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5

ENGINEERING CHANGE NOTICE

1. ECN 643842

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	09/10/98
	6. Project Title/No./Work Order No.	7. Bldg./Sys./Fac. No.	8. Approval Designator
	Tank 241-T-105	241-T-105	N/A
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.)	10. Related ECN No(s).	11. Related PO No.
	HNF-SD-WM-ER-369, Rev. 2-A	ECNs: 635536, 643788, 643803	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 changes the PO_4 and OH inventory and revises comments in Tables 3-2 and D4-2 for ^{238}PU, Am and Cm isotopes.

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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

Changes were needed for consistency with best-basis inventory modifications.

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

See attached distribution.

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DATE: SEP 14 1998 STA: 4 HANFORD RELEASE ID: 2

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

ENGINEERING CHANGE NOTICE	Page 2 of 2	1. ECN (use no. from pg. 1) ECN-643842

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 *J G Field*	9/10/98	PE		
Cog. Mgr.	K.M. Hall *Kathleen M Hall*	9/14/98	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other	J.W. Cammann *JW Cammann*	9/11/98	Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

Tank Characterization Report for Single-Shell Tank 241-T-105

Jim G. Field
Lockheed Martin Hanford Corp., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-87RL10930

EDT/ECN: ECN-643842 UC: 2070
Org Code: 7A120 Charge Code: N4G4C
B&R Code: EW 3120074 Total Pages: 199

Key Words: Waste Characterization, Single-Shell Tank, SST, Tank 241-T-105, Tank T-105, T-105, T Farm, Tank Characterization Report, TCR, Waste Inventory, TPA Milestone M-44

Abstract: This document summarizes the information on the historical uses, present status, and the sampling and analysis results of waste stored in Tank 241-T-105. This report supports the requirements of the Tri-Party Agreement Milestone M-44-15B.

DATE: HANFORD RELEASE
STA: 4 ID: 2
SEP 14 1998

9/14/98

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Approved for Public Release

RECORD OF REVISION	(1) Document Number HNF-SD-WM-ER-369	Page 1

(2) Title
Tank Characterization Report for Single-Shell Tank 241-T-105

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 on EDT 159082	B. C. Simpson	C. S. Haller
1 RS	Incorporate per ECN 635417	J. G. Field	K. M. Hall [signature] 1/20/97
		[signature] 1/20/97	
1-A RS	Incorporate per ECN-635536.	J.G. Field	K.M. Hall
		[signature] 8/20/97	[signature] 8/20/97
2 RS	Incorporate per ECN-643788.	J.G. Field	K.M. Hall
		[signature] 6/17/98	[signature] 6/17/98
2-A RS	Incorporate per ECN-643803.	J.G. Field	K.M. Hall
		[signature] 7/17/98	[signature] 7/17/98
2-B RS	Incorporate per ECN-643842.	J.G. Field	K.M. Hall
		[signature] 9/10/98	[signature] 9/14/98

HNF-SD-WM-ER-369
Revision 2-B

Tank Characterization Report for Single-Shell Tank 241-T-105

J. G. Field
S. R. Wilmarth
Lockheed Martin Hanford Corp.

Date Published
September 1998

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

FLUOR DANIEL HANFORD, INC.
P.O. Box 1000
Richland, Washington

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U.S. Department of Energy under Contract DE-AC06-96RL13200

3.0 BEST-BASIS INVENTORY ESTIMATE

Information about chemical, radiological, and/or physical properties is used to perform safety analyses, engineering evaluations, and risk assessments associated with waste management activities, as well as regulatory issues. These activities include overseeing tank farm operations and identifying, monitoring, and resolving safety issues associated with these operations and with the tank wastes. Disposal activities involve designing equipment, processes, and facilities for retrieving wastes and processing them into a form suitable for long-term storage/disposal.

Chemical and radiological inventory information is generally derived using three approaches: 1) component inventories are estimated using the results of sample analyses; 2) component inventories are predicted using the Hanford defined waste (HDW) model based on process knowledge and historical information; or 3) a tank-specific process estimate is made based on process flowsheets, reactor fuel data, essential material usage, and other operating data.

An effort is underway to provide waste inventory estimates that will serve as the standard characterization for management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available chemical information for tank 241-T-105 was performed including the following information:

- Data from core samples from tank 241-T-105 collected in 1997 and 1993
- Representative sample data for 1C and $BiPO_4$ process aluminum cladding waste (CW) waste types (Kupfer et al. 1997)
- An inventory estimate generated by the HDW model (Agnew et al. 1997).

The evaluation supports using the sample-based results as the best-basis inventory for this tank. Where sample results were not available, engineering evaluations based on sample results for other tanks containing 1C and CW waste (Kupfer et al. 1997) are used as the best basis. Where isotope-specific sample data were not available, HDW model values or a combination of sample results and HDW model values are used to determine radionuclide inventories.

Best-basis tank inventory values are derived for 46 key radionuclides (Kupfer et al. 1997), all decayed to a common report date of January 1, 1994. Often, waste sample analyses have only reported ^{90}Sr, ^{137}Cs, $^{239/240}$Pu, and total uranium (or total beta and total alpha), while other key radionuclides such as ^{60}Co, ^{99}Tc, ^{129}I, ^{154}Eu, ^{155}Eu, and ^{241}Am have been infrequently reported. For this reason, it has been necessary to derive most of the 46 key radionuclides by computer models. These models estimate radionuclide activity in batches of reactor fuel, account for the split of radionuclides to various separations plant waste streams, and track radionuclide movement with tank waste transactions. These computer models are described in Kupfer et al. (1997), Section 6.1, and in Watrous and Wootan (1997). Model-generated values for radionuclides in any of 177 tanks are reported in Agnew et al. (1997). The best-basis value for any one analyte may be either a model result or a sample or engineering assessment-based result, if available.

Tables 3-1 and 3-2 show the best-basis inventory estimate for tank 241-T-105. Simpson (1998) specifies mercury values. Radionuclide curie values are decayed to January 1, 1994.

The inventory values reported in Tables 3-1 and 3-2 are subject to change. Refer to the Tank Characterization Database (LMHC 1998) for the most current inventory values.

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-105 (Effective April 1, 1998). (2 sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C or E)[1]	Comment
Al	26,100	S	
Bi	3,350	S	
Ca	410	S	
Cl	208	S	
TIC as CO_3	9,430	S	
Cr	374	S	
F	250	S	
Fe	9,430	S	
Hg	8.28	E	Per change package 7 (Simpson 1998)
K	259	S	
La	20.20	S	
Mn	4,040	S	
Na	34,500	S	
Ni	40.2	S	
NO_2	18,220	S	
NO_3	12,700	S	
OH_{TOTAL}	69,400	C	Charge balance spreadsheet
Pb	237	S	
PO_4	2,290	S	ICP analysis
Si	1,920	S	
SO_4	5,260	S	IC analysis

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-T-105 Decayed to January 1, 1994 (Effective April 1, 1998). (3 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{239}Pu	99.1	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{240}Pu	6.68	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{241}Am	99.7	S	
^{241}Pu	10.6	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{242}Cm	0.287	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{242}Pu	4.41E-05	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{243}Am	7.07E-04	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{243}Cm	0.00588	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{244}Cm	0.0168	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes

Note:

[1]S = sample-based (see Appendix B), M = HDW model-based (Agnew et al. 1997a), and E = engineering assessment-based.

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Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-T-105 (Effective April 1, 1998).

Analyte	Total Inventory (kg)	Basis (S, M, C or E)[1]	Comment
Al	26,100	S	
Bi	3,350	S	
Ca	410	S	
Cl	208	S	
TIC as CO_3	9,430	S	
Cr	374	S	
F	250	S	
Fe	9,430	S	
Hg	8.28	E	Per change package 7 (Simpson 1998)
K	259	S	
La	20.20	S	
Mn	4,040	S	
Na	34,500	S	
Ni	40.2	S	
NO_2	18,220	S	
NO_3	12,700	S	
OH_{TOTAL}	69,400	C	Charge balance spreadsheet
Pb	237	S	
PO_4	2,290	S	ICP analysis
Si	1,920	S	
SO_4	5,260	S	IC analysis
Sr	72.5	S	
TOC	1,890	S	
U_{TOTAL}	3,010	S	
Zr	23.4	S	

Note:

[1]S = Sample-based (see Appendix B), M = HDW model-based, E = engineering assessment, and C = calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3.

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-T-105. Decayed to January 1, 1994 (Effective April 1, 1998). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	4.94	S	
^{14}C	0.41	S	
^{59}Ni	0.00480	M	
^{60}Co	15.7	S	
^{63}Ni	0.435	M	
^{79}Se	0.00357	M	
^{90}Sr	115,000	S	
^{90}Y	115,000	S	Based on ^{90}Sr activity
^{93}Zr	0.0169	M	
^{93m}Nb	0.0142	M	
^{99}Tc	153	S	
^{106}Ru	1.88E-09	M	
^{113m}Cd	0.0426	M	
^{125}Sb	274	S	
^{126}Sn	0.00538	M	
^{129}I	2.22E-04	M	
^{134}Cs	22.7	S	
^{137}Cs	13,300	S	
^{137m}Ba	12,600	S	Based on 0.946 of ^{137}Cs activity
^{151}Sm	13.2	M	
^{152}Eu	0.00586	M	
^{154}Eu	737	S	
^{155}Eu	869	S	
^{226}Ra	8.76E-07	M	
^{227}Ac	4.49E-06	M	
^{228}Ra	2.25E-11	M	
^{229}Th	4.37E-09	M	
^{231}Pa	9.88E-06	M	
^{232}Th	4.74E-12	M	
^{232}U	2.29E-05	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-T-105. Decayed to January 1, 1994 (Effective April 1, 1998). (2 sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{233}U	1.06E-06	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes
^{234}U	0.989	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes
^{235}U	0.0437	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes
^{236}U	0.00983	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes
^{237}Np	7.28E-04	M	
^{238}Pu	0.422	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{238}U	1.01	S/M	Based on ICP U sample result ratioed to HDW estimates for U isotopes
^{239}Pu	99.1	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{240}Pu	6.68	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{241}Am	99.7	S	
^{241}Pu	10.6	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{242}Cm	0.287	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{242}Pu	4.41E-05	S/M	Based on total alpha sample result ratioed to HDW estimates for alpha isotopes
^{243}Am	7.07E-04	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{243}Cm	0.00588	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes
^{244}Cm	0.0168	S/M	Based on ^{241}Am sample result ratioed to HDW estimates for alpha isotopes

Note:

[1]S = sample-based (see Appendix B), M = HDW model-based (Agnew et al. 1997a), E = engineering assessment-based.

D5.0 APPENDIX D REFERENCES

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DISTRIBUTION SHEET

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Tank Characterization Report for Single-Shell Tank 241-T-105, HNF-SD-WM-ER-369, Rev. 2-B		ECN No. ECN-643842

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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W. E. Ross	S7-84	X			
L. M. Sasaki	R2-12	X			
B. C. Simpson	R2-12	X			
R. R. Thompson	R2-12	X			
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