0049672 S

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 644468

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	08/12/98
	6. Project Title/No./Work Order No.	7. Bldg./Sys./Fac. No.	8. Approval Designator
	Tank 241-AP-101	NA	NA
	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-357, Rev. 1A	NA	NA

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)	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-101, 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. M. Conner	R2-11
K. M. Hall	R2-12		

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SEP 1998 RECEIVED EDMC

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1): 644468

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	8-26-98	PE		
Cog. Mgr. K. M. Hodgson	K. M. Hodgson	9-8-98	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other J. M. Conner R2-11	J. M. Conner	8-27-98	Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

Tank Characterization Report for Double-Shell Tank 241-AP-101

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

EDT/ECN: 644468 UC: 721
Org Code: 7A110 Charge Code: N4G3A
B&R Code: EW3120074 Total Pages: 151

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-101, 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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Release Approval Date

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STA: 4 ID: 2
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RECORD OF REVISION	(1) Document Number HNF-SD-WM-ER-357	Page 1

(2) Title
Tank Characterization Report for Double-Shell Tank 241-AP-101

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 09/06/94 on EDT-608042.	B.C. Simpson	C.S. Haller
1 RS	Incorporate per ECN-635486.	J.M. Conner	K.M. Hall
1-A RS	Incorporate per ECN-638517.	J.M. Conner	K.M. Hall
			8/20/97
1B RS	Incorporate per ECN-644468	M.J. Kupfer	K.M. Hodgson

A-7320-005 (08/91) WEF168

3.0 BEST BASIS INVENTORY ESTIMATE

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of chemical information for tank 241-AP-101 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 sample-based data should serve as the best-basis inventory for tank 241-AP-101 for the following reasons:

1. Although no individual samples of the waste currently stored in tank 241-AP-101 are available, data from the tank samples taken in November 1995 and data from the waste produced in Evaporator Campaign 95-1 can be combined to describe waste currently in tank 241-AP-101.

2. The HDW model estimate for tank 241-AP-101 is outdated because of a large number of waste transfers that have occurred subsequent to the model development.

Engineering estimates were used as the best basis when tank sample data was not available for an analyte. In addition, revised HDW model estimates were used where appropriate based on a composite of wastes currently in tank 241-AP-101.

Tables 3-1 and 3-2 show best-basis inventory estimates for tank 241-AP-101. Radionuclide values are decayed to January 1, 1994 and are based on the ratio of wastes currently in tank 241-AP-101 (6.97% AP-101, 59.04% AP-105 and 33.99% AW-106). The inventory values reported in Tables 3-1 and 3-2 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 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.

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-101 as of January 31, 1997. (2 Sheets)

Analyte	Total inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	41,800	S/E	Sum of Tables D3-5 and D3-6
Bi	0	E	Bi is relatively insoluble in the supernates added to this tank
Ca	237	S/E	Campaign 95-1 data not available.
Cl	5,680	S/E	Campaign 95-1 data not available.
TIC as CO_3	60,300	S/E	Campaign 95-1 data not available.
Cr	662	E	Campaign 95-1 data not available.
F	9,900	S/E	Sum of Tables D3-5 and D3-6
Fe	23.5	E	Campaign 95-1 data not available.
Hg	0	E	Simpson 1998
K	1.09E+05	E	Campaign 95-1 data not available.
La	0	E	La is relatively insoluble in the supernates added to this tank
Mn	0	E	Mn is insoluble in the supernates added to this tank
Na	6.31E+05	S/E	Sum of Tables D3-5 and D3-6
Ni	38.5	E	Campaign 95-1 data not available.
NO_2	1.74E+05	S/E	Sum of Tables D3-5 and D3-6
NO_3	5.68E+05	S/E	Sum of Tables D3-5 and D3-6
OH_{TOTAL}	314,000	C	
Pb	19.0	E	Campaign 95-1 data not available.

Table 3-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-101 as of January 31, 1997. (2 Sheets)

Analyte	Total inventory (kg)	Basis (S, M, C, or E)[1]	Comment
PO_4	4,280	S/E	45 percent disparity between historical and analytical results. Sum of Tables D3-5 and D3-6
Si	512	E	Campaign 95-1 data not available.
SO_4	14,800	S/E	Sum of Tables D3-5 and D3-6
Sr	0.0169	S/E	Based on ^{90}Sr assuming 30% of total Sr consists of ^{90}Sr
TOC	13,600	S/E	Sum of Tables D3-5 and D3-6
U_{TOTAL}	154	E	Campaign 95-1 data not available.
Zr	75	M	

Note:

[1]S = Sample-based, M = HDW model-based, C = Calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3, and E = Engineering assessment-based.

Table 3-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E) [1]	Comment
^{3}H	59.40	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{14}C	0.22	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{59}Ni	1.42	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{60}Co	14.20	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{63}Ni	142.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{79}Se	1.67	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{90}Sr	706.00	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{90}Y	706.00	E/S	Based on ^{90}Sr
^{93m}Nb	9.08	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{93}Zr	12.50	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{99}Tc	221.00	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{106}Ru	0.0342	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{113m}Cd	65.40	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{125}Sb	110.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{126}Sn	54.10	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{129}I	0.24	M/E	Based on volume of waste from AP-101, AP-105 and AW-106

Table 3-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)	Comment
^{134}Cs	11.0	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{137m}Ba	7.11 E+05	E/S	Based on ^{137}Cs
^{137}Cs	7.49 E+05	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{151}Sm	8990.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{152}Eu	3.34	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{154}Eu	316.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{155}Eu	175.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{226}Ra	3.28 E-04	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{227}Ac	6.41 E-04	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{228}Ra	0.191	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{229}Th	4.51 E-03	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{231}Pa	2.87 E-03	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{232}Th	0.0259	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{232}U	0.0223	M/E	Based on total U: Used HDW isotopic ratios
^{233}U	0.0853	M/E	Based on total U: Used HDW isotopic ratios
^{234}U	0.0704	M/E	Based on total U: Used HDW isotopic ratios
^{235}U	2.70 E-03	M/E	Based on total U: Used HDW isotopic ratios

Table 3-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{236}U	5.06 E-03	M/E	Based on total U: Used HDW isotopic ratios
^{237}Np	0.785	E	Campaign 95-1 data not available
^{238}Pu	2.25	E/S	Upper bounding estimate. Campaign 95-1 data not available.
^{238}U	0.0513	E/M	Based on total U: Used HDW isotopic ratios
^{239}Pu	0.624	S/E/M	Based on $^{239/240}Pu$: Used HDW isotopic ratios. HDW estimate 20.4 Ci
^{240}Pu	0.149	S/E/M	Based on $^{239/240}Pu$: Used HDW isotopic ratios
^{241}Am	0.844	E/S	Based on ratio of waste from AP-101, AP-105 and AW-106. HDW estimate 85.7 Ci. Campaign 95-1 data not available
^{241}Pu	4.33	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{242}Cm	1.38E-03	S/E/M	Based on ^{241}Am: Used HDW isotopic ratios. Campaign 95-1 data not available.
^{242}Pu	1.80E-05	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios.
^{243}Am	7.79E-05	S/E/M	Based on ^{241}Am: Used HDW isotopic ratios. Campaign 95-1 data not available.
^{243}Cm	0.07	S/E/M	Based on amount of waste from AP-105, 4% of $^{243/244}Cm$ present as ^{243}Cm. Upper bounding estimate. Campaign 95-1 data not available
^{244}Cm	1.53	S/E/M	Based on amount of waste from AP-105, 96% of $^{243/244}Cm$ presented as ^{243}Cm. Upper bounding estimate. Campaign 95-1 data not available

Note

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AP-101

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AP-101

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of available information for double-shell tank 241-AP-101 was performed, and a best-basis inventory was established. This work, detailed in the following sections, provides a best-basis inventory estimate for chemical and radionuclide components in tank 241-AP-101 and follows the methodology that was established by the standard inventory task.

D1.0 CHEMICAL INFORMATION SOURCES

Available composition information for tank 241-AP-101 waste is as follows.

- The validation summary for tank 241-AP-101 (Miller 1993) provides characterization results from the July 1993 "bottle-on-a-string" sampling event at a time when 4,016 kL (1,061 kgal) of dilute noncomplexed waste was in the tank.

- Beginning in October 1994, the contents of tank 241-AP-108 were transferred to tank 241-AP-101. Characterization results from the June 1994 grab sampling event for tank 241-AP-108 (Miller 1994, Table 14) were used to provide a composition for this waste.

- In August 1995, 2,498 kL (660 kgal) of waste from tank 241-AP-105 were transferred to tank 241-AP-101. The composition for this waste was taken from the characterization results of the March 1993 "bottle-on-a-string" sampling event given in the TCR for tank 241-AP-105 (De Lorenzo et al. 1994, Table 5-6).

- The final report for grab samples taken in November 1995 (Esch 1996) provides characterization results for tank 241-AP-101 after it received DSSF from tanks 241-AP-108(Oct. 1994) and 241-AP-105 (Aug. 1995).

- The *242-A Evaporator Campaign 95-1 Post Run Document* (Guthrie 1996, Table 10) and the final report for the August 1995 tank 241-AW-106 grab samples (Esch 1995) provided characterization results for 1,158 kL (306 kgal) of DSSF transferred from tank 241-AW-106 to tank 241-AP-101 in March 1996.

- The HDW model document (Agnew et al. 1997) provides tank content estimates derived from the Los Alamos National Laboratory model, in terms of component concentrations and inventories. A complete list of data sources used in this evaluation is in this section.

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

The HDW model (Agnew et al. 1997) provides composition estimates for waste in tank 241-AP-101 on January 1, 1994. Because tank contents have changed since that time, no comparisons between the HDW estimate and sampling data were attempted.

D3.0 COMPONENT INVENTORY EVALUATION

The following evaluation of tank contents was performed to identify potential errors and/or missing information that would influence the sample-based inventories and to estimate the current inventory in tank 241-AP-101 from sample data of contributing wastes and transfer records.

D3.1 CONTRIBUTING WASTE TYPES

At the beginning of 1994, tank 241-AP-101 contained 4,012 kL (1,060 kgal) of dilute noncomplexed waste. In a succession of alternating transfers beginning in August 1994, waste from tank 241-AP-101 was transferred to other tanks as evaporator feed and waste from tank 241-AP-108 was transferred to tank 241-AP-101. At the conclusion of the transfers (January 1995), tank 241-AP-101 contained only 295 kL (78 kgal) of dilute noncomplexed waste.

This volume remained unchanged until August 1995 when 2,498 kL (660 kgal) of double-shell slurry feed (DSSF) from tank 241-AP-105 was sent to tank 241-AP-101. Seven months later, in March 1996, another 1,158 kL (306 kgal) of DSSF from the 242-A Evaporator Campaign 95-1 was added to tank 241-AP-101. This DSSF was stored in tank 241-AW-106 before it was transferred to tank 241-AP-101. Another transfer from tank 241-AW-106 (280 kL [74 kgal]) was

made in January 1997. Since March 1997, the waste in tank 241-AP-101 has remained unchanged as of February 18, 1998 (4,220 kL). This chronology is described in Table D3-1.

D3.2 EVALUATION OF HISTORICAL DATA

The last sampling event for tank 241-AP-101 occured November 13, 1995, approximately four months before the last transfer of DSSF from Campaign 95-1. The November 1995 data (Esch 1996) may be compared to the composition derived from sample data and historical transfer information dating back to the July 1993 sampling event. A best-basis estimate was developed for the waste by combining the reconciled November 1995 data with composition and volume information for Campaign 95-1 DSSF (from the Campaign 95-1 post run document [Guthrie 1996] and grab sampling results from tank 241-AW-106 [Esch 1995]).

Table D3-1 shows the chronology of transfers associated with tank 241-AP-101 dating back to January 1, 1994. Analytical data for tank 241-AP-105 were taken from De Lorenzo et al. (1994), while analytical data for tank 241-AP-108 was taken from Miller (1994). Data for the DSSF from Campaign 95-1 were derived from Guthrie (1996) and Esch (1995). These data represent the 241-AP-108 and 241-AW-106 wastes at the time of transfer. Using these compositions and the transfer history through November 1995, an engineering estimate of the contents in November 1995 was developed (for the combination of AP-101, AP-105 and AP-108 wastes, prior to the addition of AW-106). This engineering estimate is summarized in Table D3-4.

Table D3-1. Chronology of Transfers for Tank 241-AP-101 as of January 31, 1997.[1] (2 Sheets)

Date[1]	Source	Destination	Volume change kL (kgal)	Final 241-AP-101 volume kL (kgal)
1/1/94	n/a	n/a	n/a	4,012 (1,060)
8/11/94	241-AP-101	241-AW-102	-2,816 (744)	1,196 (316)
10/7/94	241-AP-108	241-AP-101	1,075 (284)	2,271 (600)
10/8/94	241-AP-101	241-AW-102	-1,707 (451)	564 (149)
1/20/95	241-AP-108	241-AP-101	2,896 (765)	3,460 (914)
1/22/95	241-AP-101	241-AP-107	-3,164 (836)	295 (78)
8/27/95	241-AP-105	241-AP-101	2,498 (660)	2,790 (737)

Table D3-1. Chronology of Transfers for Tank 241-AP-101 as of January 31, 1997.[1] (2 Sheets)

Date[2]	Source	Destination	Volume change kL (kgal)	Final 241-AP-101 volume kL (kgal)
3/4/96	241-AW-106	241-AP-101	1,158 (306)	3,944 (1,042)
1/9/97	241-AW-106	241-AP-101	280 (74)	4,220 (1,115)

Notes: n/a = not applicable
[1]Because minor level fluctuations are not shown, volumes may not add up exactly.
[2]Dates are in the mm/dd/yy format.

Table D3-2a and D3-2b show the analytical results from the November 1995 sampling of tank 241-AP-101 (Esch 1996). (The chemical species are reported without charge designation per the best-basis inventory convention). Three samples were taken from each of the two risers at depths of 678 cm (267 in.), 340 cm (134 in.), and 25 cm (10 in.) from the tank bottom for a total of six samples. The transfer history indicates that 2,498 kL (660 kgal) of DSSF and 295 kL (78 kgal) of dilute noncomplexed waste were in the tank which suggests the waste may have been stratified. Therefore, it was assumed that samples 95-2 and 95-4 taken from the top of the waste represent the smaller dilute noncomplexed portion of the waste, and the remaining samples represent the DSSF portion. Results obtained from using this assumption differ little from results obtained if the waste is assumed to have been homogenous as indicated in Table D3-3.

Table D3-2a. Results of November 1995 Sampling of Tank 241-AP-101 Riser 1 SW[1]. (2 Sheets)

Analyte	Riser 1 SW			
	95-2	95-1	95-3	Top/ bottom[2]
Units	µg/mL	µg/mL	µg/mL	
TOC	2,100	2,060	2,340	0.90
TIC	5,360	4,960	4,300	1.25
Percent water	60.47%	58.91%	56.82%	1.06
Specific gravity	1.295	1.285	1.34	0.97
pH	13.87	13.77	13.86	1.00
OH	42,200	49,200	53,900	0.78
Al	11,000	11,600	12,600	0.87
Fe	NR	NR	NR	---

Table D3-2a. Results of November 1995 Sampling of Tank 241-AP-101 Riser 1 SW[1]. (2 Sheets)

Analyte	Riser 1 SW			
	95-2	95-1	95-3	Top/ bottom[2]
Units	µg/mL	µg/mL	µg/mL	
Na	1.53E+05	1.59E+05	1.72E+05	0.89
SO_4	3,520	3,220	2,140	1.64
PO_4	<1,210	<1,210	<613	---
NO_3	1.47E+05	1.50E+05	1.81E+05	0.81
NO_2	38,700	40,500	46,800	0.83
F	2,700	2,450	2,050	1.32
Cl	1,910	1,980	2,140	0.89
Units	µCi/mL	µCi/mL	µCi/mL	
^{90}Sr	0.152	0.134	0.163	0.93
$^{239/240}Pu$	1.66E-04	1.55E-04	1.52E-04	1.09
^{137}Cs	173	182	196	0.88
^{60}Co	NR	NR	NR	---
^{241}Am	2.98E-04	3.00E-04	3.04E-04	0.98

[1] Esch 1996.
[2] Sample 95-2 divided by sample 95-3

Table D3-2b. Results of November Sampling of Tank 241-AP-101 Riser 1 NW[1] (2 sheets).

Analyte	Riser 1 NW			
	95-4	95-5	95-6	Top/ bottom[2]
Units	µg/mL	µg/mL	µg/mL	
TOC	3,360	3,240	3,000	1.12
TIC	5,070	3,760	3,820	1.33
Percent water	60.29%	56.50%	56.47%	1.07
SpG	1.275	1.295	1.350	0.94
pH	13.95	13.91	13.93	1.00

Table D3-2b. Results of November Sampling of Tank 241-AP-101 Riser 1 NW[1] (2 sheets).

Analyte	Riser 1 NW			
	95-4	95-5	95-6	Top/bottom[2]
OH	50,700	50,100	50,300	1.01
Units	µg/mL	µg/mL	µg/mL	
Al	11,500	13,300	12,700	0.91
Fe	NR	NR	NR	---
Na	1.58E+05	1.77E+05	1.74E+05	0.90
SO_4	2,940	2,120	1,740	1.69
PO_4	1,010	617	787	1.28
NO_3	1.56E+05	1.46E+05	1.44E+05	1.08
NO_2	42,000	41,800	40,600	1.03
F	2,820	1,320	1,150	2.45
Cl	2,120	2,010	2,020	1.05
Units	µCi/mL	µCi/mL	µCi/mL	
^{90}Sr	0.184	0.190	0.109	1.69
$^{239/240}Pu$	1.52E-04	1.73E-04	1.83E-04	0.83
^{137}Cs	170	212	198	0.86
^{60}Co	NR	NR	NR	---
^{241}Am	NR	NR	NR	---

NR = Not reported.

Note:

[1]Esch 1996.

[2]Ratio of upper sample (95-2 or 95-4) to lower sample (95-3 or 95-6). Similar ratios might indicate stratification.

Table D3-3. Composition of Tank 241-AP-101 as of November 1995: Homogeneity Versus Stratification. (2 Sheets)

Analyte	If contents were homogenous	If contents were stratified
TOC (g/L)	2.65	2.66
CO_3 (*M*)	0.378	0.360
OH (*M*)	2.91	2.97

Table D3-3. Composition of Tank 241-AP-101 as of November 1995: Homogeneity Versus Stratification. (2 Sheets)

Analyte	If contents were homogenous	If contents were stratified
Al (*M*)	0.449	0.460
Fe (*M*)	NR	NR
Na (*M*)	7.19	7.34
SO_4 (*M*)	0.0272	0.0250
PO_4 (*M*)	0.00854	0.00775
NO_3 (*M*)	2.48	2.50
NO_2 (*M*)	0.907	0.918
F (*M*)	0.110	0.0974
Cl (*M*)	0.0573	0.0574
^{90}Sr (Ci/L)	1.63E-04	1.58E-04
$^{239/240}Pu$ (Ci/L)	1.64E-07	1.65E-07
^{137}Cs (Ci/L)	0.197	0.203
^{241}Am (Ci/L)	3.01E-07	3.02E-07

Note:

NR = not reported.

Table D3-4 compares the engineering estimate to the results of the November 1995 sampling event (assuming waste stratification). The engineering estimate was derived from the volumetric weighted averages of tanks 241-AP-101 (0.91%), 241-AP-105 (89.43%) and AP-108 (9.68%), based on the known supernate volume as of November 1995 (2790 kL). The reference values for 241-AP-105 may be found in De Lorenzo (1994), for 241-AP-108 in Miller (1994) and for 241-AP-101 in Miller (1993). The largest disparities were phosphate and plutonium. Because of the low plutonium concentrations, the 68 percent difference for this analyte is deemed acceptable.

The bulk of the phosphate in the engineering estimate comes from tank 241-AP-105. The IC results for phosphate were chosen from De Lorenzo et al. (1994). If the ICP results for phosphorus were used instead, the resulting disparity would be decreased from 45 to 24 percent. The November 1995 analytical results are assumed to be the better basis for phosphate.

Table D3-4. Comparison of Engineering Estimate and Sample-Based Analytical Compositions for Tank 241-AP-101 as of November 1995. (2 sheets)

Analyte	Engineering estimate	Analytical result	Ratio
Units	*M*	*M*	
Ag	1.15E-06	NR	
Al	0.388	0.460	0.84
As	1.09E-05	NR	
B	0.00177	NR	
Ba	4.17E-06	NR	
Ca	0.00149	NR	
Cd	1.42E-05	NR	
Cr	0.00322	NR	
Fe	1.07E-04	NR	
K	0.709	NR	
Na	6.51	7.34	0.89
Ni	1.66E-04	NR	
Pb	2.33E-05	NR	
Se	1.60E-06	NR	
Si	0.00462	NR	
Ti	1.19E-12	NR	
U g/L	0.0390	NR	
Zn	8.05E-04	NR	
CO_3	0.336	0.360	0.93
Cl	0.0597	0.0574	1.04
F	0.0718	0.0974	0.74
SO_4	0.0227	0.0250	0.91
NO_3	2.38	2.50	0.95
NO_2	0.941	0.918	1.03
PO_4	0.00424	0.00775	0.55
OH	2.84	2.97	0.96
TOC (g/L)	2.46	2.66	0.92

Table D3-4. Comparison of Engineering Estimate and Sample-Based Analytical Compositions for Tank 241-AP-101 as of November 1995. (2 sheets)

Analyte	Engineering estimate	Analytical result	Ratio
Units	Ci/L	Ci/L	
^{14}C	1.95E-07	NR	
^{90}Sr	2.02E-04	1.58E-04	1.28
^{90}Y	2.02E-04	1.58E-04	1.28
^{99}Tc	6.28E-05	NR	
^{137}Cs	2.13E-01	2.03E-01	1.05
^{137}Ba	2.02E-01	1.93E-01	1.05
^{154}Eu	5.32E-09	NR	
^{238}U	1.31E-08	NR	
^{237}Np	2.81E-07	NR	
^{239}Pu	1.13E-07	1.32E-07	0.68
^{241}Pu	2.77E-08	3.3E-08	
^{241}Am	3.63E-07	3.02E-07	1.20

NR = Not reported.

The November 1995 sample did not include many of the components represented in the engineering estimate. For these components, the engineering estimate is used as the best-basis. Table D3-5 provides the best-basis inventory for waste in tank 241-AP-101 prior to the final transfer of DSSF from Campaign 95-1.

Table D3-5. Estimated Waste Inventories in Tank 241-AP-101 as of November 1995. (2 Sheets)

Analyte	Pre-campaign 95-1 inventory[1]
	kg
Al	34,700
Ca	237
Cr	662
Fe	23.5
K	1.09E+05
Na	4.71E+05
Ni	38.5
Pb	19.0
Si	512
U	154
CO_3	60,300
Cl	5,680
F	5,160
SO_4	6,700
NO_3	4.33E+05
NO_2	1.18E+05
PO_4	2,050
OH_{TOTAL}	1.41E+05
TOC	7,420
Units	Ci
^{14}C	1.95E-07
^{90}Sr	564
^{90}Y	564
^{99}Tc	175

Table D3-5. Estimated Waste Inventories in Tank 241-AP-101 as of November 1995. (2 Sheets)

Analyte	Pre-campaign 95-1 Inventory[1]
Units	Ci
^{137}Cs	5.67E+05
^{137}Ba	5.39E+05
^{154}Eu	0.0149
^{238}Pu	<2.25
^{238}U	0.0518
^{237}Np	0.785
^{239}Pu	0.369
^{240}Pu	0.092
^{241}Am	0.844
^{243}Cm	<0.07
^{244}Cm	<1.53

Note:

[1]This inventory is based on the engineering or analytical composition estimates in Table D3-4, together with a tank volume of 2,790 kL (737 kgal), prior to the addition of 1,158 kL (306 kgal) of DSSF from tank 241-AW-106 in March 1996 (Campaign 95-1). Although it is not necessary for the calculation of this inventory, the estimated specific gravity of this waste is 1.41 g/ml.

After the waste inventory, as of November 1995, has been established (Table D3-5), the next task is to estimate the current composition for tank 241-AP-101 by "adding" the contribution from tank 241-AW-106 (1,431 kL [378 kgal] of DSSF produced in Campaign 95-1). The concentration estimates for this DSSF were derived by combining the results from a sample of the 242-A Evaporator slurry with the results from the August 1995 grab samples of tank 241-AW-106. The method used to construct the data was discussed in Section B3.4. Table D3-6 shows the concentration and inventory estimates for the additional DSSF from tank 241-AW-106.

Table D3-6. Concentration Estimates for DSSF Waste Received from Tank 241-AW-106 in March 1996 and January 1997.

Analyte	Concentration	Inventory [1]
	µg/mL	kg
Al	4,940	7,070
Na	1.12E+05	1.60E+05
F	3,310	4,740
NO_2	38,900	55,700
NO_3	94,200	1.35E+05
PO_4	1,560	2,230
SO_4	5,650	8,090
OH_{TOTAL}	29,600	42,400
TOC	4,310	6,170
Radionuclides	µCi/mL	Ci
^{14}C	1.55E-04	0.222
^{90}Sr	0.0990	142
^{90}Y	0.0990	142
^{99}Tc	0.0322	46.1
^{137}Cs	127	1.82E+05
^{137}Ba	121	1.82E+05
$^{239/240}Pu$	2.18E-04	0.312

Note:

[1]Based on a volume of 1,431 kL (378 kgal).

When the November 1995 inventory for tank 241-AP-101 is added to the DSSF from tank 241-AW-106, certain components in the November 1995 inventory not present in the DSSF are assumed to represent the total inventories in the tank.

The values in Tables D3-5 and D3-6 were summed to represent the total chemical inventory in tank 241-AP-101, as shown in Table D4-1. Table D3-7 shows the projected radionuclide

contributions from tanks 241-AP-101, 241-AP-105, and 241-AW-106, as well as the total radionuclide inventory currently in tank 241-AP-101. The relative tank contributions are based on the fraction from each tank added to tank 241-AP-101 after January, 1994 (295 kL out of 4,012 kL in tank AP-101, 2498 kL out of 3,103 kL in tank AP-105, and 1,158 kL out of 4,201 kL in tank AW-106, as of January 1, 1994).

Table D3-7. Summary Table Providing the Total Radionuclide Inventory in Tank 241-AP-101.[1] (2 Sheets)

Radionuclides	AP-101	AP-105	AW-106	Total Inventory in AP-101
	(Ci)	(Ci)	(Ci)	(Ci)
^{3}H	3.03	2.29	54.08	59.40
^{14}C	NR	0.00	0.22	0.22
^{59}Ni	0.02	0.45	0.95	1.42
^{60}Co	0.54	1.71	11.95	14.20
^{63}Ni	2.27	44.44	94.82	141.52
^{79}Se	0.05	0.05	1.57	1.67
^{90}Sr	NR	564.00	142.00	706.00
^{90}Y	NR	564.00	142.00	706.00
^{93m}Nb	0.19	3.31	5.58	9.08
^{93}Zr	0.25	4.44	7.80	12.50
^{99}Tc	NR	175.00	46.10	221.10
^{106}Ru	0.00	196.42	0.00	196.42
^{113m}Cd	1.20	21.41	42.79	65.40
^{125}Sb	4.24	8.37	97.21	109.83
^{126}Sn	0.08	51.68	2.38	54.14
^{129}I	0.00	0.10	0.14	0.24
^{134}Cs	1.03	8.77	1.20	11.01
^{137m}Ba	NR	5.39 E+05	1.72 E+05	7.11 E+05
^{137}Cs	NR	5.67 E+05	1.82 E+05	7.49 E+05
^{151}Sm	191	3,284	5,511	8,986
^{152}Eu	0.06	1.01	2.26	3.34
^{154}Eu	0.00	0.01	316.29	316.30
^{155}Eu	3.93	39.12	132.13	175.18
^{226}Ra	0.00	318.78	0.00	318.78
^{227}Ac	0.00	0.00	0.00	0.00
^{228}Ra	0.00	0.05	0.14	0.19
^{229}Th	0.00	0.00	0.00	0.00

Table D3-7. Summary Table Providing the Total Radionuclide Inventory in Tank 241-AP-101.[1] (2 Sheets)

Radionuclides	AP-101	AP-105	AW-106	Total Inventory in AP-101
	(Ci)	(Ci)	(Ci)	(Ci)
^{231}Pa	0.00	0.00	0.00	0.00
^{232}Th	0.00	0.01	0.02	0.03
^{232}U	NR	NR	NR	0.02
^{233}U	NR	NR	NR	0.09
^{234}U	NR	NR	NR	0.07
^{235}U	NR	NR	NR	2.7E-03
^{236}U	NR	NR	NR	5.06E-03
^{237}Np	NR	0.79	NR	0.79
^{238}Pu	NR	<2.25	NR	<2.25
^{238}U	NR	NR	NR	0.05
$^{239/240}Pu$	NR	0.461	0.31	0.773
^{239}Pu	NR	0.369	0.255	0.624
^{240}Pu	NR	0.092	0.057	0.149
^{241}Am	NR	0.844	NR	0.844
^{241}Pu	NR	NR	NR	4.33
^{242}Cm	NR	NR	NR	1.38E-03
^{242}Pu	NR	NR	NR	1.80E-04
^{243}Am	NR	NR	NR	7.79E-05
^{243}Cm	NR	<0.07	NR	<0.07
^{244}Cm	NR	<1.53	NR	<1.53

NR = Not reported.

[1]Radionuclide estimates from Tables D3-5 and D3-6 were used to estimate the indicated radionuclides. Uranium isotopes were estimated from the total uranium inventory, using the isotopic ratios in the HDW model. Values for ^{241}Pu and ^{242}Pu are based on $^{239/240}Pu$ using the HDW isotopic ratios. Estimates for ^{243}Am and ^{242}Cm are based on ^{241}Am using the HDW isotopic ratios. All other values are HDW model derived values based on the relative volume of waste from tanks 241-AP-101, 241-AP-105 and 241-AW-106. All radionuclides are decayed to January 1, 1994.

D4.0 DEFINE THE BEST BASIS AND ESTABLISH COMPONENT INVENTORIES

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities (Hodgson and LeClair 1996). As part of this effort, an evaluation of chemical information for tank 241-AP-101 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 sample-based data should serve as the best-basis inventory for tank 241-AP-101 for the following reasons:

1. Although no individual samples of the waste currently stored in tank 241-AP-101 are available, data from the tank samples taken in November 1995 and data from the waste produced in Evaporator Campaign 95-1 can be combined to describe waste currently in tank 241-AP-101.

2. The HDW model estimate for tank 241-AP-101 is outdated because of a large number of waste transfers that have occurred subsequent to the model development.

Engineering estimates were used as the best basis when tank sample data was not available for an analyte. In addition, revised HDW model estimates were used where appropriate based on a composite of wastes currently in tank 241-AP-101.

Tables D4-1 and D4-2 show best-basis inventory estimates for tank 241-AP-101. Radionuclide values are decayed to January 1, 1994 and are based on the ratio of wastes currently in tank 241-AP-101 (6.97% AP-101, 59.04% AP-105 and 33.99% AW-106). 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 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.

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-101 as of January 31, 1997. (2 Sheets)

Analyte	Total Inventory (kg)	Basis (S, M, C, or E)[1]	Comment
Al	41,800	S/E	Sum of Tables D3-5 and D3-6
Bi	0	E	Bi is relatively insoluble in the supernates added to this tank
Ca	237	S/E	Campaign 95-1 data not available.
Cl	5,680	S/E	Campaign 95-1 data not available.
TIC as CO_3	60,300	S/E	Campaign 95-1 data not available.
Cr	662	E	Campaign 95-1 data not available.
F	9,900	S/E	Sum of Tables D3-5 and D3-6
Fe	23.5	E	Campaign 95-1 data not available.
Hg	0	E	Simpson 1998
K	1.09E+05	E	Campaign 95-1 data not available.
La	0	E	La is relatively insoluble in the supernates added to this tank
Mn	0	E	Mn is insoluble in the supernates added to this tank
Na	6.31E+05	S/E	Sum of Tables D3-5 and D3-6
Ni	38.5	E	Campaign 95-1 data not available.
NO_2	1.74E+05	S/E	Sum of Tables D3-5 and D3-6
NO_3	5.68E+05	S/E	Sum of Tables D3-5 and D3-6
OH_{TOTAL}	314,000	C	
Pb	19.0	E	Campaign 95-1 data not available.

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AP-101 as of January 31, 1997. (2 Sheets)

Analyte	Total inventory (kg)	Basis (S, M, C, or E)[1]	Comment
PO_4	4,280	S/E	45 percent disparity between historical and analytical results. Sum of Tables D3-5 and D3-6
Si	512	E	Campaign 95-1 data not available.
SO_4	14,800	S/E	Sum of Tables D3-5 and D3-6
Sr	0.0169	S/E	Based on ^{90}Sr assuming 30% of total Sr consists of ^{90}Sr
TOC	13,600	S/E	Sum of Tables D3-5 and D3-6
U_{TOTAL}	154	E	Campaign 95-1 data not available.
Zr	75	M	

Note:

[1]S = Sample-based, M = HDW model-based, C = Calculated by charge balance; includes oxides as hydroxides, not including CO_3, NO_2, NO_3, PO_4, SO_4, and SiO_3, and E = Engineering assessment-based.

Table D4-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E) [1]	Comment
^{3}H	59.40	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{14}C	0.22	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{59}Ni	1.42	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{60}Co	14.20	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{63}Ni	142.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{79}Se	1.67	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{90}Sr	706.00	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{90}Y	706.00	E/S	Based on ^{90}Sr
^{93m}Nb	9.08	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{93}Zr	12.50	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{99}Tc	221.00	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{106}Ru	0.0342	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{113m}Cd	65.40	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{125}Sb	110.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{126}Sn	54.10	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{129}I	0.24	M/E	Based on volume of waste from AP-101, AP-105 and AW-106

Table D4-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E) [1]	Comment
^{134}Cs	11.0	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{137m}Ba	7.11 E+05	E/S	Based on ^{137}Cs
^{137}Cs	7.49 E+05	E/S	Based on volume of waste from AP-101, AP-105 and AW-106. Sum of Tables D3-5 and D3-6.
^{151}Sm	8990.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{152}Eu	3.34	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{154}Eu	316.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{155}Eu	175.00	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{226}Ra	3.28 E-04	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{227}Ac	6.41 E-04	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{228}Ra	0.191	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{229}Th	4.51 E-03	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{231}Pa	2.87 E-03	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{232}Th	0.0259	M/E	Based on volume of waste from AP-101, AP-105 and AW-106
^{232}U	0.0223	M/E	Based on total U: Used HDW isotopic ratios
^{233}U	0.0853	M/E	Based on total U: Used HDW isotopic ratios
^{234}U	0.0704	M/E	Based on total U: Used HDW isotopic ratios
^{235}U	2.70 E-03	M/E	Based on total U: Used HDW isotopic ratios

Table D4-2. Best-Basis Inventory Estimate for Radioactive Components in Tank 241-AP-101, Decayed to January 1, 1994. (Effective January 31, 1997) (3 Sheets)

Analyte	Total Inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{236}U	5.06 E-03	M/E	Based on total U: Used HDW isotopic ratios
^{237}Np	0.785	E	Campaign 95-1 data not available
^{238}Pu	2.25	E/S	Upper bounding estimate. Campaign 95-1 data not available.
^{238}U	0.0513	E/M	Based on total U: Used HDW isotopic ratios
^{239}Pu	0.624	S/E/M	Based on $^{239/240}Pu$: Used HDW isotopic ratios. HDW estimate 20.4 Ci
^{240}Pu	0.149	S/E/M	Based on $^{239/240}Pu$: Used HDW isotopic ratios
^{241}Am	0.844	E/S	Based on ratio of waste from AP-101, AP-105 and AW-106. HDW estimate 85.7 Ci. Campaign 95-1 data not available
^{241}Pu	4.33	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios
^{242}Cm	1.38E-03	S/E/M	Based on ^{241}Am: Used HDW isotopic ratios. Campaign 95-1 data not available.
^{242}Pu	1.80E-05	S/E/M	Based on ^{239}Pu: Used HDW isotopic ratios.
^{243}Am	7.79E-05	S/E/M	Based on ^{241}Am: Used HDW isotopic ratios. Campaign 95-1 data not available.
^{243}Cm	0.07	S/E/M	Based on amount of waste from AP-105, 4% of $^{243/244}Cm$ present as ^{243}Cm. Upper bounding estimate. Campaign 95-1 data not available
^{244}Cm	1.53	S/E/M	Based on amount of waste from AP-105, 96% of $^{243/244}Cm$ presented as ^{243}Cm. Upper bounding estimate. Campaign 95-1 data not available

Note

[1]S = Sample-based, M = HDW model-based, and E = Engineering assessment-based.

D5.0 APPENDIX D REFERENCES

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