ENGINEERING CHANGE NOTICE

0050788

Page 1 of 2

1. ECN 653782

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 []	Jim G. Field, Data Assessment and Interpretation, R2-12, 376-3753	[] Yes [X] No	05/24/99
	6. Project Title/No./Work Order No. Tank 241-S-109	7. Bldg./Sys./Fac. No. 241-S-109	8. Approval Designator N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-ER-627, Rev. 0-C	10. Related ECN No(s). ECNs: 635482, 635512, 650572	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: 2-1, 2-2, 4-1, 4-2, 5-1 and 5-2.

14a. Justification (mark one)

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

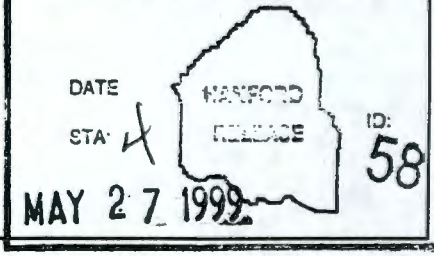
14b. Justification Details

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



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

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) ECN-653782

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. J.G. Field	5/27/99	PE	
Cog. Mgr. K.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 Single-Shell Tank 241-S-109

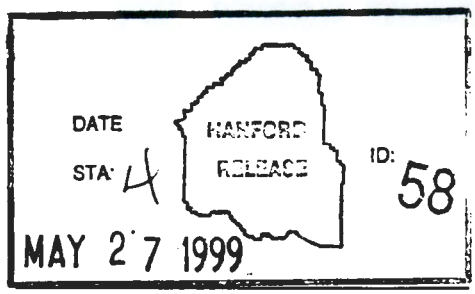
Jim G. Field
Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract 8023764-9-K001

EDT/ECN: ECN-653782 UC: 2070
Org Code: 74B20 CACN/COA: 102217/EI00
B&R Code: EW 3120074 Total Pages: 176

Key Words: Waste Characterization, Single-Shell Tank, SST, Tank 241-S-109, Tank S-109, S-109, S 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 HNF-SD-WM-ER-627	Page 1

(2) Title
Tank Characterization Report for Single-Shell Tank 241-S-109

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 01/22/97 on EDT-617652.	J.G. Field	K.M. Hall
0-A RS	Incorporate per ECN-635482.	J.G. Field J. G. Field 5/27/97	K.M. Hall Kathleen M. Hall 8/27/97
0-B RS	Incorporate per ECN-635512.	J.G. Field JM Comer for JGF	K.M. Hall Kathleen M Hall 8/27/97
0C RS	Incorporate per ECN-650572	M.J. Kupfer MJ Kupfer 9-24-98	K.M. Hodgson K.M. Hodgson 9-23-98
0-D RS	Incorporate per ECN-653782.	J.G. Field J.G. Field 5/27/99	K.M. Hall ~~K.M. Hall~~ 5/27/99

2.0 RESPONSE TO TECHNICAL ISSUES

The following technical issues have been identified for tank 241-S-109 (Brown et al. 1996).

Safety screening:

- Does the waste pose or contribute to any recognized potential safety problems?

Historical model:

- Is the waste inventory generated by a model based on process knowledge and historical information (Agnew et al. 1996b) representative of the current tank waste inventory?

Hazardous vapor safety screening:

- Does the vapor headspace exceed 25 percent of the LFL? If so, what are the principal fuel components?

- Are compounds of technological significance present in the tank at such a level that the industrial hygiene group shall be alerted to their presence so adequate breathing zone monitoring can be accomplished and future activities in and around the tank can be performed in a safe manner?

Organic Solvents:

- Does an organic solvent pool exist that may cause an organic solvent pool fire or ignition of organic solvents entrained in waste solids?

The TCP (Winkelman 1996) provides the types of sampling and analysis used to address these issues. Data from the recent analysis of push core samples and tank vapor space measurements, along with available historical information, provided the means to respond to the first two issues. Sections 2.1 and 2.2 present the response. Data from the June 1996 vapor sample provided the means to address the vapor screening issue. See Appendix B for sample and analysis data for tank 241-S-109.

2.1 SAFETY SCREENING

The data needed to screen the waste in tank 241-S-109 for potential safety problems are documented in *Tank Safety Screening Data Quality Objective* (Dukelow et al. 1995). The potential safety problems are exothermic conditions, flammable gases, and criticality conditions in the waste and flammable gases in the tank headspace. These conditions are

addressed individually in Sections 2.1.1 through 2.1.3. Because tank 241-S-109 is not a Watch List tank, the safety screening DQO was the only safety-related DQO associated with the sampling effort.

2.1.1 Exothermic Conditions (Energetics)

The first requirement outlined in the safety screening DQO (Dukelow et al. 1995) is to ensure that tank 241-S-109 does not contain enough exothermic constituents (organic or ferrocyanide) to cause a safety hazard. Because of this requirement, energetics in the tank 241-S-109 waste were evaluated. The threshold limit for energetics is 480 J/g on a dry weight basis. Results of analysis by differential scanning calorimetry indicated that no sample obtained from tank 241-S-109 had mean exothermic reactions on a dry-weight basis exceeding the safety screening DQO limit. The maximum dry weight exotherm observed was 43.0 J/g with the upper limit to a 95 percent confidence interval of 98 J/g from core 158, segment 2A.

Historical documentation indicates that no exothermic agent should be present in this tank. Waste transfer records indicate that the major waste type expected to be in the tank is evaporator bottoms from the 242-S Evaporator (SMMS1), with a thin layer of REDOX waste in the bottom of the tank (Agnew et al. 1996b).

2.1.2 Flammable Gas

Vapor phase measurements, taken on May 16, 1996 in the tank headspace from riser 11, indicated that no flammable gas was detected (0 percent of the lower flammability limit). Data from the May 16, 1996 vapor phase measurements and June 4, 1996 vapor samples are presented in Appendix B.

2.1.3 Criticality

The safety threshold limit is 1 g ^{239}Pu per liter of waste. Assuming that all alpha is from ^{239}Pu and assuming a density of 1.55 g/mL, 1 g/L of ^{239}Pu is equivalent to 40 μCi/g of alpha activity. All total alpha activity results were well below the safety screening limit. The maximum total alpha activity result was 0.022 μCi/g (core 158, segment 1 lower half) with an upper limit to a 95 percent confidence interval of 0.028 μCi/g, indicating that the potential for a criticality event is extremely low. The method used to calculate confidence limits is described in Appendix C.

4.0 RECOMMENDATIONS

All analytical results for the safety screening DQO were well within the safety notification limits. Although, the full depth of the waste was not sampled during the June/July 1996 push core sampling event, sufficient samples were obtained to address the safety screening issue and further sampling for this issue is not necessary (Reynolds et al. 1999). The June 4, 1996 vapor sample provided sufficient information to address the needs of the hazardous vapor safety screening DQO (Osborne and Buckley 1995) and the organic solvent screening issue (Cash 1996). No further vapor sampling efforts are necessary. The gateway analysis for the historical DQO failed for the samples obtained. Further evaluation of the available data will be performed at a later time to determine why the gateway analysis failed. The sampling and analysis activities performed for tank 241-S-109 have met only part of the requirements for all of the applicable DQO documents. A characterization best basis inventory was developed for the tank contents based on sample information and historical tank transfer data.

Table 4-1 summarizes the status of the Project Hanford Management Contract (PHMC) TWRS Program office review and acceptance of the sampling and analysis results reported in this tank characterization report. All DQO issues required to be addressed by sampling and analysis are listed in Column 1 of Table 4-1. Column 2 indicates by a "yes" or "no" entry whether the requirements of the DQO were met by the sampling and analysis activities performed." Column 3 indicates by a "yes" or "no" entry whether the TWRS program responsible for the DQO concurs that the sampling and analysis activities performed adequately meet the needs of the DQO. If the results/information have not yet been reviewed, "NR" is shown in the column. If the results/information have been reviewed, but acceptance or disapproval has not been decided, "ND" is shown in the column.

Table 4-1. Acceptance of Tank 241-S-109 Sampling and Analysis.

Issue	Sampling and Analysis Performed	PHMC TWRS Program Acceptance
Safety screening DQO	Yes	Yes
Hazardous vapor safety screening DQO	Yes	Yes
Organic solvent	Yes	Yes
Historical evaluation DQO	Partial	Partial

Table 4-2 summarizes the status of the TWRS Program review and acceptance of the evaluations and other characterization information contained in this report. The evaluations specifically included are the best basis inventory evaluation, the gateway analysis, and the evaluation to determine whether the tank is safe, conditionally safe, or unsafe. Column 1 lists the different evaluations performed in this report. Columns 2 and 3 are in the same format as Table 4-1. Concurrence and acceptance are summarized the same way as in Table 4-1.

Table 4-2. Acceptance of Evaluation of Characterization Data and Information for Tank 241-S-109.

Issue	Evaluation Performed	PHMC TWRS Program Acceptance
Safety Screening	Yes	Yes
Hazardous vapor	Yes	Yes
Organic solvent	No	NR
Historical "gateway" analysis	Partial	Yes

Note:
NR = Not reviewed

5.0 REFERENCES

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DISTRIBUTION SHEET

To	From	Page 1 of 2
Distribution	Data Assessment and Interpretation	Date 05/24/99
Project Title/Work Order		EDT No. N/A
Tank Characterization Report for Single-Shell Tank 241-S-109, HNF-SD-WM-ER-627, Rev. 0-D		ECN No. ECN-653782

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
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DOE/RL Reading Room	H2-53	X			
DE&S Hanford, Inc.					
G. D. Johnson	S7-73	X			
Fluor Daniel Hanford Corporation					
J. S. Hertzel	H8-67	X			
Lockheed Martin Hanford, Corp.					
J. W. Cammann	R2-11	X			
J. G. Field	R2-12	X			
R. E. Larson	T4-07	X			
L. M. Sasaki	R2-12	X			
B. C. Simpson	R2-12	X			
R. R. Thompson	R2-12	X			
ERC (Environmental Resource Center)	R1-51	X			
T.C.S.R.C.	R1-10	5			
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