0049688

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN 640358

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	8-13-97
	6. Project Title/No./Work Order No. Tank 241-AW-104	7. Bldg./Sys./Fac. No. NA	8. Approval Designator NA
	9. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-WM-ER-453, Rev. 0	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 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

Add Appendix C, Evaluation to Establish Best-Basis Inventory for Double-Shell Tank 241-AW-104.

SEP 1998 RECEIVED EDMC

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

An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities. As part of this effort, an evaluation of available information for double-shell tank 241-AW-104 was performed, and a best-basis inventory was established. This work follows the methodology that was established by the standard inventory task.

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

Central Files	A3-88	K. M. Hall	R2-12
DOE Reading Room	H2-53	K. M. Hodgson	R2-11
TCSRC	R1-10	R. T. Winward	H5-49
File	H5-49	K. E. Bell	R2-12
T. E. Jones	H5-49		
M. J. Kupfer	H5-49		
M. D. LeClair (3)	H0-50		

RELEASE STAMP

AUG 25 1997

DATE: HANFORD RELEASE

STA: 37 ID: 20

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

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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
NA		

21. Approvals

	Signature	Date		Signature	Date
Design Authority			Design Agent		
Cog. Eng. M. J. Kupfer	M J Kupfer	8-21-97	PE		
Cog. Mgr. K. M. Hodgson	K M Hodgson	8/18/97	QA		
QA			Safety		
Safety			Design		
Environ.			Environ.		
Other K. E. Bell	Kevin E. Bell	8/15/97	Other		

DEPARTMENT OF ENERGY

Signature or a Control Number that tracks the Approval Signature

ADDITIONAL

Tank Characterization Report for Double-Shell Tank 241-AW-104

T. E. Jones (Meier Associates), R. T. Winward (Meier Associates), and M. J. Kupfer
Lockheed Martin Hanford Corporation, Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200

EDT/ECN: 640358 UC: 712
Org Code: 74610 Charge Code: N4G3A
B&R Code: EW3120074 Total Pages: 81

Key Words: TCR, best-basis inventory

Abstract: An effort is underway to provide waste inventory estimates that will serve as standard characterization source terms for the various waste management activities. As part of this effort, an evaluation of available information for double-shell tank 241-AW-104 was performed, and a best-basis inventory was established. This work follows the methodology that was established by the standard inventory task.

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AUG 25 1997
DATE:
STA: 37
HANFORD RELEASE
ID: 20

Janis Bishop 8/25/97
Release Approval Date

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Approved for Public Release

RECORD OF REVISION	(1) Document Number WHC-SD-WM-ER-453	Page 1

(2) Title
Tank Characterization Report for Double-Shell Tank 241-AW-104

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 07/13/95 on EDT 612549.	L. A. Tusler	J. G. Kristofzski
0A RS	Incorporate per ECN-640358.	M. J. Kupfer	K. M. Hodgson
		MJ Kupfer 8-21-97	K.M. Hodgson 8-18-97

A-7320-005 (08/91) WEF168

APPENDIX C

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AW-104

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APPENDIX C

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR DOUBLE-SHELL TANK 241-AW-104

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 (DST) 241-AW-104 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.

C1.0 CHEMICAL INFORMATION SOURCES

Available waste (chemical) information for tank 241-AW-104 includes the following:

- The information included in Sections 2.0, 3.0, 4.0, and 5.0 of this Tank Characterization Report (TCR).
- Analytical data on two supernatant and one sludge grab samples obtained in September 1994.
- Analytical data from 242-A Evaporator/Crystallizer Fiscal Year 1985 Campaign Run 85-1 Post-Run Document (Pontious 1985)
- Inventory estimates for this tank were generated from the Hanford Defined Waste (HDW) model (Agnew et al. 1997).

C2.0 COMPARISON OF COMPONENT INVENTORY VALUES

Tank 241-AW-104 is categorized as containing dilute noncomplexed miscellaneous Plutonium-Uranium Extraction (PUREX) Plant wastes and is essentially full. The contents are separated into a liquid layer and a soft solids layer. The formation of the major part of the solids layer can be traced to a point in time when the tank was used as a double-shell slurry feed (DSSF) receiver from the 242-A Evaporator (Agnew et al. 1997). Chemical analysis of the DSSF provided input to this engineering assessment. Limited analytical data from a grab sampling event in 1994 provided a limited analytical-based inventory estimates. The tank inventory estimates reported in Agnew et al. and limited analytical-based inventory

estimates are listed in Table C2-1 for the non-radionuclides and Table C2-2 for radionuclides. The chemical species are reported without charge designation per the best basis inventory convention.

Table C2-1. Hanford Defined Waste Model and Limited Sample-Based Predicted Inventory Estimates for Nonradioactive Components in Tank 241-AW-104.

Analyte	HDW inventory estimate[a] (kg)	Analytical based inventory estimates[b] (kg)	Analyte	HDW inventory estimate[a] (kg)	Analytical based inventory estimates[b] (kg)
Al	75.5	NR	Ni	2,810	NR
Bi	0.42	NR	NO_2	1,960	19,300
Ca	8,190	NR	NO_3	62,600	60,200
Cl	554	900	OH	43,700	15,300
Cr	1,620	NR	Pb	35.3	NR
F	1,910	362	PO_4	25,600	<430
Fe	40,200	NR	Si	3.88	NR
Hg	7.97	NR	SO_4	1,550	1,820
K	1,190	NR	CO_3	36,000	NR
Mn	1,280	NR	TOC	1,940	NR
Na	60,000	NR	U_{TOTAL}	8,500	NR
NH_3	225	NR	Zr	1,600	NR
H_2O (wt%)	93.2	NR	Density (g/mL)	1.04	NR

HDW = Hanford Defined Waste
NR = Not Reported
[a] Agnew et al. (1997)
[b] Table A-2, this TCR.

Table C2-2. Hanford Defined Waste Model Inventory Estimates for Radioactive Components in Tank 241-AW-104.

Analyte	HDW inventory estimate[a] (Ci)	Analyte	HDW inventory estimate[a] (Ci)
^{90}Sr	282	^{137}Cs	518
^{239}Pu	882		

HDW = Hanford Defined Waste
[a] Agnew et al. (1997), decayed to January 1, 1994.

C3.0 COMPONENT INVENTORY EVALUATION

The following evaluation was conducted to assess various estimates of tank contents.

C3.1 WASTE HISTORY TANK 241-AW-104

The DST 241-AW-104 went into service in 1980. From 1980 through the third quarter of 1984 this tank received PUREX miscellaneous wastes, dilute noncomplexed waste, water, and DSSF from the 242-A Evaporator. There was little accumulation of solids in the tank through this time period. In the fourth quarter of 1984, the tank received 3,634 kL (960 kgal) of a concentrated DSSF. An approximate 250 cm (100 in.) solids layer remained in the tank when the DSSF was pumped out of the tank during the second quarter of 1986. This salt cake layer has remained in the tank.

From 1986 through 1992, tank 241-AW-104 received dilute PUREX waste and water. Since 1992, transfers in and out of the tank have been minimal. For a more complete history of the waste in this tank refer to Section 2.3 of this TCR and Agnew et al. (1995).

C3.2 EXPECTED TYPE OF WASTE BASED ON THIS ASSESSMENT

Both Agnew et al. (1997) and Hanlon (1996) list the total waste volume in tank 241-AW-104 as 4,250 kL (1,122 kgal). Agnew et al. identifies the waste in the tank as 3,860 kL (1,020 kgal) of supernatant mixing model (SMM) composite and 390 kL (103 kgal) of tank layer model (TLM) solids composite. The SMM composite includes 708 kL (187 kgal) of SMMA salt cake and 3,150 kL (833 kgal) of liquids. Agnew et al. reports the composition of the TLM solids to be 18.9 kL (5 kgal) of PUREX zirconium-cladding waste and 367 kL (97 kgal) of PUREX low-level waste. In this document, the TLM solids composite are assumed to be "sludge."

Hanlon (1996) lists the tank as containing 3,150 kL (832 kgal) of supernatant liquids and 1,100 kL (290 kgal) of sludge and salt cake. Thus, the solids and liquid waste volume estimates reported in Hanlon (1996) and Agnew et al. (1997) are in agreement.

C3.3 BASIS FOR CALCULATIONS USED IN THIS ENGINEERING EVALUATION

The general approach in this engineering assessment is to utilize all available information to formulate the best-basis estimate of the tank's contents. The sources of information may include analytical data from samples taken from the tank of interest, analytical data from other tanks believed to contain waste types similar to those believed to be in the tank of interest, and data from models utilizing historical process records. The confidence level assigned to the best-basis inventory values then depends on the level of agreement among the various information sources.

C3.3.1 PRELIMINARY ASSESSMENT OF AVAILABLE INFORMATION

A preliminary assessment identified three sources of information that could potentially be used to develop the best-basis inventory estimate. First, some analytical data were available from grab samples taken from the tank in 1994. Second, post-run documents from 242-A Evaporator operations provided some information on the composition of the slurry feed materials that were the source of much of the salt cake layer in tank 241-AW-104. The third source is the HDW model results reported by Agnew et al. (1997). While the liquid phase in this tank was reasonably well characterized in 1994, only very limited analytical data were available for the solids phase in this tank.

In this engineering assessment it is assumed that the solids layer in tank 241-AW-104 could be approximated by combining the TLM solids inventory estimates (i.e., sludge) from Agnew et al. (1997) with estimates for salt cake that separated from the DSSF. Salt cake inventory estimates are based on analytical data from the evaporator post-run document (Pontious 1985). The assumption is that the salt cake originating from the DSSF has the same composition as the original DSSF. Although it is likely there were some selective separations of certain species between liquid and solid phase as the salt cake formed, no attempt was made in this assessment to address its impact on the tank inventory estimate.

C3.3.2 LIQUID PHASE INVENTORY ESTIMATES

Grab samples collected at two depths within the liquid layer and one from the soft solids layer were characterized in 1994. The sampling information is included in Table C3-1. The samples were analyzed to address compatibility issues associated with future 242-A Evaporator operations. The characterization focused on major inorganics, TOC, and radionuclides for the supernatant samples. The solids sample was only analyzed for

water-soluble anions and pH. Thus, available analytical data provide only a partial tank inventory estimate.

The analytical results from the two supernatant samples are listed in Table C3-2. Tank inventory estimates for the liquid phase were calculated by multiplying analyte concentrations by the volume of the liquid phase and are also included in Table C3-2.

Table C3-1. Tank 241-AW-104 Grab Sampling Information.

Riser number	Sample number	Sample depth (from bottom) meters (inches)	Waste type
16C	R6463	10.3 (406)	Supernatant
	R6464	4.27 (168)	Supernatant
	R6465	1.78 (70)	Solids

Table C3-2. Tank 241-AW-104 Analytical Data for Supernatant Grab Samples.[a] (2 Sheets)

Analyte	Sample #R6463 (μg/mL)	Sample #R6464 (μg/mL)	Mean (μg/mL)	Projected inventory, (kg)
Al	56.1	142	99.1	312
Fe	<1.05	<1.05	<1.05	<3.31
Na	6,550	10,000	8,280	26,100
Cl	31.5	87.1	59.3	187
F	19.8	4.82	12.3	38.7
OH	674	2,850	1,760	5,540
NO_3	9,150	12,400	10,800	34,000
NO_2	1,600	2,740	2,170	6,830
PO_4	<101	<101	<101	<318
SO_4	279	326	303	954
CO_3	2,510	1,670	2,090	6,600
TOC	501	418	460	1,450

Table C3-2. Tank 241-AW-104 Analytical Data for Supernatant Grab Samples.[a] (2 Sheets)

Analyte	Sample #R6463 (µg/mL)	Sample #R6464 (µg/mL)	Mean (µg/mL)	Projected inventory (kg)
Radionuclides[b]	µCi/mL	µCi/mL	µCi/mL	Ci
^{137}Cs	2.30	6.78	4.54	14,300
$^{239/240}Pu$	1.59 E-05	1.66 E-05	1.63 E-05	0.053
^{90}Sr	0.00780	0.00777	0.00779	24.5

[a] Based on Appendix A of this TCR
[b] Analyses completed in 1994. Supernatant liquid volume = 3,150 kL (832 kgal).

C3.3.3 SOLIDS INVENTORY ESTIMATES

The origin of most of the solids layer in tank 241-AW-104 can be traced to a DSSF produced during 242-A Evaporator run 85-1 in the fourth quarter of 1984. This DSSF was stored in tank 241-AW-104 for about 18 months. Approximately 250 cm (100 in.) of solids remained when the DSSF was pumped out of the tank. This solids layer has remained relative constant even though large quantities of dilute PUREX low-level waste have been pumped through the tank since the solids layer formed.

Slurry samples were taken during the 85-1 evaporator run (Pontious 1985). The slurry samples were reported to have contained from 15 to 20 vol% solids. The compositions of the DSSF for the 85-1 evaporator run are listed in Table C3-3. Inventory estimates for the solids that were assumed to have come from the DSSF are also listed in Table C3-3.

The limited analytical results from the solids grab sample taken in 1994 are also listed in Table C3-4. This sample was analyzed for water soluble anions only.

Tank inventory estimates for the solids in tank 241-AW-104 were calculated for a limited number of analytes and are also included in Table C3-4. The inventory estimates based on the solids grab sample analyses are compared with inventory estimates based on DSSF analytical data.

Table C3-3. Solids Inventory Estimates for Tank 241-AW-104.

Analyte	DSSF composition[a] (μg/mL)	DSSF solids inventory estimates[b] (kg)	TLM solids inventory estimate[c] (kg)	Engineering-based solids inventory estimate[d] (kg)
Al	37,000	26,200	0	26,200
Fe	NR	NR	39,800	39,800
Na	212,000	150,000	7,250	150,000
K	16,000	11,300	230	11,300
Cl	5,680	4,020	48.4	4,070
F	2,660	1,880	1,900	1,880
OH	51,800	36,700	41,200	36,700
NO_3	145,000	103,000	5,650	103,000
NO_2	106,000	75,000	160	75,000
PO_4	2,800	1,980	2,180	1,980
SO_4	NR	NR	128	128
CO_3	11,400	8,070	12,400	8,070
Density	1.41	1.41	1.21	NA
Radio-nuclides	(μCi/mL)	(Ci)	(Ci)	(Ci)
^{90}Sr	2.01	1,150[e]	79.7	1,150
^{99}Tc	0.253	179[e]	0.017	179
^{137}Cs	449	258,000[e]	94.1	258,000

DSSF = Double-shell slurry feed
NR = Not reported
TLM = Tank layer model
[a] Pontious (1985)
[b] Solids volume = 708 kL (187 kgal)
[c] Agnew et al. (1997)
[d] Used DSSF solids inventory estimate when available; otherwise used TLM solids inventory estimate
[e] Radionuclide inventories decayed to January 1, 1994.

Table C3-4. Tank 24-AW-104 Analytical Data for Solid Grab Samples.

Analyte	Analytical result[a] (μg/mL)	Analytical-based projected inventory[a] (kg)	DSSF solids inventory estimates[b] (kg)
Cl	650	713	4,020
F	294	323	1,880
OH	8,860	9,730	36,700
NO_3	23,900	26,200	103,000
NO_2	11,900	13,100	75,000
PO_4	<101	<111	1,980
SO_4	792	870	NR

DSSF = Double-shell slurry feed
NR = Not reported
[a] Analytical Data and inventory estimates from Table 4.2, this TCR. Inventory estimates based on solids volume of 1,100 kL (290 kgal)
[b] Data from Table C3-3. Inventory estimates based on a salt cake volume of 708 kL (187 kgal).

C3.3.4 ENGINEERING-BASED INVENTORY ESTIMATES

The engineering-based tank inventory estimates were calculated by summing the supernatant inventory estimates (Table C3-2) and solids inventory estimates (Table C3-3) and are summarized in Table C3-5. The HDW model-based estimates are also included for comparison.

There are major disagreements (i.e., greater than a factor of 10 difference) between the inventory estimates projected by the engineering assessment and the HDW model for six of the 15 analytes listed in Table C3-5, include aluminum, potassium, nitrite, and radioactive strontium, technetium, and cesium. There are also significant differences between analytical-based solids inventory estimate and the DSSF-based inventory estimate (see Table C3-4). Further tank sampling will be required to resolve the inconsistencies in the inventory estimates.

Table C3-5. Tank 241-AW-104 Engineering-Based Inventory Estimates.

Analyte	Supernatant inventory estimates[a] (kg)	Solids inventory estimates[b] (kg)	Engineering-based inventory estimate[c] (kg)	HDW model based inventory estimate[d] (kg)
Al	312	26,200	26,500	75.5
Fe	<3.12	39,800	39,800	40,200
Na	26,100	150,000	176,000	60,000
K	NR	11,300	11,300	1,190
Cl	187	4,070	4,260	554
F	38.7	1,880	1,920	1,910
OH	5,540	36,700	42,200	43,700
NO_3	34,000	103,000	137,000	62,600
NO_2	6,830	75,000	81,800	1,960
PO_4	<318	1,980	1,980	25,600
SO_4	954	128	1,082	1,550
CO_3	6,600	8,070	14,700	36,000
Radionuclides[e] (Ci)				
^{90}Sr	24.5	1,150	1,170	282
^{99}Tc	NR	179	179	0.443
^{137}Cs	14,300	258,000	272,000	518

HDW = Hanford Defined Waste
NR = Not reported
[a] Data from Table C3-2
[b] Data from Table C3-3
[c] Sum of data in columns 2 and 3
[d] Agnew et al. (1997)
[e] Radionuclides decayed to January 1, 1994.

C4.0 DEFINE THE BEST-BASIS AND ESTABLISH COMPONENT INVENTORIES

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 that is suitable for long-term storage/disposal.

Chemical and radiological inventory information are generally derived using three approaches: (1) component inventories are estimated using results of sample analyses, (2) component inventories are estimated using the 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. The information derived from these different approaches is often inconsistent.

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 tank 241-AW-104 was performed. An assessment of available chemical information for tank 241-AW-104 was performed, including the following:

- The information included in Sections 3.0, 4.0, and 5.0 of this TCR
- Analytical data on two supernatant and one sludge grab samples obtained in September 1994
- Analytical data from the 242-A Evaporator/Crystallizer Fiscal Year 1985 Campaign Run 85-1 Post-Run document (Pontious 1985)
- Inventory estimates for this tank were generated from the HDW model (Agnew et al. 1997).

Based on this engineering assessment, a best-basis inventory was developed for tank 241-AW-104 using the available analytical data and the HDW model tank inventory estimates reported by Agnew et al. (1997).

All available information supports the conclusion that this tank contains 3,150 kL (832 kgal) of dilute supernatant liquid with the major constituents characterized. The tank also contains 1,100 kL (290 kgal) of salt cake and sludge with limited characterization data. Both the analytical-based and HDW model results were used to develop the best-basis inventory estimates listed below. The best-basis inventory estimates are listed in Tables C4-1 and C4-2 for nonradioactive components and radioactive components, respectively.

Once the best-basis inventories were determined, the hydroxide inventory was calculated by performing a charge balance with valences of other analytes. In some cases, this approach required that other analyte (e.g., sodium or nitrate) inventories be adjusted to achieve the charge balance. No adjustments were required in this best-basis inventory estimate. This charge balance approach is consistent with that used by Agnew et al. (1997).

Best-basis tank inventory values were 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 were only reported for total beta, total alpha, ^{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 HDW 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. (No attempt has been made to ratio or normalize model results for all 46 radionuclides when values for measured nuclides disagree with the model.) For a discussion of typical error between model derived values and sample derived values, see Kupfer et al. 1997, Section 6.1.10.

The inventory values reported in Tables C4-1 and C4-2 are subject to change. Refer to the Tank Characterization Database (TCD) for the most current inventory values.

Table C4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-AW-104 (Effective May 31, 1997).

Analyte	Total inventory (kg)	Basis (M, E, or C)[1]	Comment
Al	26,500	E	
Bi	0.42	M	
Ca	8,190	M	
Cl	4,260	E	
TIC as CO_3	36,000	M	
Cr	1,620	M	
F	1,920	E	
Fe	40,200	M	
Hg	7.97	M	
K	11,300	E	
La	0.00397	M	
Mn	1,280	M	
Na	176,000	E	
Ni	2,810	M	
NO_2	81,800	E	
NO_3	137,000	E	
OH	144,000	C	
Pb	35.3	M	
PO_4	1,980	E	
Si	3.88	M	
SO_4	1,082	E	
Sr	0	M	
TOC	1,940	M	
U_{TOTAL}	8,500	M	
Zr	1,600	M	

[1]M = Hanford Defined Waste model-based
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.

Table C4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AW-104, Decayed to January 1, 1994 (Effective May 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	0.741	M	
^{14}C	0.0607	M	
^{59}Ni	0.00582	M	
^{60}Co	0.138	M	
^{63}Ni	0.618	M	
^{79}Se	0.00687	M	
^{90}Sr	1,170	E	
^{90}Y	1,170	E	Based on ^{90}Sr data.
^{93}Zr	0.0334	M	
^{93m}Nb	0.0236	M	
^{99}Tc	0.443	M	
^{106}Ru	9.78	M	
^{113m}Cd	0.188	M	
^{125}Sb	1.96	M	
^{126}Sn	0.0105	M	
^{129}I	8.57 E-04	M	
^{134}Cs	0.749	M	
^{137}Cs	272,000	E	M-based value = 518
^{137m}Ba	257,000	E	Referenced to ^{137}Cs
^{151}Sm	24.2	M	
^{152}Eu	0.0279	M	
^{154}Eu	1.66	M	
^{155}Eu	4.1	M	
^{226}Ra	2.67 E-07	M	
^{227}Ac	1.66 E-06	M	
^{228}Ra	5.71 E-04	M	
^{229}Th	1.33 E-05	M	
^{231}Pa	7.39 E-06	M	
^{232}Th	5.84 E-05	M	
^{232}U	0.00276	M	

Table C4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-AW-104, Decayed to January 1, 1994 (Effective May 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{233}U	0.00707	M	
^{234}U	4.12	M	
^{235}U	0.157	M	
^{236}U	0.339	M	
^{237}Np	0.00176	M	
^{238}Pu	109	M	
^{238}U	2.83	M	
^{239}Pu	882	M	
^{240}Pu	268	M	
^{241}Am	0.45	M	
^{241}Pu	11,100	M	
^{242}Cm	0.00204	M	
^{242}Pu	0.0415	M	
^{243}Am	7.53 E-05	M	
^{243}Cm	3.22 E-04	M	
^{244}Cm	0.00154	M	

[1]S = Sample-based
M = Hanford Defined Waste model-based
E = Engineering assessment-based.

C5.0 APPENDIX C REFERENCES

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