0050229 S

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 634675

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 []	M. J. Kupfer, LMHC, H5-49, 376-6631	[] Yes [X] No	09/08/98
	6. Project Title/No./Work Order No. Tank 241-AP-103	7. Bldg./Sys./Fac. No. NA	8. Approval Designator NA
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) HNF-SD-WM-ER-359, Rev. 1A	10. Related ECN No(s). NA	11. Related PO No. NA

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

13a. Description of Change

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

This ECN compiles all reconciliation changes made to the Best-Basis Inventory in FY 1998 and should replace Section 3.0 and Appendix D, Evaluation to Establish Best-Basis Inventory for Double-Shell Tank 241-AP-103, of the Tank Characterization Report. The reconciliation process involved correction of errata, reassessment of data outlyers, verification of uranium isotopic distribution and other alpha isotope distribution, and removal of "less than" values, etc. Changes were made to both text and tables. The inventory estimates of several waste components were revised.

14a. Justification (mark one)

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

14b. Justification Details

Tank waste inventory estimates are being provided as standard source term for the various waste management activities. FY 1997 evaluation of available information for all 177 underground storage tanks was performed and published in TCRs, preliminary TCRs, or revisions to existing TCRs. In FY 1998, a reconciliation process is being performed to update the best-basis inventories. This process ensures that the latest inventory estimates are available as a consistent source-term to support the activities of TWRS disposal and other users.

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

Central Files	B1-07	K. M. Hodgson	R2-11
DIMC	H6-15	M. J. Kupfer	~~H5-49~~ R3-75
DOE Reading Room	H2-53	M. D. LeClair (3)	~~H5-49~~ R3-75
TCSRC	R1-10	J. G. Field	R2-12
K. M. Hall	R2-12		

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ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 634675

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	[]	Other	[X]
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
NA		

21. Approvals

	Signature	Date		Signature	Date
Design Authority			Design Agent		
Cog. Eng. M. J. Kupfer	M. J. Kupfer	9-8-98	PE		
Cog. Mgr. K. M. Hodgson	K. M. Hodgson	9-8-98	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other J. G. Field R2-12	J. G. Field	9-8-98	Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

RECORD OF REVISION	(1) Document Number HNF-SD-WM-ER-359	Page 1

(2) Title
Tank Characterization Report for Double-Shell Tank 241-AP-103

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 608044	B. C. Simpson	C. S. Haller
1 RS	Incorporate per ECN 635416	J. G. Field	K. M. Hall
		J G Field 1/20/97	1/20/97
1-A RS	Incorporate per ECN-635519.	J.G. Field	K.M. Hall
		J G Field 8/20/97	K.M. Hall 8/20/97
1-B RS	Incorporate per ECN-634675	M.J. Kupfer	K.M. Hodgson
		M J Kupfer 9-8-98	K.M. Hodgson 9-8-98

A-7320-005 (08/91) WEF168

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HNF-SD-WM-ER-359, Rev. 1B

Tank Characterization Report for Double-Shell Tank 241-AP-103

S. L. Lambert
COGEMA Engineering Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 634675 UC: 721
Org Code: 7A110 Charge Code: N4G3A
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Key Words: TCR, best-basis inventory, standard inventory

Abstract: The best-basis inventory provides waste inventory estimates that serve as standard characterization source terms for the various waste management activities. To establish a best-basis inventory for double-shell tank 241-AP-103, an evaluation of available information was performed. This work follows the methodology established in *Standard Inventories of Chemicals and Radionuclides in Hanford Site Tank Wastes*, HNF-SD-WM-TI-740, Rev. 0A (Kupfer et al. 1997).

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3.0 BEST BASIS INVENTORY ESTIMATE

Although most of the waste was transferred from tank 241-AP-103 in 1994 for concentration in the 242-A evaporator, the 1991 grab sampling data should be considered the best basis for the present inventory in tank 241-AP-103 for the following reasons:

1. No other representative sample data exist, nor is there enough historical or flowsheet information to derive a reliable historical estimate.

2. The existing data indicate adequate precision, and an analysis of variance showed that the waste was not vertically stratified before the bulk of it was pumped out of the tank.

3. The HDW model predicts chemical concentrations far in excess of both the mean concentrations and upper bounding concentrations reported by the laboratories.

Best-basis inventory estimates for tank 241-AP-103 are presented in Tables 3-1 and 3-2. These estimates are based on reported mean concentration values from the 1991 sampling event and a residual heel volume of 87 kL (23 kgal). The quality of the estimates has been designated as medium. As mentioned earlier, the sample data suggest that some stratification of the waste may have existed when the tank was nearly full, so that when it was emptied from the bottom, the composition of the remaining heel was commensurate with samples taken from the top of the tank. However, the evidence for this, upon inspection, is inconclusive. This uncertainty forces the quality of the estimate to be medium rather than high.

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

Best-basis tank inventory values are derived for 46 key radionuclides (as defined in Section 3.1 of 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, etc., 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 their 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 the Hanford Defined Waste Rev. 4 model results (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. For a discussion of typical error between model derived values and sample derived values, see Kupfer et al. 1997, Section 6.1.10.

Where analytical data was not available for an analyte, HDW model/Engineering estimates were used for the best basis. HDW model inventory estimates were multiplied by the ratio of Hanlon (1997) and Agnew et al. (1997) tank volumes (87:4,277 kL).

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-103 as of May 31, 1997 (2 Sheets).

Analyte	Total inventory (kg)	Basis (S, M, C or E)[12]	Comment
Al	21.5	S	
Bi	0	E	Bi is relatively insoluble in the supernates added to this tank
Ca	21.8	M/E	
Cl	4.43	S	
CO_3	226	S	
Cr	0.379	S	
F	11.2	S	
Fe	0.073	S	
Hg	0	E	Simpson 1998
K	30.9	M/E	
La	0	E	La is relatively insoluble in coating wastes which were not added to this tank
Mn	0.0026	S	
Na	459	S	
Ni	5.69	M/E	
NO_2	113	S	
NO_3	355	S	
OH_{TOTAL}	78.6	C	
Pb	0.035	S/E	Upper bound
PO_4	12.0	S	
Si	29.9	M/E	
SO_4	31.5	S	
Sr	4.08E-06	S/E	Estimated assuming 30% of Sr is ^{90}Sr
TOC	9.57	S	

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-103 as of May 31, 1997 (2 Sheets).

Analyte	Total inventory (kg)	Basis (S, M, C or E)[1,2]	Comment
U_{TOTAL}	0.32	S	
Zr	0.328	M/E	

Notes:

[1]S = Sample-based
M = Hanford Defined Waste model-based (Agnew et al. 1997)
E = Engineering assessment-based
C = Calculated by charge balance; includes oxides as hydroxide not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3.

[2]Based on 1991 grab samples (see Appendix B).

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{3}H	0.45	S	
^{14}C	4.0 E-04	S	
^{59}Ni	0.00902	M/E	Value based on 0.02 times HDW value
^{60}Co	0.96	S/E	Upper bounding value
^{63}Ni	0.892	M/E	Value based on 0.02 times HDW value
^{79}Se	9.75E-04	S	
^{90}Sr	0.170	S	
^{90}Y	0.170	S	Based on ^{90}Sr
^{93}Zr	0.172	M/E	Value based on 0.02 times HDW value
^{93m}Nb	0.135	M/E	Value based on 0.02 times HDW value
^{99}Tc	0.094	S	

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{106}Ru	1.60E-04	M/E	Value based on 0.02 times HDW value
^{113m}Cd	0.656	M/E	Value based on 0.02 times HDW value
^{125}Sb	37.4	M/E	Value based on 0.02 times HDW value
^{126}Sn	0.0588	M/E	Value based on 0.02 times HDW value
^{129}I	0.0029	M/E	Value based on 0.02 times HDW value
^{134}Cs	4.0	M/E	Based on ^{137}Cs. Used HDW model ratios
^{137}Cs	577	S	
^{137m}Ba	547	S	Based on ^{137}Cs
^{151}Sm	135	M/E	Value based on 0.02 times HDW value
^{152}Eu	0.127	M/E	Value based on 0.02 times HDW value
^{154}Eu	1.46	S/E	Upper bounding estimate
^{155}Eu	2.31	S/E	Upper bounding estimate
^{226}Ra	1.9E-06	M/E	Value based on 0.02 times HDW value
^{227}Ac	1.13E-05	M/E	Value based on 0.02 times HDW value
^{228}Ra	1.96E-04	M/E	Value based on 0.02 times HDW value
^{229}Th	4.56E-06	M/E	Value based on 0.02 times HDW value
^{231}Pa	3.44E-05	M/E	Value based on 0.02 times HDW value
^{232}Th	1.92E-05	M/E	Value based on 0.02 times HDW value

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{232}U	3.08E-05	M/S	Based on total U: Used HDW isotopic ratios.
^{233}U	1.18E-04	M/S	Based on total U: Used HDW isotopic ratios.
^{234}U	1.48E-04	M/S	Based on total U: Used HDW isotopic ratios. S = 5.70E-04 Ci.
^{235}U	5.66E-06	M/S	Based on total U: Used HDW isotopic ratios. S = 2.95E-05 Ci.
^{236}U	1.1E-05	M/S	Based on total U: Used HDW isotopic ratios.
^{237}Np	0.0185	M/E	Value based on 0.02 times HDW value. Sample value high "less-than"
^{238}Pu	2.77E-05	M/S	Based on ^{239}Pu: Used HDW isotopic ratios. Sample value high "less-than"
^{238}U	1.07E-04	M/S	Based on total U: Used HDW isotopic ratios.
^{239}Pu	4.88E-04	S/E/M	
^{240}Pu	1.12E-04	S/E/M	
^{241}Am	9.87E-04	S	HDW value corrected to current inventory equals 1.1 Ci
^{241}Pu	0.00219	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{242}Cm	8.99E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume
^{242}Pu	1.19E-08	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{243}Am	7.29E-08	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume

Table 3-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{243}Cm	1.42E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume
^{244}Cm	2.81E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume

Notes:

[1]S = Sample-based
M = Hanford Defined Waste model-based (Agnew et al. 1997) (The HDW model inventory values were multiplied by 0.02 [ie. 87/4,277] based on the current tank volume).
E = Engineering assessment-based

[2]Based on 1991 grab samples (see Appendix B).

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR TANK 241-AP-103

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AP-103

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Hodgson et al. 1996). As part of this effort, an evaluation of available chemical information for tank 241-AP-103 was performed, and a best-basis inventory was established. This work, detailed in the following sections, follows the methodology that was established by the standard inventory task.

The following evaluation provides a best-basis inventory estimate for chemical and radionuclide components in tank 241-AP-103.

D1.0 CHEMICAL INFORMATION SOURCES

Available composition information for the waste in tank 242-AP-103 is as follows:

- Characterization results from the 1991 "bottle-on-a-string" sampling event.
- The HDW model document (Agnew et al. 1997). A complete list of data sources used in this evaluation is provided at the end of this section.

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

Sample-based inventories derived from 1991 analytical concentration data, and HDW model inventories generated by the HDW model (Agnew et al. 1997), are compared in Tables D2-1 and D2-2. (The chemical species are reported without charge designation per the best-basis inventory convention). Sample-based inventories derived for comparison with HDW values are based on a tank volume of 4,315 kL (1,140 kgal). This was the tank inventory in 1991 when samples were taken. The HDW model tank volume basis is slightly lower at 4,277 kL (1,130 kgal). The density calculated by the HDW model is 1.07 g/mL compared to a mean analytical result of 1.00 g/mL.

During 1994, all but 87 kL (23 kgal) of the waste in tank 241-AP-103 was transferred to tank 241-AW-102 to be concentrated in the 242-A Evaporator (Hanlon 1997). The inventory shown in tables D2-1 and D2-2 thus no longer exist in 241-AP-103. They are shown for comparison purposes only. However, the relative proportions of the remaining analytes are assumed to still exist (see Section D3.0).

Table D2-1. Sampling and Hanford Defined Waste Model Inventory Estimates for Nonradioactive Components in DST 241-AP-103.

Analyte	Sampling inventory estimate[1] (MT)	HDW inventory estimate[2] (MT)	Analyte	Sampling inventory estimate[1] (MT)	HDW inventory estimate[2] (MT)
Al	1.05	13.7	Ni	NR	0.285
As	2.07E-04	NR	Pb	0.00171	0.00891
Ba	< 2.78E-04	NR	Se	8.56E-05	NR
Cd	4.75E-04	NR	Si	NR	1.49
Ca	NR	1.09	U	0.0158	0.351
Cr	0.0188	0.703	Zn	0.00189	NR
Fe	0.00528	0.341	Zr	NR	0.016
K	NR	1.55	NH_3	0.164	0.973
Mg	0.00511	NR	CO_3	11.0	27.4
Mn	1.85E-04	0.0465	Cl	0.212	4.43
Na	22.7	152	NO_2	5.56	9.77
CN	0.00236	NR	PO_4	0.595	2.41
F	0.552	0.359	SO_4	1.50	8.47
NO_3	17.3	135	TOC	0.479	8.81

Notes:

MT = metric ton
NR = not reported

[1]Based on a 1991 tank volume of 4,315 kL (1,140 kgal) for comparison with HDW only. The current tank volume is 87 kL (23 kgal).
[2]Agnew et al. (1997)

Table D2-2. Sampling and Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Double-Shell Tank 241-AP-103. (decayed to January 1, 1994)

Analyte	Sampling inventory estimate[1] (Ci)	HDW inventory estimate[2] (Ci)	Analyte	Sampling inventory estimate[1] (Ci)	HDW inventory estimate[2] (Ci)
^{241}Am	0.0488	55.4	$^{239/240}Pu$	0.0301	53.2
^{14}C	0.0191	15.2	^{79}Se	0.0479	1.88
^{137}Cs	28,000	2.66E+05	$^{89/90}Sr$	11.2	57,200
^{234}U	6.0E-04	0.162	^{99}Tc	4.62	72.8
^{235}U	2.95E-05	6.22E-03	^{3}H	22.4	1,010
^{238}U	1.07E-04	0.127			

Notes:
[1]Based on a 1991 tank volume of 4,315 kL (1,140 kgal) for comparison with HDW only. The current tank volume is 87 kL.(23 kgal).
[2]Agnew et al. (1997)

Tables D2-1 and D2-2 show that the HDW model estimates are higher for all components except fluoride. In many cases, estimates generated by the model are over one order of magnitude higher than the analytical result. This is true for major and minor components alike.

D3.0 COMPONENT INVENTORY EVALUATION

Some of the waste mixtures added to tank 241-AP-103 were fairly complex; consequently, any estimate based on transfer information would have a large uncertainty. For example, waste added to the tank often included miscellaneous wastes from B plant and T plant via tank 241-AY-102, for which there are only poorly defined mean compositions.

Except for the high range of values for analyte concentrations in some instances, there is little reason to suspect that the analytical results for tank 241-AP-103 did not accurately reflect the waste's composition when the tank was nearly full. Thus, the mean sample-based inventories from the 1991 grab sample event are still considered the best-basis inventory for the small liquid heel remaining.

Where analytical data was not available for an analyte, HDW model/Engineering estimates were used for the best basis. HDW model inventory estimates were multiplied by the ratio of Hanlon (1997) and Agnew et al. (1997) tank volumes (87:4,277 kL).

D4.0 DEFINE THE BEST BASIS AND ESTABLISH COMPONENT INVENTORIES

Although most of the waste was transferred from tank 241-AP-103 in 1994 for concentration in the 242-A evaporator, the 1991 grab sampling data should be considered the best basis for the present inventory in tank 241-AP-103 for the following reasons:

1. No other representative sample data exist, nor is there enough historical or flowsheet information to derive a reliable historical estimate.

2. The existing data indicate adequate precision, and an analysis of variance showed that the waste was not vertically stratified before the bulk of it was pumped out of the tank.
3. The HDW model predicts chemical concentrations far in excess of both the mean concentrations and upper bounding concentrations reported by the laboratories.

Best-basis inventory estimates for tank 241-AP-103 are presented in Tables D4-1 and D4-2. These estimates are based on reported mean concentration values from the 1991 sampling event and a residual heel volume of 87 kL (23 kgal). The quality of the estimates has been designated as medium. As mentioned earlier, the sample data suggest that some stratification of the waste may have existed when the tank was nearly full, so that when it was emptied from the bottom, the composition of the remaining heel was commensurate with samples taken from the top of the tank. However, the evidence for this, upon inspection, is inconclusive. This uncertainty forces the quality of the estimate to be medium rather than high.

The inventory values reported in Tables D4-1 and D4-2 are subject to change. Refer to the Tank Characterization Database (TCD) (LMHC 1998) for the most current inventory values.

Best-basis tank inventory values are derived for 46 key radionuclides (as defined in Section 3.1 of 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, etc., 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 their 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 the Hanford Defined Waste Rev. 4 model results (Agnew et al. 1997). The best-basis value for any one analyte

be either a model result or a sample or engineering assessment-based result if available. For a discussion of typical error between model derived values and sample derived values, see Kupfer et al. 1997, Section 6.1.10.

Where analytical data was not available for an analyte, HDW model/Engineering estimates were used for the best basis. HDW model inventory estimates were multiplied by the ratio of Hanlon (1997) and Agnew et al. (1997) tank volumes (87:4,277 kL).

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-103 as of May 31, 1997 (2 Sheets).

Analyte	Total inventory (kg)	Basis (S, M, C or E)[1,2]	Comment
Al	21.5	S	
Bi	0	E	Bi is relatively insoluble in the supernates added to this tank
Ca	21.8	M/E	
Cl	4.43	S	
CO_3	226	S	
Cr	0.379	S	
F	11.2	S	
Fe	0.073	S	
Hg	0	E	Simpson 1998
K	30.9	M/E	
La	0	E	La was not added to this tank
Mn	0.0026	S	
Na	459	S	
Ni	5.69	M/E	
NO_2	113	S	
NO_3	355	S	
OH_{TOTAL}	78.6	C	
Pb	0.035	S/E	Upper bound
PO_4	12.0	S	
Si	29.9	M/E	
SO_4	31.5	S	
Sr	4.08E-06	S/E	Estimated assuming 30% of Sr is ^{90}Sr

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-103 as of May 31, 1997 (2 Sheets).

Analyte	Total inventory (kg)	Basis (S, M, C or E)[1,2]	Comment
TOC	9.57	S	
U_{TOTAL}	0.32	S	
Zr	0.328	M/E	

Notes:

[1]S = Sample-based
M = Hanford Defined Waste model-based (Agnew et al. 1997)
E = Engineering assessment-based
C = Calculated by charge balance; includes oxides as hydroxide not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3.

[2]Based on 1991 grab samples (see Appendix B).

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{3}H	0.45	S	
^{14}C	4.0 E-04	S	
^{59}Ni	0.00902	M/E	Value based on 0.02 times HDW value
^{60}Co	0.96	S/E	Upper bounding value
^{63}Ni	0.892	M/E	Value based on 0.02 times HDW value
^{79}Se	9.75E-04	S	
^{90}Sr	0.170	S	
^{90}Y	0.170	S	Based on ^{90}Sr
^{93}Zr	0.172	M/E	Value based on 0.02 times HDW value
^{93m}Nb	0.135	M/E	Value based on 0.02 times HDW value
^{99}Tc	0.094	S	

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{106}Ru	1.60E-04	M/E	Value based on 0.02 times HDW value
^{113m}Cd	0.656	M/E	Value based on 0.02 times HDW value
^{125}Sb	37.4	M/E	Value based on 0.02 times HDW value
^{126}Sn	0.0588	M/E	Value based on 0.02 times HDW value
^{129}I	0.0029	M/E	Value based on 0.02 times HDW value
^{134}Cs	4.0	M/E	Based on ^{137}Cs. Used HDW model ratios
^{137}Cs	577	S	
^{137m}Ba	547	S	Based on ^{137}Cs
^{151}Sm	135	M/E	Value based on 0.02 times HDW value
^{152}Eu	0.127	M/E	Value based on 0.02 times HDW value
^{154}Eu	1.46	S/E	Upper bounding estimate
^{155}Eu	2.31	S/E	Upper bounding estimate
^{226}Ra	1.9E-06	M/E	Value based on 0.02 times HDW value
^{227}Ac	1.13E-05	M/E	Value based on 0.02 times HDW value
^{228}Ra	1.96E-04	M/E	Value based on 0.02 times HDW value
^{229}Th	4.56E-06	M/E	Value based on 0.02 times HDW value
^{231}Pa	3.44E-05	M/E	Value based on 0.02 times HDW value
^{232}Th	1.92E-05	M/E	Value based on 0.02 times HDW value

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{232}U	3.08E-05	M/S	Based on total U: Used HDW isotopic ratios.
^{233}U	1.18E-04	M/S	Based on total U: Used HDW isotopic ratios.
^{234}U	1.48E-04	M/S	Based on total U: Used HDW isotopic ratios. S = 5.70E-04 Ci.
^{235}U	5.66E-06	M/S	Based on total U: Used HDW isotopic ratios. S = 2.95E-05 Ci.
^{236}U	1.1E-05	M/S	Based on total U: Used HDW isotopic ratios.
^{237}Np	0.0185	M/E	Value based on 0.02 times HDW value. Sample value high "less-than"
^{238}Pu	2.77E-05	M/S	Based on ^{239}Pu: Used HDW isotopic ratios. Sample value high "less-than"
^{238}U	1.07E-04	M/S	Based on total U: Used HDW isotopic ratios.
^{239}Pu	4.88E-04	S/E/M	
^{240}Pu	1.12E-04	S/E/M	
^{241}Am	9.87E-04	S	HDW value corrected to current inventory equals 1.1 Ci
^{241}Pu	0.00219	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{242}Cm	8.99E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume
^{242}Pu	1.19E-08	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{243}Am	7.29E-08	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AP-103 as of May 31, 1997 (Decayed to January 1, 1994). (4 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1,2]	Comment
^{243}Cm	1.42E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume
^{244}Cm	2.81E-06	M/S	Based on ^{241}Am: Used HDW isotopic ratios. Value corrected to current volume

Notes:

[1]S = Sample-based
M = Hanford Defined Waste model-based (Agnew et al. 1997) (The HDW model inventory values were multiplied by 0.02 [ie. 87/4,277] based on the current tank volume).
E = Engineering assessment-based

[2]Based on 1991 grab samples (see Appendix B).

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