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Preliminary Tank Characterization Report for Single-Shell Tank 241-TX-106: Best-Basis Inventory

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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 single-shell tank 241-TX-106 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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PRELIMINARY TANK CHARACTERIZATION REPORT FOR SINGLE-SHELL TANK 241-TX-106: BEST-BASIS INVENTORY

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PRELIMINARY TANK CHARACTERIZATION REPORT FOR SINGLE-SHELL TANK 241-TX-106: BEST-BASIS INVENTORY

This document is a preliminary Tank Characterization Report (TCR). It only contains the current best-basis inventory (Appendix D) for single-shell tank 241-TX-106. No TCRs have been previously issued for this tank, and current core sample analyses are not available. The best-basis inventory, therefore, is based on an engineering assessment of waste type, process flowsheet data, early sample data, and/or other available information.

The *Standard Inventories of Chemicals and Radionuclides in Hanford Site Tank Wastes* (Kupfer et al. 1997) describes standard methodology used to derive the tank-by-tank best-basis inventories. This preliminary TCR will be updated using this same methodology when additional data on tank contents become available.

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-TX-106

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-TX-106

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 single-shell tank 241-TX-106 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.

D1.0 CHEMICAL INFORMATION SOURCES

There is no previous Tank Characterization Report (TCR) for tank 241-TX-106. Available waste (chemical) information for tank 241-TX-106 includes the following:

- The TCRs from tanks 241-U-102 (Hu et al. 1997) and 241-U-105 (Brown and Franklin 1996) discuss waste layers within those tanks that are believed to contain Supernatant Mixing Model 242-T Evaporator salt cake generated from 1965 until 1976 (SMMT2)
- Letter Report on 241-TX-116 (Horton 1977)
- The inventory estimate for this tank was generated from the Hanford Defined Waste (HDW) model (Agnew et al. 1996) developed by Los Alamos National Laboratory (LANL).

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

HDW model inventories are shown in Tables D2-1 and D2-2. The nonradioactive components are listed in Table D2-1 on a kilogram (kg) basis. The radioactive component estimates are listed in Table D2-2 on a curie (Ci) basis. The HDW model document (Agnew et al. 1996) provides tank content estimates derived from process records. No sample-based inventories are available for this tank. The chemical species are reported without charge designation as per the best-basis inventory convention.

Table D2-1. Hanford Defined Waste Model Predicted Inventory Estimates for Nonradioactive Components in Tank 241-TX-106.

Analyte[a]	HDW[b] inventory estimate (kg)	Analyte[a]	HDW[b] inventory estimate (kg)
Al	37,900	Ni	439
Bi	463	NO_2	85,000
Ca	1,570	NO_3	332,000
Cl	7,480	OH	106,000
Cr	3,040	Pb	227
F	2,390	P as PO_4	11,500
Fe	1,320	Si	2,030
Hg	2.44	S as SO_4	24,600
K	2,160	TIC as CO_3	28,500
Mn	156	TOC	11000
Na	259,000	U_{TOTAL}	4,690
NH_3	1,080	Zr	150
H_2O (wt%)	48.3	density (kg/L)	1.40

HDW = Hanford Defined Waste
[a] No sample-based inventory available for tank 241-TX-106
[b] Agnew et al. (1996).

Table D2-2. Hanford Defined Waste Model Predicted Inventory Estimates for Radioactive Components in Tank 241-TX-106.

Analyte[a]	HDW[b] inventory estimate (Ci)
^{137}Cs	235,000
^{90}Sr	123,000

HDW = Hanford Defined Waste
[a] No sample-based inventory available for tank 241-TX-106
[b] Agnew et al. (1996), decayed to January 1, 1994.

There are differing waste volume estimates for tank 241-TX-106. Hanlon (1996) lists the tank volume as 1,715 kL (453 kgal), whereas Agnew et al. (1996) reports the volume to be 1,291 kL (341 kgal). According to Anderson (1990), the 1,715 kL (453 kgal) value dates back to 1977 when the tank was listed as inactive. However, as noted by Swaney (1993) in a memo addressing discrepancies between the tank volume reported from manual level readings (1,313 kL [347 kgal]) and that reported in the waste status summary report for single-shell tanks (1,715 kL [453 kgal]), the waste status summary report was not updated in 1982 when tank 241-TX-106 was jet pumped. Swaney recommended that no adjustments be made to the waste status summary report until new photographs could be taken to resolve the discrepancy. Based on the information from Swaney, the volume listed by Agnew et al. (1,291 kL [341 kgal]) is used in this engineering assessment of best-basis tank inventory values.

Hanlon (1996) and Hill et al. (1995) list the waste type for this tank to be salt cake whereas Agnew et al. (1996) reports the tank to contain 18.9 kL (5 kgal) of sludge and 1,272 kL (336 kgal) of salt cake. Based on the HDW model, the 18.9 kL (5 kgal) of sludge only makes a significant contribution to inventory values for uranium (approximately 40 percent) and iron (approximately 67 percent).

D3.0 COMPONENT INVENTORY EVALUATION

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

D3.1 WASTE HISTORY TANK 241-TX-106

Tank 241-TX-106 began receiving metal waste (MW) in the second quarter of 1952. The tank was sluiced in 1955 and declared empty in early 1957 (Rodenhizer 1987). The tank received Reduction and Oxidation (REDOX) (R) waste beginning in 1957. According to Anderson (1990), the tank held approximately 132 kL (35 kgal) of R waste from 1957 until 1964. In 1964 the tank received 2,320 kL (613 kgal) of R waste from tank 241-TX-101. In the first quarter of 1971, 2,154 kL (569 kgal) of R waste were transferred to other tanks. From 1971 through 1976 the predominate waste type transferred into the tank was evaporator bottoms (EB) from 242-T Evaporator. The tank was labeled inactive in 1977. In June 1983, the tank was jet pumped, interim-stabilized with intrusion prevention completed in August 1984. The tank is classified as a sound, stabilized tank. For a more complete history of the waste in this tank see Brevick (1995).

D3.2 EXPECTED TYPE OF WASTE BASED ON THIS ASSESSMENT

Expected waste types in tank 241-TX-106, based on the various source documents, are as follows:

Agnew et al. (1996): SMMT2, R, and MW
Hanlon (1996): salt cake
Hill et al. (1995): R, EB, and MIX

MW	=	Metal waste
SMMT2	=	A mixture of supernatant coming from the 242-T Evaporator that is a blend of other waste types that upon cooling precipitated as a salt cake
R	=	High-level REDOX waste
EB	=	Evaporator bottoms
MIX	=	Mixture of several miscellaneous wastes

All references agree that the predominate waste type in tank 241-TX-106 is salt cake from the 242-T Evaporator. Hanlon (1996) and Hill et al. (1995) identify the waste to be all salt cake. Agnew et al. (1996) lists the tank as containing 18.9 kL (5 kgal) of sludge and 1,291 kL (341 kgal) of salt cake. The sludge is reported by Agnew et al. to include 4 kL (1 kgal) MW and 15.1 kL (4 kgal) of R waste. The 18.9 kL (5 kgal) of sludge represents approximately 1.5 percent of the waste volume and only effects the overall inventory estimate for iron and uranium (Agnew et al.). Since the HDW model uranium value is used in the best-basis estimate and the HDW model value for iron is smaller than the engineering assessment values (see Table D3-3), the 18.9 kL (5 kgal) of sludge can be ignored.

For the engineering assessment, the tank is assumed to contain only SMMT2 salt cake.

D3.3 ASSUMPTIONS USED

The following evaluation provides an engineering assessment of tank 241-TX-106 contents. For this evaluation, the following assumptions and observations are made:

- Component inventories can be calculated by multiplying the average concentration of an analyte from similar tanks by the current tank volume and density estimate of the waste.

- Only salt cake from the 242-T Evaporator contributed to solids formation.

- The radiolysis of nitrate to nitrite is not factored into this evaluation.

There is limited chemical characterization data for tanks in the TX Tank Farm and few currently sampled tanks are projected to contain salt cake similar to that expected to be found in tank 241-TX-106. The salt cake in this tank came from the 242-T Evaporator. Salt cake produced in that evaporator between 1965 and 1976 is identified as T2 salt cake. The HDW model refers to this salt cake as T2 SltCk on a global basis or as SMMT2 when calculated with the SMM for an individual tank. Thus, the HDW model identifies waste in tank 241-TX-106 to be SMMT2. The only chemical characterization data for SMMT2 waste appear to be from three tanks (241-U-102 [Hu et al. 1997], 241-U-105 [Brown and Franklin 1996], and 241-TX-116 [Horton 1977]). It is assumed that this material will adequately represent SMMT2 salt cake.

D3.4 BASIS FOR SALT CAKE CALCULATIONS

Table D3-1 shows the engineering approaches used for tank 241-TX-106.

Table D3-1. Engineering Approaches Used for 241-TX-106.

Type of waste	How calculated	Check method
Supernatant	No supernatant	None
Salt cake Volume = 1,291 kL (341 kgal) Density = 1.70 g/mL for SMMT2	Used sample-based concentrations from other tanks with SMMT2 salt cake waste. See Table D3-2.	None, no sample-based information is available for this tank.
Sludge volume = assumed to be zero in this assessment	None expected	None

SMMT2 = Supernatant Mixing Model 242-T Evaporator salt cake generated from 1965 until 1976

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. This approach is best suited for cases where extensive analytical data exist for multiple sampling events from the tank of interest and from a number of other tanks containing similar waste types. However, for tank 241-TX-106, no tank-specific analytical data are available and very little analytical data are available for the SMMT2 salt cake projected to be in that tank.

Agnew et al. (1996) identified the salt cake in tank 241-TX-106 as SMMT2. A review of existing TCRs identified two tanks (241-U-102 [Hu et al. 1997] and 241-U-105 [Brown and Franklin 1996]) that contained analytical characterization data that could be ascribed to layers of SMMT2 salt cake. In addition, limited characterization data were available from core samples taken from tank 241-TX-116 in the mid-1970's (Horton 1977).

Analytical data from segments 4 through 6 of tank 241-U-102 cores and segment 8 of tank 241-U-105 cores were selected as being representative of SMMT2 salt cake. For almost all selected analytes, there were 14 data points from tank 241-U-102 and 4 data points from tank 241-U-105.

The mean was calculated from selected data from each U Tank Farm tank after including a weighting factor to correct for material recovery during sampling. The weighted means for each tank are listed in columns 2 and 3 of Table D3-2. The U Tank Farm means were calculated from each tank mean after including a factor to correct for material recovery during sampling and are listed in column 4 of Table D3-2. The means from tank 241-TX-116 are also listed in column 5 of Table D3-2. The tank 241-TX-116 means were calculated after removing high silica values resulting from the addition of diatomaceous earth to the tank.

Table D3-2. Composition of T2 Salt Cakes (2 Sheets).

Analyte	241-U-102 T2 salt cake wt. avg.[a,b] (μg/g)	241-U-105 T2 salt cake wt. avg.[a,c] (μg/g)	U Tank Farm T2 salt cake wt. avg.[a] (μg/g)	241-TX-116 T2 salt cake mean[d,e] (μg/g)	T2 salt cake prediction[f] (μg/g)	HDW T2 SltCk[g] (μg/g)
Ag	11.6	19.7	13.1	NR	13.1	NR
Al	18,000	12,900	17,100	38,000	27,500	17,912
Bi	<70.5	<47.2	<66.2	NR	<66.2	220.81
Ca	308	253	298	NR	298	1,462
Cd	<5.94	12.8	<7.21	NR	<7.21	NR
Cl	5,100	5,790	5,230	NR	5,230	3,327.8
CO_3	53,500	36,500	50,300	58,000	54,200	17,093
Cr	2,310	2,100	2,270	353	1,310	4259.6
F	<125	1,110	<307	3,540	<1,920	930.79
Fe	391	2,270	737	23,900	12,300	620.58
Hg	NR	NR	NA	NR	NA	1.1338
K	1750	1,470	1,700	NR	1,700	1060.7
La	<35.2	29.7	<34.2	NR	<34.2	0.0001
Mn	123	743	237	NR	237	160.31
Na	262,600	220,500	254,800	166,700	210,800	192,764
Ni	91.5	89.5	91.1	NR	91.1	405.82

Table D3-2. Composition of T2 Salt Cakes (2 Sheets).

Analyte	241-U-102 T2 salt cake wt. avg.[a,b] (μg/g)	241-U-105 T2 salt cake wt. avg.[a,c] (μg/g)	U Tank Farm T2 salt cake wt. avg.[a] (μg/g)	241-TX-116 T2 salt cake mean[d,e] (μg/g)	T2 salt cake prediction[f] (μg/g)	HDW T2 SltCk[g] (μg/g)
NO_2	56,700	40,100	53,600	7,840	30,700	46,096
NO_3	284,700	395,700	305,200	308,700	306,946	268,197
OH	NR	NR	NA	NA	NA	68,079
Pb	<119	214	<136	NR	<136	109.91
P as PO_4	5,050	14,100	6,720	8,620	7,670	7,707.9
Si	152	232	167	NR	167	1,817.7
S as SO_4	17,900	8,350	16,200	16,400	16,300	13,823
Sr	<7.04	<4.72	<6.61	NR	<6.61	0
TOC	8,810	11,000	9,210	NR	9,210	5,191
U	<353	545	<388	NR	<388	2,174.3
Zr	10.8	45.4	17.2	NR	17.2	14.707
Radionuclide[h] (μCi/g)						
^{241}Am	<37.0	<0.95	<30.3	NR	<30.3	0.0285
^{60}Co	<0.155	0.086	<0.142	NR	<0.142	0.027
^{134}Cs	NR	NR	NA	9.64 E-04	9.64 E-04	0.0016
^{137}Cs	197	145	188	34.8	111	163.24
^{154}Eu	<0.475	0.61	<0.499	NR	<0.499	0.431
^{155}Eu	<1.10	0.82	<1.05	NR	<1.05	0.1849
Density (g/mL)	1.66	1.73	1.70[i]	NR	1.70	1.634

HDW = Hanford Defined Waste
NA = Not applicable
NR = Not reported
[a] Weighted average based on the weight of each partial core segment analyzed
[b] Hu et al. (1997)
[c] Brown and Franklin (1996)
[d] Silica-free basis due to the addition of diatomaceous earth to this tank
[e] Horton (1977)
[f] Average of U Tank Farm and tank 241-TX-116 data
[g] Agnew et al. (1997)
[h] Decayed to January 1, 1994
[i] A simple average is used for the density.

When both a U Tank Farm weighted mean and a tank 241-TX-116 mean were available, the predicted composition for the SMMT2 salt cake was calculated as the average of the two. However, when only one value was available it was used as the predicted SMMT2 composition. The predicted SMMT2 composition is listed in column 6 of Table D3-2. The major impact of including characterization data from tank 241-TX-116 in the predicted SMMT2 salt cake composition is to significantly increase values for the Al and Fe.

In comparing the engineering estimates based on SMMT2 salt cake (Table D3-2, column 6) with the HDW model T2SltCk estimates (Table D3-2, column 7), significant differences are noted for Fe. Less significant differences are noted for Al, Ca, carbonate, K, Mn, Na, and nitrate. The Fe values used in the developing the SMMT2 formulation exhibited large variations. There is close to an order of magnitude difference in Fe between the two U Tank Farm tanks. The Fe value for tank 241-TX-116 is an order of magnitude higher than the larger U Tank Farm tank value. The HDW model predicts a Fe value comparable with the lower U Tank Farm tank value. Since the analytical values span almost two orders of magnitude, there will be considerable uncertainty in the projected Fe value for tank 241-TX-106. The value developed through this evaluation appears unreasonably high. Since the value developed for Fe appears to be unreasonably high when tank 241-TX-116 data are included, this engineering assessment utilizes the value developed from U Tank Farm tank data.

The three analytically determined carbonate values used to develop the SMMT2 formulation are reasonably consistent. However, these values are significantly higher than the value determined by the HDW model. It is likely that the highly basic tank wastes have absorbed atmospheric carbon dioxide. Absorption of carbon dioxide would convert hydroxide to carbonate.

Table D3-3 lists the inventory estimates calculated using the predicted SMMT2 composition and the U Tank Farm composition. The HDW model estimates are also included. The bulk density value used in the engineering assessment estimates (1.70 g/mL) is approximately 20 percent higher than the value used in the HDW model estimates (1.40 g/mL). This leads to proportionally higher estimates in the engineering assessment.

Table D3-3. Tank 241-TX-106 Inventory Estimates. (Volume = 1,291 kL) (2 Sheets)

Analyte	Inventory estimates using T2SltCk (kg)	Inventory estimates using U Tank Farm (kg)	HDW model values[a] (kg)
Al	60,500	37,500	37,900
Bi	<145	<145	463
Ca	653	653	1,570
Cd	16	16	NR
Cl	11,500	11,500	7,480
CO_3	119,000	110,000	28,500
Cr	2,880	4,990	3,040
F	<4,220	<673	2,390
Fe	27,000	1,620	1,320
K	3,730	3,730	2,160
La	<75	<75	2.35 E-04
Mn	521	521	156
Na	463,000	559,000	259,000
Ni	200	200	439
NO_2	67,500	118,000	85,000
NO_3	674,000	670,000	332,000
OH	72,200	NR	106,000
Pb	<300	<300	227
P as PO_4	16,800	14,800	11,500
Si	367	367	2030
S as SO_4	35,800	35,500	24,600
Sr	<15	<15	4.95 E-05
TOC	20,200	20,200	11,000
U	<852	<852	4,690
Zr	38	38	150

Table D3-3. Tank 241-TX-106 Inventory Estimates. (Volume = 1,291 kL) (2 Sheets)

Analyte	Inventory estimates using T2SltCk (kg)	Inventory estimates using U Tank Farm (kg)	HDW model values[a] (kg)
Radionuclides[b] (Ci)			
^{134}Cs	2.11	NR	NR
^{137}Cs	244,000	412,000	235,000
^{90}Sr	NR	NR	123,000

HDW = Hanford Defined Waste
NR = Not reported
[a] Agnew et al. (1996)
[b] Radionuclides decayed to January 1, 1994.

D4.0 DEFINE THE BEST-BASIS AND ESTABLISH COMPONENT INVENTORIES

Key waste management 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. Information about chemical, radiological, and/or physical properties is used to perform safety analyses, engineering evaluations, and risk assessment associated with these activities.

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

An evaluation of available chemical information for tank 241-TX-106 was performed. Available data included the following:

- An inventory estimate generated by the HDW model (Agnew et al. 1996)
- Evaluation of SMMT2 data from two U Tank Farm tanks (241-U-102 [Hu et al. 1997] and 241-U-105 [Brown and Franklin 1996]) and older characterization data from tank 241-TX-116 (Horton 1977).

Based on this evaluation, an engineering assessment-based inventory was developed for tank 241-TX-106 (for which sample information was not available). Where available, the engineering assessment-based inventory was chosen as the best-basis inventory for the following reasons:

- No analytical data are available for tank 241-TX-106
- No methodology is available to fully predict SMMT2 salt cake from process flowsheets or historical records.

For those analytes where no values could be calculated from the engineering assessment-based inventory the HDW model values were used.

The SMMT2 salt cake formulation was extrapolated from limited characterization data available from two U Tank Farm tanks containing similar wastes (241-U-102 [Hu et al. 1997] and 241-U-105 [Brown and Franklin 1996]) and from tank 241-TX-116 (Horton 1977). However, since no post-1989 analytical data were available from tank 241-TX-106 or any other tank with similar wastes within the TX Tank Farm, the reliability of these estimates (in either this engineering assessment or the HDW model inventory estimate) are suspect. Substantial uncertainty exists with these estimates.

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, while other key radionuclides such as ^{60}Co, ^{99}Tc, ^{129}I, ^{154}Eu, ^{155}Eu, and ^{241}Am, etc., were 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.

Best-basis tables for chemicals and only four radionuclides (^{90}Sr, ^{137}Cs, Pu, and U) were being generated in 1996, using values derived from an earlier version (Rev. 3) of the HDW model. When values for all 46 radionuclides became available in Rev 4 of the HDW model, they were merged with draft best-basis chemical inventory documents. Defined scope of work in FY 1997 did not permit Rev. 3 chemical values to be updated to Rev. 4 chemical values.

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 analyses (e.g., sodium or nitrate) inventories be adjusted to achieve the charge balance. No adjustments were required in this best-basis estimate. This charge balance approach is consistent with that used by Agnew et al. (1997).

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

Table D4-1. Best-Basis Inventory Estimates for Nonradioactive Components in Tank 241-TX-106 (Effective January 31, 1997).

Analyte	Total inventory (kg)	Basis (S, M, E, or C)[1]	Comment
Al	60,500	E	
Bi	463	M	
Ca	653	E	
Cl	11,500	E	
TIC as CO_3	119,000	E	
Cr	2,880	E	
F	<4,220	E	
Fe	1,620	E	U Tank Farm estimate used for Fe
Hg	2.44	M	
K	3,730	E	
La	<75	E	
Mn	521	E	
Na	463,000	E	
Ni	200	E	
NO_2	67,500	E	
NO_3	674,000	E	
OH_{TOTAL}	148,000	C	
Pb	<300	E	
PO_4	16,800	E	
Si	367	E	
SO_4	35,800	E	
Sr	<15	E	
TOC	20,200	E	
U_{TOTAL}	4,690	M	
Zr	150	M	

[1]S = Sample-based
M = Hanford Defined Waste model-based, Agnew et al. (1996)
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.

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Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-TX-106, Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (kg)	Basis (S, M, or E)[1]	Comment
^{3}H	196	M	
^{14}C	27.7	M	
^{59}Ni	2.32	M	
^{60}Co	3.7	M	
^{63}Ni	226	M	
^{79}Se	2.94	M	
^{90}Sr	112,000	M	
^{90}Y	112,000	M	
^{93}Zr	14.4	M	
^{93m}Nb	10.5	M	
^{99}Tc	197	M	
^{106}Ru	0.00571	M	
^{113m}Cd	74.6	M	
^{125}Sb	132	M	
^{126}Sn	4.44	M	
^{129}I	0.380	M	
^{134}Cs	2.75	M	
^{137}Cs	244,000	E	
^{137m}Ba	231,000	E	Based on ^{137}Cs
^{151}Sm	10,300	M	
^{152}Eu	3.59	M	
^{154}Eu	508	M	
^{155}Eu	212	M	
^{226}Ra	1.55 E-04	M	
^{227}Ac	9.72 E-04	M	
^{228}Ra	0.219	M	
^{229}Th	0.00508	M	
^{231}Pa	0.00400	M	

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-TX-106, Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (kg)	Basis (S, M, or E)[1]	Comment
^{232}Th	0.0135	M	
^{232}U	1.10	M	
^{233}U	4.20	M	
^{234}U	1.42	M	
^{235}U	0.0596	M	
^{236}U	0.0326	M	
^{237}Np	0.711	M	
^{238}Pu	1.31	M	
^{238}U	1.62	M	
^{239}Pu	50.2	M	
^{240}Pu	8.22	M	
^{241}Am	54.0	M	
^{241}Pu	86.0	M	
^{242}Cm	0.137	M	
^{242}Pu	4.66 E-04	M	
^{243}Am	0.00185	M	
^{243}Cm	0.0125	M	
^{244}Cm	0.121	M	

[1]S = Sample-based
M = Hanford Defined Waste model-based, Agnew et al. (1997)
E = Engineering assessment-based.

D5.0 APPENDIX D REFERENCES

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