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Preliminary Tank Characterization Report for Single-Shell Tank 241-TX-102: 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-102 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-102: BEST-BASIS INVENTORY

July 1997

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PRELIMINARY TANK CHARACTERIZATION REPORT FOR SINGLE-SHELL TANK 241-TX-102: 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-102. 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.

REFERENCE

Kupfer, M. J., A. L. Boldt, B. A. Higley, K. M. Hodgson, L. W. Shelton, B. C. Simpson, and R. A. Watrous (LMHC), S. L. Lambert, and D. E. Place (SESC), R. M. Orme (NHC), G. L. Borsheim (Borsheim Associates), N. G. Colton (PNNL), M. D. LeClair (SAIC), R. T. Winward (Meier Associates), and W. W. Schulz (W^2S Corporation), 1997, *Standard Inventories of Chemicals and Radionuclides in Hanford Site Tank Wastes*, HNF-SD-WM-TI-740, Rev. 0, Lockheed Martin Hanford Corporation, Richland, Washington.

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-TX-102

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APPENDIX D

EVALUATION TO ESTABLISH BEST-BASIS INVENTORY FOR SINGLE-SHELL TANK 241-TX-102

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-102 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-102. Available waste (chemical) information that may apply to tank 241-TX-102 includes the following:

- The TCRs from tank 241-U-102 (Hu et al. 1997) and tank 241-U-105 (Brown and Franklin 1996) provide relevant information and 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, generated from the Hanford Defined Waste (HDW) model (Agnew et al. 1996).

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

The 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) provide tank content estimates, derived from process records. No sample-based inventories are available for this tank. The chemical species are reported with charge designation per the best-basis inventory convention.

The waste volume used for the best-basis calculations is 821 kL (217 kgal) of salt cake. Hanlon (1996) lists the waste type for this tank to be all salt cake, whereas Agnew et al. (1996) reports the tank contents to be 814 kL (215 kgal) of salt cake and 7.57 kL (2 kgal) of metal waste (MW). The potential 7.57 kL (2 kgal) of MW would contribute negligibly to the overall tank inventory estimates except for uranium and iron.

Table D2-1. Hanford Defined Waste-Based Inventory Estimates for Nonradioactive Components in Tank 241-TX-102.

Analyte[a]	HDW[b] inventory estimate (kg)	Analyte[a]	HDW[b] inventory estimate (kg)
Al	22,500	Ni	247
Bi	298	NO_2	53,200
Ca	941	NO_3	208,000
Cl	4,760	OH	64,100
Cr	1,480	oxalate	8.21 E-5
F	1,540	Pb	145
Fe	331	P as PO_4	7,560
Hg	1.56	Si	1,320
K	1,380	S as SO_4	16,200
Mn	102	TIC as CO_3	19,000
Na	166,000	TOC	10,000
NH_4	668	U_{TOTAL}	5,400
H_2O (wt%)	48.1	Zr	96.3
density (kg/L)	1.4		

HDW = Hanford Defined Waste
[a] No sample-based data
[b] Agnew et al. (1996).

Table D2-2. Hanford Defined Waste-Based Inventory Estimates for Radioactive Components in Tank 241-TX-102.

Analyte[a]	HDW[b] inventory estimate (Ci)
^{137}Cs	152,000
^{90}Sr	66,000

HDW = Hanford Defined Waste
[a] No sample-based data
[b] Agnew et al. (1996), decayed to January 1, 1994.

D3.0 COMPONENT INVENTORY EVALUATION

The following evaluation was conducted to assess various estimates of tank 241-TX-102 content.

D3.1 WASTE HISTORY TANK 241-TX-102

Tank 241-TX-102, the second tank in a 4-tank cascade, began filling with MW in the first quarter of 1950 and was full by July 1950. The tank contained MW until it was sluiced and declared empty in the first quarter of 1957 (Rodenhizer 1987). The tank received Reduction and Oxidation (REDOX) waste from 1957 until 1970. In 1970, the REDOX wastes were transferred to other tanks. From 1971, tank 241-TX-102 received primarily evaporator bottoms from the 242-T Evaporator. The tank was removed from service in 1975. A salt well pump was installed in March 1977. The tank was interim stabilized in April 1983, 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 refer to the supporting document (Brevick 1995).

D3.2 EXPECTED TYPE OF WASTE BASED ON THIS ASSESSMENT

Expected waste types in tank 241-TX-102 based on the various source documents are as follows:

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

MW = Metal waste

SMMT2	=	A mixture of concentrated supernatant coming from the 242-T Evaporator that are 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 operational wastes

Agnew et al. (1995), Hanlon (1996), and Hill et al. (1995) all agree that the tank 241-TX-102 contains 821 kL (217 kgal) of wastes and that it is essentially all salt cake. Hanlon and Hill et al. identify the waste as all salt cake. Agnew et al. lists the tank as containing 7.57 kL (2 kgal) of MW and 814 kL (215 kgal) of salt cake. Rodenhizer (1987) states that the tank was sluiced and declared empty of MW in the first quarter of 1957. The tank received R waste until 1970. At that point the R waste was transferred from tank 241-TX-102 to other tanks. Thus, the assignment of a MW heel in this tank seems questionable. Since 7.57 kL (2 kgal) would be less than 1 percent of the total waste and its presence is questionable, its potential contribution was ignored in this engineering assessment. The tank is assumed to contain all salt cake as Hanlon indicates.

D3.3 ASSUMPTIONS USED

The following evaluation provides an engineering assessment of tank 241-TX-102 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 in tank 241-TX-102.

- 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-102. The salt cake in this tank came from the 242-T Evaporator. Salt cake produced in the 241-T 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 Supernatant Mixing Model (SMM) for an individual tank. Thus, the HDW model identifies waste in tank 241-TX-102 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], and 241-TX-116 [Horton 1977]). It is assumed that this material will represent SMMT2 salt cake.

D3.4 BASIS FOR SALT CAKE CALCULATIONS

Table D3-1 shows the engineering approaches used for tank 241-TX-102.

Table D3-1. Engineering Approaches Used for Tank 241-TX-102.

Type of waste	How calculated	Check method
Supernatant	No supernatant	None
Salt cake Volume = 821 kL (217 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 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-102, no tank-specific analytical data 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-102 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 four 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 Table D3-2, columns 2 and 3. 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 Table D3-2, column 4. The means from tank 241-TX-116 are also listed in Table D3-2, column 5. The tank 241-TX-116 means were calculated after removing high silica values resulting from the addition of diatomaceous earth to the tank.

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 Table D3-2, column 6. The major impact of including characterization data from tank 241-TX-116 in the predicted SMMT2 salt cake composition is the significant increase in values for the Al and Fe.

Table D3-2. Composition of T2 Salt Cakes (3 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

Table D3-2. Composition of T2 Salt Cakes (3 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)
Ni	91.5	89.5	91.1	NR	91.1	405.82
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

Table D3-2. Composition of T2 Salt Cakes (3 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)

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.

In comparing the engineering estimates based on SMMT2 salt cake (Table D3-2, column 6) with the HDW model T2 SltCk estimates (Table D3-2, column 7), there are significant differences 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 an 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-102. 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 estimate.

Table D3-3. Tank 241-TX-102 Inventory Estimates.

Analyte	Inventory estimates using T2Sltck (kg)	Inventory estimates using U Tank Farm (kg)	HDW model values for 241-TX-102[a] (kg)
Al	38,400	22,400	22,500
Bi	<92.3	<92.3	298
Ca	416	416	941
Cl	7,300	7,300	4,760
CO3	75,600	70,300	19,000
Cr	1,830	3,200	1,480
F	<2,680	<428	1,540
Fe	17,200	1,030	331
K	2,370	2,370	1,380
La	<47.7	<47.7	1.51 E-04
Mn	331	331	102
Na	294,000	356,000	166,000
Ni	127	127	247
NO_2	42,900	74,900	53,200
NO_3	428,000	426,000	208,000
OH	45,900	NR	64,100
P as PO_4	10,700	9,390	7,560
Si	233	233	1,320
S as SO_4	22,700	22,600	16,200
TOC	12,900	12,900	10,000
U	<542	<542	5,400
Zr	24	24	96.3
Radionuclides[b] (Ci)			
^{137}Cs	155,000	262,000	152,000
^{90}Sr	NR	NR	66,000

HDW = Hanford Defined Waste
NR = Not reported

[a]Agnew et al. (1996)
[b]Decayed to January 1, 1994.

D4.0 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 assessment 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 evaluation of available chemical information for tank 241-TX-102 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 Farms (241-U-102 [Hu et al. 1997] and 241-U-105 [Brown and Franklin 1996]) tanks 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-102 (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-102

- 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) and from tank 241-TX-116. However, since no post-1989 analytical data were available from tank 241-TX-102 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, Agnew et al. (1996). When values for all 46 radionuclides became available in Rev. 4 of the HDW model (Agnew et al. [1997]), they were merged with draft best-basis chemical inventory documents. Defined scope of work in FY 1997 did not permit HDW Rev. 3 chemical values to be updated to HDW 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 analyte (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-102 (Effective January 31, 1997).

Analyte	Total inventory (kg)	Basis (S, M, E,or C)[1]	Comment
Al	38,400	E	
Bi	298	M	
Ca	416	E	
Cl	7,300	E	
TIC as CO_3	75,600	E	
Cr	1,830	E	
F	<2,680	E	
Fe	1,030	E	U Farm estimate used for Fe
Hg	1.56	M	
K	2,370	E	
La	1.5 E-04	M	
Mn	331	E	
Na	294,000	E	
Ni	127	E	
NO_2	42,900	E	
NO_3	428,000	E	
OH_{TOTAL}	95,100	C	
Pb	145	M	
PO_4	10,700	E	
Si	233	E	
SO_4	22,700	E	
Sr	3.18 E-04	M	
TOC	12,900	E	
U_{TOTAL}	5,400	M	
Zr	96.3	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.

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-TX-102 Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{3}H	128	M	
^{14}C	17.9	M	
^{59}Ni	1.32	M	
^{60}Co	20.4	M	
^{63}Ni	129	M	
^{79}Se	1.96	M	
^{90}Sr	69,500	M	
^{90}Y	69,500	M	
^{93}Zr	9.64	M	
^{93m}Nb	6.96	M	
^{99}Tc	128	M	
^{106}Ru	0.00388	M	
^{113m}Cd	50.7	M	
^{125}Sb	89.1	M	
^{126}Sn	2.95	M	
^{129}I	0.246	M	
^{134}Cs	2.49	M	
^{137}Cs	155,000	E	
^{137m}Ba	147,000	E	Referenced to ^{137}Cs.
^{151}Sm	6,890	M	
^{152}Eu	2.72	M	
^{154}Eu	352	M	
^{155}Eu	163	M	
^{226}Ra	9.04E-05	M	
^{227}Ac	5.83E-04	M	
^{228}Ra	0.138	M	
^{229}Th	0.00319	M	
^{231}Pa	0.00262	M	
^{232}Th	0.00845	M	
^{232}U	0.689	M	

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-TX-102 Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E)[1]	Comment
^{233}U	2.64	M	
^{234}U	1.61	M	
^{235}U	0.0695	M	
^{236}U	0.0252	M	
^{237}Np	0.456	M	
^{238}Pu	0.851	M	
^{238}U	1.74	M	
^{239}Pu	29.7	M	
^{240}Pu	5.00	M	
^{241}Am	35.1	M	
^{241}Pu	56.9	M	
^{242}Cm	0.104	M	
^{242}Pu	3.13E-04	M	
^{243}Am	0.00123	M	
^{243}Cm	9.58E-03	M	
^{244}Cm	0.0818	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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