semi-volatile) analyses have been performed on the tank; therefore, no environmental assessment of these compounds can be made.

The 1985 analysis did indicate that the waste contained high concentrations of environmentally sensitive metals such as cadmium, chromium, and lead. However, the metals are in an immobile precipitate and are unlikely to migrate in their present state.

### 5.5.4 Process Development Evaluation

The metal and anion analysis of waste from the 1985 sampling is important for evaluating the disposal waste form (glass) formulations and identifying potential components that may affect

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## 6.0 CONCLUSIONS AND RECOMMENDATIONS

The sludge in tank 241-TY-106 was sampled and analyzed in 1985 and 1995. The 1985 samples were evaluated for a broad spectrum of analytes that included metals, anions, radionuclides, density, and total organic carbon. Because the tank contents have not appreciably changed since the late 1970s, the data are considered to be best estimates of the composition of the sludge.

The 1995 sampling event was governed by the *Tank Safety Screening Data Quality Objective* (Babad and Redus 1994), and only thermogravimetric analysis, differential scanning calorimetry, and total alpha analyses were performed on the acquired samples. The results demonstrated that the tank waste satisfies the safety criteria for water content, fuel energy (heat), and criticality. Tank vapor sampling demonstrated that the vapor space gases satisfy the criterion for gas flammability.

The sludge contains large quantities of iron, sodium, silicon, uranium, and nitrate which is expected because the material consists almost entirely of uranium recovery waste and diatomaceous earth. However, some of the proportion of the analytes does not agree as closely with history as others indicating possibility of process changes, upsets or commingling with other wastes. Environmentally sensitive metals such as cadmium, chromium, and lead are present within the waste but are unlikely to migrate in their precipitated state. The major radionuclides are  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$ , and the heat generated by these isotopes is well below the 40,000 Btu/hr limit for the tank.



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### DISTRIBUTION SHEET

To Distribution	From Characterization Plans, Coordination and Reports	Page 1 of 4
		Date 09/01/95
Project Title/Work Order Tank Characterization Report for Single-Shell Tank 241-TY-106, WHC-SD-WM-ER-482, Rev. 0-A		EDT No. EDT-611426
		ECN No. ECN-625682

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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OSTI (2)	A3-36	X
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