S

ENGINEERING CHANGE NOTICE

0050776

Page 1 of 2

1. ECN 653798

Proj. ECN

2. ECN Category (mark one)	3. Originator's Name, Organization, MSIN, and Telephone No.	4. USQ Required?	5. Date
Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	Andrew M. Templeton, Data Assessment and Interpretation, R2-12, 373-5589	[] Yes [X] No	05/25/99
	6. Project Title/No./Work Order No. Tank 241-AN-107	7. Bldg./Sys./Fac. No. 241-AN-107	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-600, Rev. 0-B	10. Related ECN No(s). ECNs: 612297, 644487	11. Related PO No. N/A

12a. Modification Work	12b. Work Package No.	12c. Modification Work Complete	12d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 12b) [X] No (NA Blks. 12b, 12c, 12d)	N/A	N/A Design Authority/Cog. Engineer Signature & Date	N/A Design Authority/Cog. Engineer Signature & Date

13a. Description of Change

13b. Design Baseline Document? [] Yes [X] No

This ECN has been generated in order to update the document to reflect results of recent data/information evaluation.

Replace pages:
ES-5, ES-6, 6-1, 6-2, 7-3, and 7-4

14a. Justification (mark one)

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

14b. Justification Details

A tank characterization report page change revision is required to reflect the results of recent evaluation of data/information pertaining to adequacy of tank sampling for safety screening purposes (Reynolds et al. 1999, Evaluation of Tank Data for Safety Screening, HNF-4217, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington).

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

See attached distribution.

RELEASE STAMP

DATE: MAY 27 1999

STA: 4

HANFORD RELEASE

ID: 2

A-7900-013-2 (05/96) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1)
ECN-653798

16. Design Verification Required	17. Cost Impact				18. Schedule Impact (days)	
	ENGINEERING		CONSTRUCTION			
[] Yes	Additional	[] $	Additional	[] $	Improvement	[]
[X] No	Savings	[] $	Savings	[] $	Delay	[]

19. 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 13. Enter the affected document number in Block 20.

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	[]		[]

20. 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		

21. Approvals

Signature	Date	Signature	Date
Design Authority		Design Agent	
Cog. Eng. A.M. Templeton	5/27/99	PE	
Cog. Mgr. K.M. Hall Kathleen M. Hall	5/27/99	QA	
QA		Safety	
Safety		Design	
Environ.		Environ.	
Other		Other	
		DEPARTMENT OF ENERGY	
		Signature or a Control Number that tracks the Approval Signature	
		ADDITIONAL	

Tank Characterization Report for Double-Shell Tank 241-AN-107

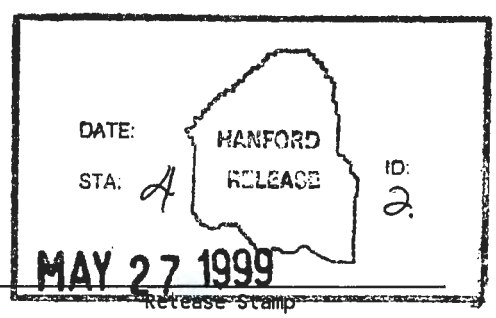
Andrew M. Templeton
Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract 8023764-9-K001

EDT/ECN: ECN-653798 UC: 2070
Org Code: 74B20 CACN/COA: 102217/EI00
B&R Code: EW 3120074 Total Pages: 102

Key Words: Waste Characterization, Double-Shell Tank, DST, Tank 241-AN-107, Tank AN-107, AN-107, AN Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: N/A

5/27/99
Release Approval Date



Release Stamp

Approved for Public Release

RECORD OF REVISION	(1) Document Number WHC-SD-WM-ER-600	Page 1

(2) Title
Tank Characterization Report for Double-Shell Tank 241-AN-107

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 8/14/96 on EDT .617516.	J. Jo	J. G. Kristofzski
0A RS	Incorporate per ECN-612297	M. J. Kupfer 7-24-97	K. M. Hodgson 7-23-97
0B RS	Incorporate per ECN-644487	M.J. Kupfer 8/5/98 for	K.M. Hodgson 8-3-98
0-C RS	Incorporate per ECN-653798.	A.M. Templeton 7/27/99	K.M. Hall 5/27/99

Table ES-2. Chemical Data Summary for Tank 241-AN-107.[1]

Analyte	Liquids			Solids		
	Overall Mean	RSD (Mean)	Projected Inventory	Overall Mean	RSD (Mean)	Projected Inventory
RADIONUCLIDES	**μCi/mL**	**%**	**Ci**	**μCi/g**	**%**	**Ci**
Total alpha	0.799	2.88	2,800	0.989	14.2	727
CARBON	**μg C/mL**	**%**	**kg C**	**μg C/g**	**%**	**kg C**
Total organic carbon	55,700	2.39	1.95E+05	42,700	8.34	31,400
PHYSICAL PROPERTIES		**%**	**kg**		**%**	**kg**
Weight percent water	49.9	0.347	2.41E+06	45.5	3.00	3.34E+05
Bulk density (g/mL)	1.38	0.605	---	1.45	2.47	---

Note:
[1]Esch (1996)

A summary of the analytical data, including relative standard deviations (RSD) and projected inventories, is presented in Table ES-2.

A tank heat load calculated based on analytical data found in Herting (1994) was 8,060 W (27,500 Btu/hr). The Historical Tank Content Estimate (HTCE) prediction was 7,500 W (25,600 Btu/hr) (Agnew et al. 1996a), while the heat load estimate by Kummerer (1994) was 7,910 W (27,000 Btu/hr). These estimates show good agreement and are well below the design specification of 20,500 W (70,000 Btu/hr) for the 241-AN tank farm (Harris 1992).

Waste stored at the Hanford Site is maintained in an alkaline state to minimize general and stress corrosion. Tank 241-AN-107 has a history of depletion of the caustic in the waste. At present, the concentration of caustic in the waste poses no general corrosion problems.

However, at the current levels of caustic, stress corrosion and failure could occur. This situation is being addressed in a two-phase plan. Phase 1 would add 19 M sodium hydroxide to the supernatant only. Phase 2 would thoroughly mix the sludge and supernatant layers as the sodium hydroxide was being added (Carothers 1992).

A profile of tank 241-AN-107 is provided in Figure ES-1.

This tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999).

The analytical results show that the waste exhibits total fuel content resulting in changes in enthalpy in excess of -480 J/g and TOC greater than 3 weight percent. However, the high moisture content places the tank in the "conditionally safe" category. The moisture in the waste must be maintained at greater than 17 weight percent in order to ensure that the tank remains in the "conditionally safe" category (Turner et al. 1995).

Finally, all analytical results indicate the feasibility of successful retrieval and disposal of the waste. However, the caustic depletion issue warrants further sampling or evaluation. Measures must also be taken to ensure that the moisture in the tank remains within the safety limits.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The waste in tank 241-AN-107 has been sampled and analyzed for the purposes of safety screening according to the requirements listed in the *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). The tank was grab sampled in February 1996. To assess tank safety, the safety screening DQO required analyses for energetics, total alpha activity, weight percent water, density, a check for the presence of a separable organic layer, and the flammable gas concentration of the tank headspace. This tank was sufficiently sampled to satisfy the requirements of safety screening (Reynolds et al. 1999). The sample analyses were performed at the WHC 222-S Laboratory.

The safety screening DQO has established a decision limit of a change in enthalpy of -480 J/g (dry weight basis) for exothermic reactions detected during the DSC analysis. All the samples except one duplicate exhibited exothermic reactions greater than the decision limit; the highest exothermic reaction measured was -1,304 J/g (dry weight). The highest upper 95 percent confidence interval limit for the DSC analysis was -1,985 J/g on a dry weight basis.

Because the DSC results exceeded the decision limit, total organic carbon was analyzed. All TOC samples exceeded the decision limit of 30,000 μg C/g (dry weight); the highest sample-duplicate mean result on a dry weight basis was 87,400 μg C/g. The highest upper 95 percent confidence interval limit on the mean on a dry weight basis for the TOC analysis was 88,600 μg C/g. However, because its contents have a moisture content greater than the criterion of 17 weight percent (the tank contents measured $>$ 40 percent water), the tank can be considered "conditionally safe" in accordance with the *Data Quality Objective to Support Resolution of the Organic Complexant Safety Issue* (Turner et al. 1995).

The safety screening DQO limit for criticality is 42.4 μCi/g for the sludge and 61.5 μCi/mL for the supernatant, and is assessed from the total alpha activity. All results were well below the limit. The mean sludge result was 0.989 μCi/g and the mean supernatant result was 0.799 μCi/mL. The highest upper 95 percent confidence interval limit on the mean was 3.44 μCi/g for the sludge and 1.23 μCi/mL for the supernatant.

The heat load for tank 241-AN-107 according to the HTCE was 7,500 W (25,600 Btu/hr), while the heat load estimate by Kummerer (1994) was 7,910 W (27,000 Btu/hr). Analytical data from sampling and analysis events in February 1993 and May 1994 were used to calculate the heat load. A result of 8,060 W (27,500 Btu/hr) was obtained. These estimates are well below the design specification of 20,500 W (70,000 Btu/hr) for the 241-AN tank farm (Harris 1992).

The DQO notification limit for flammable gas concentration is 25 percent of the LFL (as discussed in Section 4.0). Combustible gas meter readings taken at the time of the 1996 sampling revealed the concentration of flammable gases to be 0 percent of the LFL.

Finally, all analytical results indicate the feasibility of successfully retrieving and disposing of the waste. However, the caustic depletion issue warrants further monitoring. Measures must also be taken to ensure that the moisture in the tank remains within limits.

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