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		Design Authority				3		Central Files		A3-88	
		Design Agent				3		DOE Reading Room		H2-53	
1	1	Cog. Eng. M. J. Kupfer	<i>[Signature]</i>	8-1-97		3		R. E. Stout		H5-49	
1		Cog. Mgr. K. M. Hallgren	<i>[Signature]</i>	8-25-97		3		TCSRC		R1-10	
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Tank Characterization Report for Single-Shell Tank 241-S-105

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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-S-105 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-S-105:
BEST-BASIS INVENTORY**

July 1997

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**PRELIMINARY TANK CHARACTERIZATION REPORT
FOR SINGLE-SHELL TANK 241-S-105:
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-S-105. 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 (W²S 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-S-105

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APPENDIX D**EVALUATION TO ESTABLISH BEST-BASIS INVENTORY
FOR SINGLE-SHELL TANK 241-S-105**

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-S-105 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 single-shell tank 241-S-105. Available waste (chemical) information that may apply to tank 241-S-105 includes the following:

- Analytical data from tanks in the S and U Tank Farms with similar Supernatant Mixing Model (SMM) salt cake waste type and Reduction and Oxidation (REDOX) process first cycle (R) sludge waste type.
- The Hanford Defined Waste (HDW) model document (Agnew et al. 1996) provides tank content estimates, derived from the HDW model, in terms of component concentrations and inventories.

D2.0 COMPARISON OF COMPONENT INVENTORY VALUES

HDW model inventories, generated by HDW model, are shown in Tables D2-1 and D2-2. (The chemical species are reported without charge designation per the best-basis inventory convention.) No samples have been taken from tank 241-S-105 that can be used to estimate tank inventory for comparison with the HDW model estimate. The tank volume used to generate the HDW inventory is 1,541 kL (407 kgal) waste that is partitioned into 8 kL (2 kgal) sludge, 1,533 kL (405 kgal) salt cake (Agnew et al. 1996), which differs from Hanlon (1996), which lists 1,726 kL (456 kgal) of waste that consists of 8 kL (2 kgal) sludge and 1,718 kL (454 kgal) of salt cake. The HDW model density for the sludge waste is estimated to be 1.48 g/ml and a salt cake density of 1.46 g/mL.

Table D2-1. Hanford Defined Waste-Based Inventory Estimates for Nonradioactive Components in Tank 241-S-105. (2 sheets)

Analyte	HDW ^a inventory estimate (kg)	Analyte	HDW ^a inventory estimate (kg)
Al	62,200	NO ₃	415,000
Bi	225	OH	166,000
Ca	1,780	oxalate	1.65 E-04
Cl	8,600	Pb	210
Cr	5,460	P as PO ₄	7,550
F	1,140	Si	2,620
Fe	955	S as SO ₄	22,700
Hg	1.75	Sr	6.41 E-05
K	2,420	TIC as CO ₃	21,000
La	3.05 E-04	TOC	6,460
Mn	198	U _{TOTAL}	4,010
Na	336,000	Zr	68.8
Ni	511	H ₂ O (wt%)	44.7
NO ₂	170,000	density (g/mL)	1.46

HDW = Hanford Defined Waste

^a Agnew et al. (1996).

D3.0 COMPONENT INVENTORY EVALUATION

D3.1 WASTE HISTORY TANK 241-S-105

Tank 241-S-105 was filled with first cycle (R) waste from the REDOX facility from the second quarter of 1953 until the third quarter of 1973. The last transfer into tank 241-S-105 was in 1974 from tank 241-S-102. Between 1991 and 1992 the tank had transfers out to tanks 241-AN-101 and 241-AW-102. The tank was removed from service in 1976, labeled inactive in 1978, primary stabilized in June 1979, partially isolated in December 1982, and jet pumped/interim stabilized in September 1988. Intrusion prevention was completed in September 1990. The tank was salt-filled and a salt well pump was installed in 1974. A jet pump was installed and initiated in 1978. Between 1978 and 1980, 432 kL (114 kgal) of liquid was jet pumped from the tank.

D3.2 INTEGRITY OF TANK 241-S-105

Tank 241-S-105 is categorized as sound and is interim stabilized with intrusion prevention completed. The Tank 241-S-105 surface level is monitored with a Food Instrument Corporation gauge through riser 3. Current surface level readings can be located on PC-SACS taken from the recently installed ENRAF gauge (where ENRAF is not an acronym, but the capitalized name of the manufacturer). As of January 2, 1997, the surface level reading indicated a waste height of 395.2 cm (155.58 in.) that corresponds to a volume of 1,697 kL (448 kgal) of total waste.

The tank 241-S-105 liquid observation well is located in riser 14. The tank is monitored weekly with a neutron probe and on request with a gamma probe. The monitoring limits are a 9.1-cm (0.3-ft) decrease and a 12.2-cm (0.4-ft) increase.

D3.3 CONTRIBUTING WASTE TYPES

The HDW model (Agnew et al. 1996) predicts that the tank contains a total of 1,541 kL (407 kgal) of waste that consists of REDOX process high-level waste (7.6 kL [2 kgal] R1) and 1,533 kL (405 kgal) salt cake (SMMS1) predicted from the Supernatant Mixing Model.

The Sort on Radioactive Waste Type (SORWT) model (Hill 1995) lists R (high-level REDOX process waste) and Evaporator Bottoms (EB) as the primary and secondary waste types, respectively. Evaporator bottoms waste is the SORWT definition for salt cake that is equivalent to the SMM waste type.

Hanlon (1996) lists 1,726 kL (456 kgal) of waste which consists of 7.6 kL (2 kgal) of sludge and 1,718 kL (454 kgal) of salt cake. No description of where the sludge and salt cake came from are given.

D3.4 INVENTORY EVALUATION

The following evaluation provides an engineering assessment of tank 241-S-105 contents. For this evaluation, the following assumptions and observations are made:

- Tank volume listed in Hanlon (1996) (1,726 kL). Hanlon volumes are assumed because recent ENRAF surface level measurements agree more closely with the total waste volumes from Hanlon (1996).
- Only the SMMS1 and R waste streams contributed to solids formation.

D3.5 BASIS FOR CALCULATIONS USED IN THIS ENGINEERING EVALUATION

Table D3-1 shows the engineering evaluation approaches used on tank 241-S-105.

Table D3-1. Engineering Evaluation Approaches Used On Tank 241-S-105.

Type of waste	How calculated	Check method
Supernatant	Assumed no Supernatant.	None.
Salt cake Volume ^a = 1,718 kL (453 kgal) Density = 1.63 g/mL	Used sample-based concentrations from tanks with SMMS1 salt cake waste: 241-S-101, 241-S-102, 241-U-106, and 241-U-109.	None, no sample-based information is available for this tank.
Sludge Volume ^a = 7.6 kL (2.08 kgal) Density = 1.77 g/mL	Used the average analyte concentration from tank 241-S-101, 241-S-104, and 241-S-107. All have sample data and R1 waste. Only the segments that are believed to have R1 waste were used to calculate the concentration from each tank.	None, no sample-based information is available for this tank.

SMMS1 = Supernatant Mixing Model 242-S Evaporator salt cake generated
R1 = REDOX high-level waste generated between 1952 to 1957

^a Hanlon (1996).

D3.5.1 Basis for Salt Cake Calculations Used in this Engineering Evaluation.

For this evaluation the methodology developed for SMMS1 salt cake was used. This is based on comparing concentrations from S and U Tank Farm sample data shown in Table D3-2. Tanks 241-S-101, 241-S-102, 241-U-106, and 241-U-109 were used to produce the average salt cake analyte concentrations for SMMS1 salt cake used in this comparison. To calculate the average SMMS1 concentration the waste volumes and predicted location from Agnew et al. (1996) for SMMS1 layers were determined. The TCR sample data was reviewed and using the segments that were located within the predicted location from Agnew et al., an average concentration was calculated. The concentrations from each tank and the segments used in the calculation are shown in Table D3-3. For comparison the SMM salt cake composition predicted by the HDW model for tank 241-S-105 is also shown.

Table D3-2. SMMS1 Salt Cake Concentrations. (2 Sheets)

Analyte	241-S-101 segments 2L-4U ^a µg/g	241-S-102 segments 7L-10U ^b µg/g	241-U-106 segments 2U-4L ^c µg/g	241-U-109 segments 5U-8L ^d µg/g	Average concentration ^e µg/g	HDW model SMM concentration for tank 241-S-105 ^f µg/g
Al	18,000	15,085	13,620	13,625	15,100	27,400
Ag	12	17	16	NR	15	NR
B	110	75	80	NR	88	NR
Bi	71	76	<DL	<DL	73.5	100
Ca	273	237	336	<DL	282	766
Cl	4,500	4,099	2,926	NR	3,842	3,840
Cr	10,000	4,359	3,170	4,233	5,440	2,290
F	500	13,596	4,669	NR	6,255	508
Fe	508	1,298	3,096	<DL	1,630	235
K	1,109	898	1,309	NR	1,110	1,080
La	<DL	37	43	NR	40	1.36 E-04
Mn	266	597	1,189	<DL	684	88.4
Na	150,000	189,500	170,500	218,300	182,000	150,000
Ni	114	49	304	<DL	155	218
NO ₂	91,000	40,100	56,000	42,900	57,500	75,800
NO ₃	110,000	99,200	147,200	297,000	163,000	185,000
Pb	91	137	348	NR	192	93.8
PO ₄	9,500	114,500	5,888	5,970	34,000	3,370
P	2,290	33,900	1,949	<DL	12,700	NR

Table D3-2. SMMS1 Salt Cake Concentrations. (2 Sheets)

Analyte	241-S-101 segments 2L-4U ^a μg/g	241-S-102 segments 7L-10U ^b μg/g	241-U-106 segments 2U-4L ^c μg/g	241-U-109 segments 5U-8L ^d μg/g	Average concentration ^e μg/g	HDW model SMM concentration for tank 241-S-105 ^f μg/g
S	5,940	2,683	3,878	NR	4,170	NR
Si	5,269	517	176	<DL	1,990	1,170
SO ₄	20,700	12,500	10,774	11,100	13,800	10,100
Sr	7	<DL	<DL	NR	7	2.86 E-05
TOC	1,900	5,340	24,626	3,920	8,950	2,880
U	560	1,403	781	<DL	914	1,780
Zn	30	32	54	<DL	39	NR
Zr	14	39	88	NR	47	30.7
Oxalate	15,400	15,700	9,880	NR	13,700	1.65 E-04
Density g/mL	1.58	1.69	1.57	1.67	1.63	1.46
Radionuclides ^g (μCi/g)						
⁹⁰ Sr	252	23	77	9	90	62
¹³⁷ Cs	175	121	175	142	153	162

<DL = Less then the Detectable Limit.

HDW = Hanford Defined Waste

NR = Not reported

SMMS1 = Supernatant Mixing Model 242-S Evaporator salt cake generated from 1973 until 1976

^a Kruger et al. (1996)^b Eggers (1996)^c Brown et al. (1997)^d Baldwin and Stephens (1996)^e Average of tank 241-S-101, 241-S-102, 241-U-106, and 241-U-109 concentrations^f Agnew et al. (1996)^g Radionuclides are reported as of the date of sample analysis.**D3.5.2 Basis for Sludge Calculations Used in This Engineering Evaluation**

Sample data from tanks 241-S-101, 241-S-104, and 241-S-107 (Kruger et al. 1996, DiCenso et al. 1994, and Simpson et al. 1996, respectively) were used to produce average

analyte concentrations for R1 sludge waste. To calculate the average concentration, the volumes and predicted location of the sludge were taken from Agnew et al. (1996) for the tanks R1 waste. The TCR sample data were then reviewed and, only the segments that were located within the predicted sludge location from Agnew et al. were used in deriving an average concentration. The average concentration from each tank and the segments used in the calculation is shown below in Table D3-3. For comparison, the average sludge layer composition predicted by the HDW model for tank 241-S-105 is also shown.

Table D3-3. R1 Sludge Concentrations for Tanks with Tank Characterization Reports.
(2 Sheets)

Analyte	241-S-101 segments 7U-8L ^a μg/g	241-S-104 total concentration ^b μg/g	241-S-107 segments 7U-8L ^c μg/g	Average concentration ^d μg/g	HDW sludge layer concentration for tank 241-S-105 ^e μg/g
Al	127,000	117,000	56,400	100,000	75,400
Ag	9.71	<DL	<DL	9.7	NR
B	63.1	26.6	49	46.2	NR
Bi	<38.8	<45.7	NR	<42.2	0
Ca	322	247	234	268	5,800
Cl	2,050	3,200	1,860	2,370	934
Cr	2,230	2,350	1,180	1,920	30,600
F	<65.7	145	150	<120	0
Fe	1,960	1,720	1,160	1,613	38,100
K	539	300	457	432	224
La	<19.5	<2.07	NR	<10.8	0
Mn	2,750	1,150	83	1,330	0
Na	112,000	121,000	60,400	97,800	36,800
Ni	90.7	56	206	118	2,010
NO ₂	31,100	25,900	34,300	30,433	60,600
NO ₃	119,000	191,000	57,600	122,500	1,470
Pb	37	29.6	33	33.2	0
PO ₄	1,360	<2,190	1,630	<1,730	0
P	278	93.2	391	254	NR
S	343	472	293	369	NR
Si	1,360	1,330	1,060	1,250	225
SO ₄	897	2,270	1,300	1,489	992

Table D3-3. R1 Sludge Concentrations for Tanks with Tank Characterization Reports.
(2 Sheets)

Analyte	241-S-101 segments 7U-8L ^a μg/g	241-S-104 total concentration ^b μg/g	241-S-107 segments 7U-8L ^c μg/g	Average concentration ^d μg/g	HDW sludge layer concentration for tank 241-S-105 ^e μg/g
Sr	456	424	378	420	0
TOC	NR	1,730	NR	1,730	0
U	7,684	6,690	8,685	7,690	3,460
Zn	25.1	20.1	24	23.1	NR
Zr	36	33.6	131	66.9	0
density	1.77	1.64	1.90	1.77	1.48
Radionuclides ^f (μCi/g)					
⁹⁰ Sr	NR	301	276	288	529
¹³⁷ Cs	98	60.5	74	77.6	31.9

<DL = Less than Detectible Limit

HDW = Hanford Defined Waste

NR = Not reported

^a Kruger et al. (1996)^b DiCenso et al. (1994)^c Simpson et al. (1996)^d Average of tanks 241-S-101, 241-S-104, and 241-S-107 concentrations^e Agnew et al. (1996)^f Radionuclides decayed to January 1, 1994.

D3.6 ESTIMATED COMPONENT INVENTORIES

The Chemical inventory of tank 241-S-105 is estimated from the assumed salt cake and sludge volumes (Table D3-1). The resulting inventories are provided in Table D3-4. The inventories estimated by the HDW model are included for comparison.

Table D3-4. Comparison of Selected Component Inventory Estimates for Tank 241-S-105.

Component	Inventory estimates for R1 sludge layer (kg)	Inventory estimates for SMMS1 salt cake layer (kg)	Engineering assessment-based tank inventory estimates (kg)	HDW model tank inventory estimates ^a (kg)
Bi	<0.57	94	95	225
K	5.8	3,100	3,100	2,420
La	<0.28	112	112	3.05 E-04
NO ₃	1,650	457,000	459,000	415,000
Mn	18	1,920	1,940	198
SO ₄	20	38,600	38,600	22,700
Cr	30	15,240	15,300	5,460
PO ₄	<23	95,200	95,200	7,550
F	<1.6	17,200	17,200	1,140
Al	1,350	42,200	43,600	62,200
Fe	22	4,580	4,600	955
TOC	22	25,100	25,100	6,460
Na	1,330	510,000	511,000	336,000
H ₂ O (percent)	NR	31.0	31.0	44.7

HDW = Hanford Defined Waste

NR = Not recorded

^a Agnew et al. (1996).

Since no post-1989 analytical data were available from this tank, the reliability of these estimates (in either this engineering assessment or the HDW model inventory estimates) are suspect. Although these uncertainties cannot be resolved at this point, some trends can be discussed.

Manganese. Potassium permanganate was used in the REDOX process until 1959, thus manganese is expected to be found in tanks containing waste from that process. It is most likely present as highly insoluble manganese dioxide in the alkaline waste materials and would be expected to be in the sludge. The R1 Sludge composition estimate developed in this engineering assessment for Mn was 1,330 µg/g. Interestingly, the SMMS1 salt cake composition estimate for Mn was 684 µg/g--much higher salt cake than would be expected based on solubility considerations. It should be noted that there are large ranges in both the SMMS1 and R1 data sets for Mn.

The HDW model predicts zero Mn in the Sludge in tank 241-S-105 and 109 $\mu\text{g/g}$ in the salt cake layer. The HDW model inventory estimate for Mn is 195 kg. Based on the discussion above, the 1,940 kg inventory estimate developed in this engineering assessment is likely to be closer to the true value.

Phosphate. There is a large difference between the engineering assessment tank inventory estimate (95,200 kg) and the HDW model estimate (7,550 kg). The engineering assessment value is biased high because of one extremely high phosphate value in the data set used to develop the SMMS1 salt cake composition estimate (see Table D3-2). If the phosphate data from tank 241-S-102 are eliminated from the SMMS1 composition estimate then engineering assessment and the HDW estimate would be in reasonable agreement. However, since the HDW model failed to predict the high phosphate value for 241-S-102, it should not be taken as a reliable indicator for phosphate in tank 241-S-105.

Fluoride. The fluoride ion inventory estimate is over an order of magnitude higher in the engineering assessment (13,300) than in the HDW model (1,140). However, as shown by the data in Table D3-2, the fluoride values in two of the four tanks agree reasonably with the HDW model value. Values for the other two tanks are much larger. Without analytical data from tank 241-S-105 it is difficult to defend the choice of one value over the other.

Iron. The Fe inventory estimate is about 4.8 times higher in the engineering assessment than in the HDW model. Although the 8 kL sludge only represents approximately 1 percent of the waste volume in this tank, it contributes approximately 50 percent of the total Fe in the HDW model. However, in the engineering assessment only approximately 1 percent of the Fe comes from the sludge. The Fe value determined in the engineering assessment for the salt cake is approximately seven times the HDW model salt cake value. As shown in Table D3-2, the data set used to estimate Fe in the SMMS1 salt cake varies from 3,096 $\mu\text{g/g}$ to less than detection limit. Without analytical data from tank 241-S-105 it is difficult to defend the choice of one value over the other.

Sodium. The sodium value determined in this engineering assessment is approximately one and a half times the value predicted by the HDW model. As shown in Table D3-2, the sodium values for the salt cake from the four tanks are reasonably consistent. The reason for the difference is unclear.

Total Hydroxide. Once the best-basis inventories were determined, the hydroxide inventory was calculated by performing a charge balance with the valence of other analytes. In some cases, this approach requires that other analyte (e.g., sodium or nitrate) inventories be adjusted to achieve the charge balance. During such adjustments, significant figures are retained. This charge balance approach is consistent with that used by Agnew et al. (1997).

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. 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.

As part of this effort, an evaluation of available chemical information for tank 241-S-105 was performed, including the following:

- The inventory estimate generated by the HDW model (Agnew et al. 1996)
- An engineering evaluation that estimates a SMMS inventory based on methodology developed by evaluation of similar S and U tanks and an engineering evaluation of R sludge based on sampling-based data from tank 241-S-101, 241-S-104, and 241-S-107.

Based on this evaluation, an engineering assessment-based inventory was developed for tank 241-S-105 (for which sampling information was not available). Where available, the engineering assessment-based inventory was chosen as the best-basis inventory for the following reasons:

- The sampling-based inventory analytical concentrations of the other S and U tanks containing SMMS1 compared favorably with each other for SMMS1 salt cake.
- No methodology is available to fully predict SMMS salt cake from process flowsheet or historical records.
- No methodology is available to fully predict R1 sludge from process flowsheet or historical records for this tank. REDOX process first-cycle (R1) waste changed composition during the process and accurate records of these changes are not available at this time. Also R1 waste was cascaded and transferred into and out of many S, SX, and U tanks between 1952 and 1978 which makes it hard to predict precipitation factors for analytes in the waste. Some tanks will show higher concentrations for certain analytes because of the length of time the waste was in the tank before being transferred out.

- The HDW Model does agree with the other sampling-based inventories in most cases.
- For those few analytes where no values were available from the sampling-based inventory of similar tanks, the HDW model values were used.

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 , $^{239/240}\text{Pu}$, 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. (No attempt has been made to ratio or normalize model results for all 46 radionuclides when values for measured radionuclides 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 Hanford Defined Waste 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.

The best-basis inventory estimate for tank 241-S-101 is presented 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-S-105 (Effective January 31, 1997).

Analyte	Total inventory (kg)	Basis (S, M, C, or E) ¹	Comment
Al	43,600	E	
Bi	95	E	
Ca	718	E	
Cl	10,700	E	
TIC as CO ₃	21,000	M	
Cr	15,300	E	
F	17,200	E	
Fe	4,600	E	
Hg	1.75	M	
K	3,100	E	
La	112	E	
Mn	1,940	E	
Na	511,000	E	
Ni	437	E	
NO ₂	161,000	E	
NO ₃	459,000	E	
OH	185,000	C	
Pb	537	E	
PO ₄	95,200	E	
Si	5,580	E	
SO ₄	38,600	E	
Sr	24	E	
TOC	25,100	E	
U _{TOTAL}	2,580	E	
Zr	132	E	

¹S = Sample-based

M = Hanford Defined Waste model-based (Agnew et al. 1996)

E = Engineering assessment-based

C = Calculated by charge balance; includes oxides as hydroxides, not including CO₃, NO₂, NO₃, PO₄, SO₄, and SiO₃.

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-S-105
Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E) ¹	Comment
³ H	345	M	
¹⁴ C	42.4	M	
⁵⁹ Ni	3.13	M	
⁶⁰ Co	41.8	M	
⁶³ Ni	303	M	
⁷⁹ Se	4.63	M	
⁹⁰ Sr	270,000	E	
⁹⁰ Y	270,000	E	Based on ⁹⁰ Sr
⁹³ Zr	22.6	M	
^{93m} Nb	16.9	M	
⁹⁹ Tc	303	M	
¹⁰⁶ Ru	0.00635	M	
^{113m} Cd	108	M	
¹²⁵ Sb	169	M	
¹²⁶ Sn	7.02	M	
¹²⁹ I	0.582	M	
¹³⁴ Cs	2.04	M	
¹³⁷ Cs	451,000	E	
^{137m} Ba	426,000	E	Based on ¹³⁷ Cs
¹⁵¹ Sm	16,400	M	
¹⁵² Eu	3.91	M	
¹⁵⁴ Eu	680	M	
¹⁵⁵ Eu	223	M	
²²⁶ Ra	2.33 E-04	M	
²²⁷ Ac	0.00139	M	
²²⁸ Ra	0.084	M	
²²⁹ Th	0.00199	M	
²³¹ Pa	0.0059	M	
²³² Th	0.00557	M	
²³² U	0.491	M	

Table D4-2. Best-Basis Inventory Estimates for Radioactive Components in Tank 241-S-105
Decayed to January 1, 1994 (Effective January 31, 1997). (2 Sheets)

Analyte	Total inventory (Ci)	Basis (S, M, or E) ¹	Comment
²³³ U	1.88	M	
²³⁴ U	1.18	M	
²³⁵ U	0.0488	M	
²³⁶ U	0.0326	M	
²³⁷ Np	1.23	M	
²³⁸ Pu	1.52	M	
²³⁸ U	1.23	M	
²³⁹ Pu	60.8	M	
²⁴⁰ Pu	9.77	M	
²⁴¹ Am	75	M	
²⁴¹ Pu	99.5	M	
²⁴² Cm	0.135	M	
²⁴² Pu	5.31 E-04	M	
²⁴³ Am	0.00199	M	
²⁴³ Cm	0.0117	M	
²⁴⁴ Cm	0.13	M	

¹S = Sample-based

M = Hanford Defined Waste model-based (Agnew et al. 1997)

E = Engineering assessment-based.

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D5.0 APPENDIX D REFERENCES

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