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TWRS EIS
CALCULATION COVER SHEET

DISCIPLINE: Computer Science and Radiation Technology,
TITLE: Database Manager and Health Physicist

ORIGINATOR: Mitchell Pelton and Johnny Davis

DATE: 1/27/95
REVISION NO: 0

OBJECTIVE: Aggregate the tank farm inventories given by WHC memo (Golberg 12/26/94) into the specified groupings as outline by the ESE memo (Rogers 12/2/94). Also since no inventories were given for double shell tanks in 1995, back calculate them from 1999 to 1995.

METHODOLOGY: Data was received in an EXCEL 4.0 workbook and thus manipulated with the same. Find which tank farms are associated with which grouping and add those inventories together. Back calculation for radionuclides is explained further in the text of this memo.

ASSUMPTIONS: No decay chains were used in back calculating radionuclide inventories from 1999 to 1995.

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Table 6
Aggregated Inventory (Metric Tons) of Nonradioactive Chemicals for Double Shell Tanks

Chemical	5EDS		3EDS		3WDS		Total	
	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble
Ag+	1.18E-01	1.32E+00	2.10E-01			5.80E-02	3.28E-01	1.38E+00
Al+3		4.29E+01		1.05E+01		1.44E+01		6.78E+01
As+5	7.44E-01	2.97E-01	2.60E-02			2.01E-01	7.70E-01	4.98E-01
B+3	1.01E-01	9.17E-01	6.64E-02		3.52E-01	7.66E-02	5.19E-01	9.94E-01
Ba+2	7.01E-01	2.41E+00	6.16E-02	6.80E-01	2.93E-02	3.26E-03	7.91E-01	3.09E+00
Be+2	5.97E-02	7.47E-03	2.22E-02	1.39E-04			8.19E-02	7.61E-03
Bi+3	1.74E+00		5.21E-01				2.26E+00	
Ca+2	5.19E+00	7.96E+00	6.02E-01	1.79E+00	4.48E+00	1.74E+00	1.03E+01	1.15E+01
Cd+2	9.68E-02	5.77E+00	7.05E-02			2.42E-01	1.67E-01	6.01E+00
Ce+3	2.26E-02	2.78E+00				2.64E-01	2.26E-02	3.04E+00
Cr+3		9.31E+00		7.84E-01		2.40E+01		3.41E+01
Cu+2	7.32E-02	4.05E-01	1.04E-01			3.42E-01	1.77E-01	7.46E-01
Fe+3	3.10E+00	1.32E+02	8.18E-01	1.92E+00	4.17E+00	8.27E+00	8.09E+00	1.42E+02
Hg+	5.75E-02		9.43E-04				5.84E-02	
K+	1.48E+02	1.79E+00	3.60E+02	1.80E+01	3.72E+01	3.76E-01	5.46E+02	2.02E+01
La+	2.19E-01	1.96E+01		1.35E+00		9.89E-02	2.19E-01	2.10E+01
Li+	2.13E-03	2.26E-02			3.64E-03	1.96E-03	5.77E-03	2.46E-02
Mg+2	5.26E-01	9.53E+00	3.92E-01	1.00E+00	4.67E-02	4.62E-01	9.65E-01	1.10E+01
Mn+4	6.11E+00	1.48E+01	1.53E-01	9.50E-01	1.42E+00	2.29E+00	7.69E+00	1.80E+01
Mo+6	3.82E+00	2.09E-01	2.72E-01	5.25E-01	7.85E-01	6.71E-02	4.87E+00	8.01E-01
Na+	6.00E+03	6.51E+01	2.80E+03	1.36E+02	2.13E+03	2.85E+01	1.09E+04	2.30E+02
Nd+3		1.19E+01				1.17E-01		1.20E+01
Ni+2	3.34E+00	5.03E+00	1.81E-01	4.30E-01	5.54E-01	1.11E+00	4.07E+00	6.57E+00
Pb+4	5.63E-01	2.95E+00	1.39E+00			3.34E-01	1.96E+00	3.28E+00
Pd		1.20E+00						1.20E+00
Rb	6.14E-02	2.56E-03					6.14E-02	2.56E-03
Re	4.01E-03	3.25E-02		2.14E-01			4.01E-03	2.46E-01
Rh	1.20E-02	7.34E-02		1.47E+00		1.38E-01	1.20E-02	1.68E+00
Ru	2.60E-02	2.63E-01		8.35E-01		1.36E-01	2.60E-02	1.23E+00
Sb	6.21E-01	1.51E+00		1.35E+00		9.82E-02	6.21E-01	2.96E+00
Se	1.21E+00	7.20E-01	2.20E-03	2.59E+00		6.37E-01	1.21E+00	3.95E+00
SiO3-	1.03E+01	1.99E+02	5.13E+00	9.32E+00	7.15E-02	6.01E+00	1.55E+01	2.14E+02
Sn	3.21E-05		3.81E-04				4.13E-04	
Te	5.40E-03	6.21E-02		1.13E+00		1.03E-01	5.40E-03	1.30E+00
Th	2.02E-02	3.83E-01		2.55E+00		6.24E-01	2.02E-02	3.56E+00
Ti	6.24E-02	2.00E-01	2.23E-02	2.57E-01		3.86E-02	8.47E-02	4.96E-01
Tl	2.33E-01	3.65E+00		2.92E+01		5.49E-01	2.33E-01	3.34E+01
UO2+2	2.19E+00	7.91E-01	1.36E+00	2.60E+01			3.54E+00	2.68E+01
V+5	6.20E-02	8.09E-03		1.66E-01		1.37E-02	6.20E-02	1.88E-01
W+6	7.47E-01						7.47E-01	
Zn+2	3.50E-01	4.20E-01	2.14E+00	2.80E-01	1.10E+00	2.45E-01	3.59E+00	9.45E-01
Zr+4	2.30E-01	1.85E+01	2.18E-01	2.58E+02		1.85E-01	4.48E-01	2.77E+02
Al(OH)4-2	2.44E+03		8.34E+02		1.19E+03		4.47E+03	
CO3-2	9.41E+02	5.17E+01	8.43E+02	3.00E+00	8.39E+01	3.61E+00	1.87E+03	5.83E+01
Cl-	1.47E+02	5.75E-01	5.24E+01	3.60E-02	7.41E+01	8.77E-01	2.73E+02	1.49E+00
Cr(OH)4-	4.06E+01		1.14E+01		6.01E+01		1.12E+02	
F-	3.56E+01	6.39E-01	3.02E+02	1.81E+01	8.63E+00	3.63E-01	3.46E+02	1.91E+01
SO4-2	2.77E+02	1.96E+00	7.10E+01	1.25E+00	3.83E+01	3.46E+00	3.86E+02	6.68E+00
NO3-	4.43E+03	2.04E+01	2.19E+03	8.28E+00	1.03E+03	1.04E+01	7.65E+03	3.91E+01
NO2-	1.94E+03	5.06E+00	8.88E+02	8.94E-01	2.44E+02	2.46E+00	3.07E+03	8.42E+00
PO4-3	7.13E+01	1.40E+01	7.44E+01	4.57E-01	6.63E+01	7.16E+00	2.12E+02	2.16E+01
OH-	9.99E+02	2.45E+01	6.97E+02	5.96E+01	2.03E+02	3.87E+01	1.90E+03	1.23E+02
TOC	8.08E+02	6.25E+01	5.48E+01	4.60E+00	1.28E+02	1.29E+00	9.90E+02	6.84E+01
Total	1.83E+04	7.45E+02	9.19E+03	6.04E+02	5.31E+03	1.60E+02	3.28E+04	1.51E+03
H2O	2.76E+04		4.88E+04		9.51E+03		8.59E+04	
Grand Total	4.59E+04	7.45E+02	5.80E+04	6.04E+02	1.48E+04	1.60E+02	1.19E+05	1.51E+03
Volume, Liters	3.51E+07		5.06E+07		9.60E+06		9.53E+07	

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Tank Waste Current Source Inventory

January 27, 1995

Introduction

The purpose of this paper is to offer recommendations on the current source inventory to be used in the Tank Waste Remediation System (TWRS) Environmental Impact Statement (EIS). Current source inventory, as used here, refers to the inventory of tank constituents available for release into the environment at the current time. This initial inventory is an important requirement for the fate and transport modeling and, ultimately, the risk assessment for the TWRS EIS.

To support the risk assessment group in assessing risk from exposure to tank constituents, the fate and transport modeling group(s) must first model the changes in contaminant concentrations resulting from the movement of contaminants through the environment from the source (tanks) to the receptor. To execute the fate and transport model, a release term describing the amount of each tank constituent actually released into the environment must first be developed. The release term will be some fraction of the inventory available for release, and can thus be calculated from the current source inventory presented in this paper. Calculation of release terms is the responsibility of the fate and transport modeling group(s) and will not be further addressed in this paper.

Aggregated Source Areas

The range of available approaches for representing the contaminant sources in the 177 tanks has been reviewed in a previous paper (Rogers, 1994). That paper recommends against representing each tank as a discrete source and instead recommends that contaminant source locations be defined by combining tank farms and considering each group of tank farms as a discrete source. The 177 tanks are grouped into eight source areas, three in the 200 West Area and five in the 200 East Area, each of which contains groups of either single-shell tank (SST) farms or double-shell tank (DST) farms (Figure 1). The eight source areas are defined on the basis of tank farm location, tank type (SST or DST), hydrogeolgy, and source data considerations. A detailed discussion of the rationale for defining the source areas is provided in Rogers (1994).

Use of the eight source areas as recommended in Rogers (1994) appears fully compatible with the planned strategy for conducting the risk assessment as outlined in JEG (1994). It is therefore assumed that these source areas are to be used in the TWRS EIS. In the following paragraphs, aggregated current source inventories are generated for each of the eight source areas defined in Rogers (1994). Should the source areas later be modified, corresponding modifications to the current source inventories can easily be made.

Sources of Data and Recommended Method for Generating Current Source Inventories

Rogers (1994) recommends that source inventories for the eight source areas be determined by pro-rating the total source by the sum of the volume contained in the tanks in each area. At the time this recommendation was made, the contaminant source data available from Westinghouse Hanford Company (WHC [Goldberg, 1994a]) displayed tank inventories only on a total tank basis (i.e., total inventory for SSTs and total inventory for DSTs). WHC has subsequently updated the total-tank source data (Goldberg, 1994b) (see Tables 1 and 2). More importantly, WHC has also provided computer spreadsheets containing tank-by-tank and farm-by-farm inventories for DSTs and SSTs, respectively, to Advanced Sciences, Inc. (ASI) (Young, 1994; Pelton, 1994).

A disadvantage with determining current source inventories by volume ratio, as recommended in Rogers (1994), is that it could result in allocating mass for certain contaminants to source areas where no such mass actually resides. This would lead to inaccurate representation of the risk originating from a given source area. The tank-by-tank and farm-by-farm inventories provided in the WHC spreadsheets eliminate the need to use volume ratios to allocate tank inventories and make it possible to generate aggregated current source inventories for each of the eight source areas that accurately allocate contaminant mass. The current source inventories presented herein are therefore generated using the WHC tank-by-tank and farm-by-farm inventories.

Decay Dates

The current assumption is that the year 1995 will be used as the starting time (T_0) for the TWRS EIS risk assessment. The radionuclide data provided by WHC for SSTs were decayed to a range of dates, including 1995. The radionuclide data provided by WHC for DSTs, however, were decayed only to December 31, 1999. ASI has performed a calculation to convert the WHC inventories for DSTs to a December 31, 1995 decay date. The calculation was performed using the simple decay equation as follows:

$$I_{(1995)} = I_{(1999)} \times e^{+\lambda t}$$

where

$I_{(1995)}$ = Inventory year 1995
$I_{(1999)}$ = Inventory year 1999
λ = Decay Constant = $\ln 2/T_{1/2}$
t = Decay Duration (1999 - 19995 = 4 years)
$T_{1/2}$ = Radionuclide Half Life

Current Source Inventory for Single-shell Tanks

Five of the eight source areas are comprised of groups of single-shell tank farms (Figure 1). Current source inventories for the five SST source areas are shown in Tables 3 and 4. Table 3 shows the aggregated inventory of radionuclides for the five areas decayed to 12/31/95

(totals decayed to 12/31/99 are also included for comparison purposes); Table 4 shows the aggregated inventory of nonradioactive chemicals. The inventories were generated by summing the data provided in the WHC farm-by-farm inventories for the single-shell tank farms in each source area. The total column in Table 3 (12/31/99) and Table 4 must be the same as the totals listed in Tables 1 and 2, respectively, for SST waste.

Current Source Inventory for Double-shell Tanks

Three of the eight source areas contain groups of double-shell tank farms (Figure 1). Current source inventories for the three DST source areas are shown in Tables 5 and 6. Table 5 shows the aggregated inventory of radionuclides for the three areas decayed to 12/31/95 (totals decayed to 12/31/99 are also included for comparison purposes); Table 6 shows the aggregated inventory of nonradioactive chemicals. The inventories were generated by summing the data provided in the WHC tank-by-tank inventories for the double-shell tanks in each source area. The total column in Table 5 (12/31/99) and Table 6 must be the same as the totals listed in Tables 1 and 2, respectively, for DST waste.

References

Goldberg, C.E., 1994a, Internal Memorandum to G.K. Allen et al., *Preliminary Environmental Impact Statement and 1994 Integrated Database Tank Inventory Tables*, 7E330-94-038, Westinghouse Hanford Company, Richland, Washington (October 6).

Goldberg, C.E., 1994b, Internal Memorandum to G.K. Allen et al., *Final Environmental Impact Statement and 1994 Integrated Database Tank Inventory Tables*, 71220-94-041, Westinghouse Hanford Company, Richland, Washington (December 13).

JEG, 1994, *Tank Waste Remediation System Environmental Impact Statement Strategy for Risk Assessment*, Draft Revision 1, Prepared by the Jacobs Engineering Team, Richland, Washington (September).

Pelton, M.A., 1994, Advanced Sciences, Inc., Memorandum to Jacobs Engineering Group et al., *C. Goldberg Data*, Richland, Washington (December 19).

Rogers, P., 1994, Environmental Science and Engineering, Inc., Memorandum to M. Nelson, Jacobs Engineering Group, *Recommended Source Descritization for No Action and In Situ Alternatives*, Richland, Washington (December 2).

Young, J., 1994, Advanced Sciences, Inc., Memorandum to M. Nelson, Jacobs Engineering Group, *Hard Copy of Goldberg cc:Mail Transmittal of Tank Inventory*, Richland, Washington (December 19).

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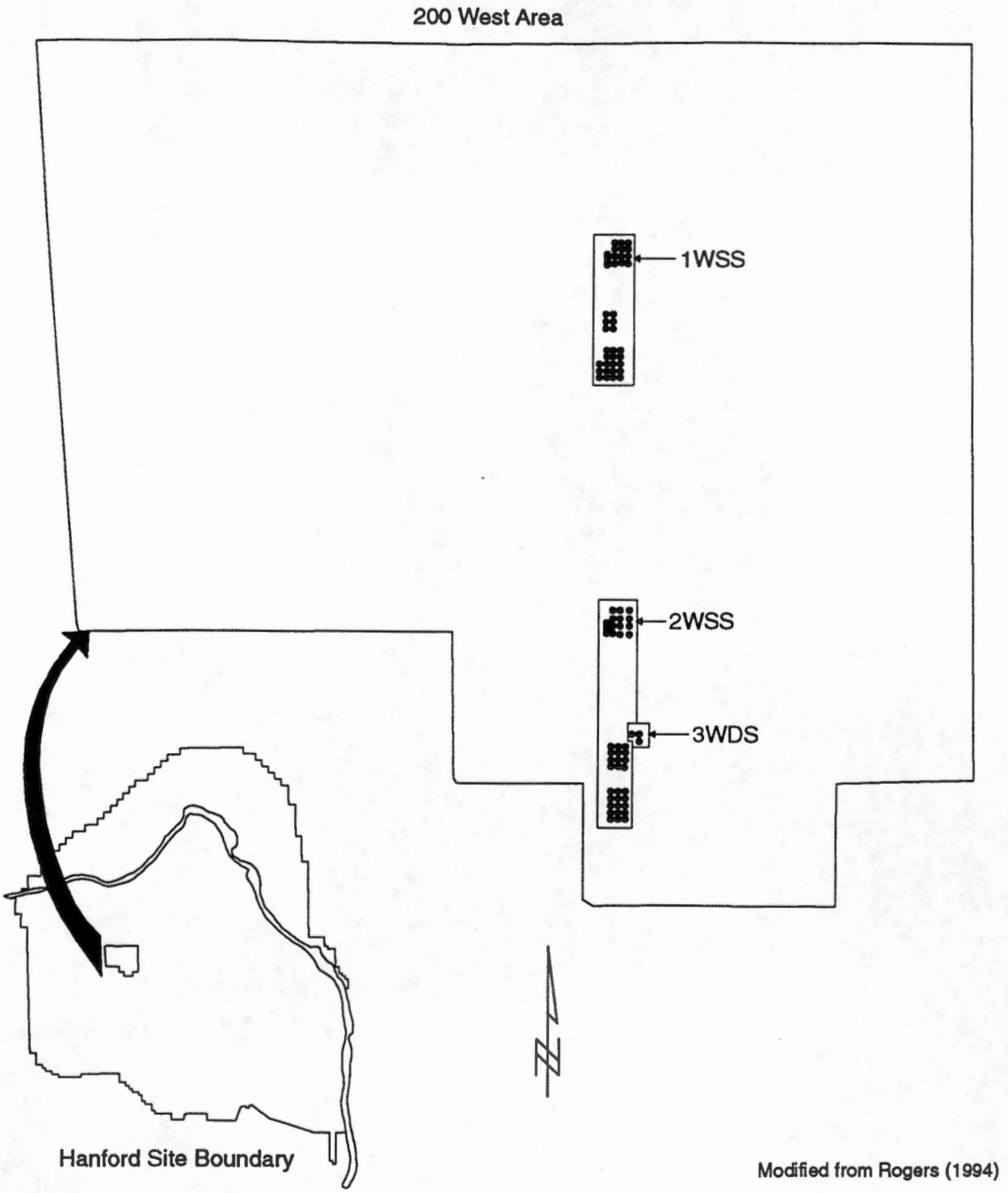
Figure 1
Source Locations
(Sheet 1 of 2)



Modified from Rogers (1994)

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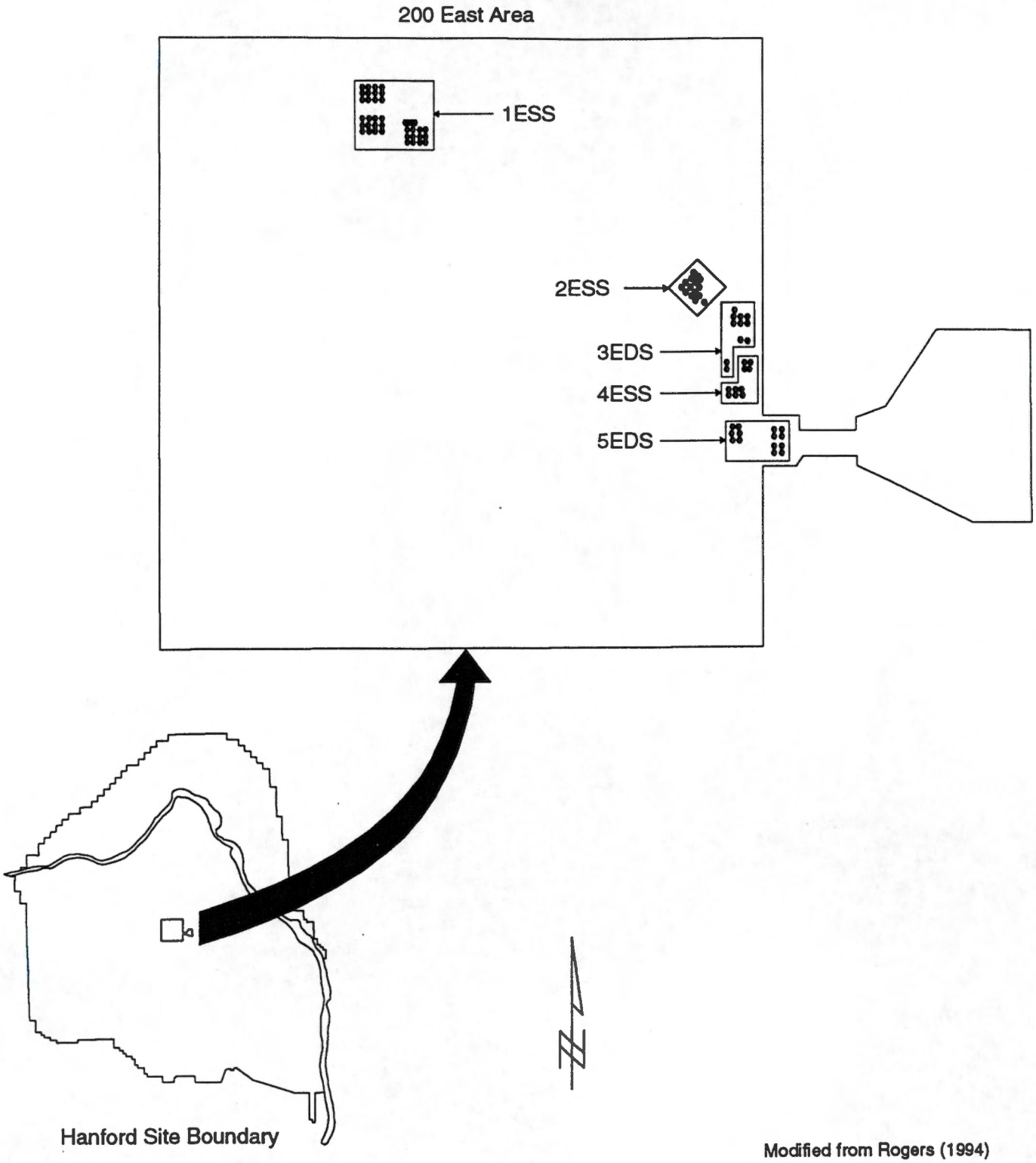
Figure 1
Source Locations
(Sheet 2 of 2)



Modified from Rogers (1994)

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Table 1
Total Inventory (Curies) of Radionuclides for Single and Double Shell Tanks
Sheet 1 of 2

Decayed to 12/31/99				
Radionuclides	SST	DST		
Ci	Total	Soluble	Insoluble	Total
Ac-225	1.98E-05			
Ac-227	2.21E-02			
Am-241 (2)	3.30E+04	5.31E+03	6.54E+04	7.07E+04
Am-242	6.82E+01			
Am-242m	6.86E+01			
Am-243	3.32E+01			
At-217	1.98E-05			
Ba-137m	7.68E+06	2.48E+07	6.49E+05	2.54E+07
Bi-210	7.17E-08			
Bi-211	2.21E-02			
Bi-212	3.72E-14			
Bi-213	1.98E-05			
Bi-214	2.70E-07			
C-14 (2)	3.00E+03	3.45E+02	1.99E+03	2.34E+03
Cm-242	5.66E+01			
Cm-244	1.18E+02			
Cm-245	1.04E-02			
Cs-135	1.45E+02			
Cs-137	8.12E+06	2.61E+07	6.83E+05	2.68E+07
Eu-154		5.37E+04	1.44E+03	5.51E+04
Fr-221	1.98E-05			
Fr-223	3.06E-04			
I-129 (2)	1.60E+01			
Nb-93m	3.20E+03			
Ni-59	5.03E+03			
Ni-63	2.69E+05			
Np-237	6.97E+01			
Np-238	3.26E-01			
Np-239	3.32E+01			
Pa-231	3.80E-02			
Pa-233	6.97E+01			
Pa-234	7.69E-01			
Pa-234m	4.81E+02			
Pb-209	1.98E-05			
Pb-210	7.17E-08			
Pb-211	2.21E-02			
Pb-212	3.72E-14			
Pb-214	2.70E-07			
Pd-107	8.65E+01			
Po-210	7.17E-08			
Po-211	6.04E-05			
Po-212	2.38E-14			
Po-213	1.94E-05			
Po-214	2.70E-07			
Po-215	2.21E-02			
Po-216	3.72E-14			
Po-218	2.70E-07			
Pu-238	1.08E+03			
Pu-239 (2)	1.80E+04	1.31E+03	7.05E+03	8.36E+03
Pu-240 (2)	4.30E+03	3.28E+02	2.07E+03	2.40E+03
Pu-241	3.55E+04	7.76E+02	3.86E+04	3.94E+04
Pu-242	4.32E-04			
Ra-223	2.21E-02			

Source: Golberg (1999b)

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Table 1
Total Inventory (Curies) of Radionuclides for Single and Double Shell Tanks
Sheet 2 of 2

Decayed to 12/31/99				
Radionuclides	SST	DST		
Ci	Total	Soluble	Insoluble	Total
Ra-224	3.72E-14			
Ra-225	1.98E-05			
Ra-226	2.70E-07			
Ra-228	7.42E-14			
Rh-106	3.79E-02			
Rn-219	2.21E-02			
Rn-220	3.72E-14			
Rn-222	2.70E-07			
Ru-106	3.79E-02			
Sb-126	8.78E+01			
Sb-126m	6.27E+02			
Se-79	9.11E+02			
Sm-151 (2)	6.30E+05			
Sn-126	6.27E+02			
Sr-90 (2)	4.36E+07	6.15E+05	9.47E+06	1.01E+07
Tc-99 (2)	1.10E+04	2.07E+04	3.99E+02	2.11E+04
Th-227	2.18E-02			
Th-228	3.72E-14			
Th-229	1.98E-05			
Th-230	3.90E-05			
Th-231	2.06E+01			
Th-232	6.42E-13			
Th-234	4.81E+02			
Tl-207	2.21E-02			
Tl-208	1.34E-14			
Tl-209	4.28E-07			
U-233	1.21E-02			
U-234	2.12E-01			
U-235	2.06E+01			
U-236	2.88E-03			
U-237	8.69E-01			
U-238	4.81E+02			
Y-90	4.36E+07	6.15E+05	9.47E+06	1.01E+07
Zr-93	3.94E+03			
Total	1.04E+08	5.22E+07	2.04E+07	7.26E+07

Source: Golberg (1999b)

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Table 2
Total Inventory (Metric Tons) of Nonradioactive Chemicals for Single and Double Shell Tanks

Chemical Metric Tons	SST (1)				DST (2)	
	Sludge	Saltcake	Interstitial Liquid	Total	Soluble	Insoluble
Ag+					3.28E-01	1.38E+00
Al(OH)4-	6.25E+02	1.25E+03	1.08E+03	2.96E+03	4.47E+03	
Al+3 (3)	1.99E+03			1.99E+03		6.78E+01
As+5					7.70E-01	4.98E-01
B+3					5.19E-01	9.94E-01
Ba+2					7.91E-01	3.09E+00
Be+2					8.19E-02	7.61E-03
Bi+3	2.61E+02			2.61E+02	2.26E+00	
Ca+2	1.28E+02			1.28E+02	1.03E+01	1.15E+01
Cd+2	3.84E+00			3.84E+00	1.67E-01	6.01E+00
Ce+3	2.35E+02			2.35E+02	2.26E-02	3.04E+00
Cl-	4.00E+01			4.00E+01	2.73E+02	1.49E+00
CO3-2	1.15E+03	4.13E+02	9.37E+01	1.66E+03	1.87E+03	5.83E+01
Cr+3	8.63E+01			8.63E+01		3.41E+01
CrO4-2			5.06E+01	5.06E+01	9.05E+01	
Cu+2					1.77E-01	7.46E-01
F-	8.00E+02		1.18E+01	8.12E+02	3.46E+02	1.91E+01
Fe(CN)6-4	3.22E+02			3.22E+02		
Fe+3	6.27E+02			6.27E+02	8.09E+00	1.42E+02
Hg+	9.00E-01			9.00E-01	5.84E-02	
K+					5.46E+02	2.02E+01
La+					2.19E-01	2.10E+01
Li+					5.77E-03	2.46E-02
Mg+2					9.65E-01	1.10E+01
Mn+4	1.20E+02			1.20E+02	7.69E+00	1.80E+01
Mo+6					4.87E+00	8.01E-01
Na+	1.58E+04	3.39E+04	5.44E+03	5.52E+04	1.09E+04	2.30E+02
Ni+2	1.78E+02			1.78E+02	4.07E+00	6.57E+00
NO2-	2.00E+03	1.53E+03	3.00E+03	6.53E+03	3.07E+03	8.42E+00
NO3-	1.48E+04	8.03E+04	4.32E+03	9.94E+04	7.65E+03	3.91E+01
OH-	4.22E+03	8.51E+02	7.45E+02	5.82E+03	1.90E+03	1.23E+02
Pb+4					1.96E+00	3.28E+00
PO4-3	3.89E+03	6.43E+02	2.03E+02	4.74E+03	2.12E+02	2.16E+01
SiO3-	1.21E+03			1.21E+03	1.53E+01	2.14E+02
SO4-2	5.01E+02	1.15E+03		1.65E+03	3.86E+02	6.68E+00
Sr+2	3.60E+01			3.60E+01		
TOC (4)			4.73E+02	4.73E+02	9.90E+02	6.84E+01
UO2+2					3.54E+00	2.68E+01
V+5					6.20E-02	1.88E-01
W+4	1.44E+01			1.44E+01	7.47E-01	
Zn+2					3.59E+00	9.45E-01
Zr+4	2.46E+02			2.46E+02	4.48E-01	2.77E+02
Total	4.93E+04	1.20E+05	6.52E+03	1.76E+05	3.28E+04	1.45E+03
H2O	2.62E+04	1.40E+04	4.80E+03	4.50E+04	8.59E+04	
Total w/H2O	7.55E+04	1.34E+05	1.13E+04	2.21E+05	1.19E+05	

Source: Goldberg (1999b)

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Table 3
Aggregated Inventory (Curies) of Radionuclides for Single Shell Tanks
Sheet 1 of 2

Radionuclide	Decayed to 12/31/1995					Total	
Ci	1WSS	2WSS	1ESS	2ESS	4ESS	12/31/95	12/31/99
Ac-225	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Ac-227	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Am-241	2.26E+03	1.26E+04	9.96E+03	1.29E+04	6.14E+03	4.39E+04	3.30E+04
Am-242	2.68E+00	1.94E+01	1.88E+01	2.00E+01	8.67E+00	6.95E+01	6.82E+01
Am-242m	2.69E+00	1.95E+01	1.89E+01	2.01E+01	8.71E+00	6.98E+01	6.86E+01
Am-243	1.02E+00	7.82E+00	9.57E+00	1.16E+01	3.12E+00	3.32E+01	3.32E+01
At-217	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Ba-137m	8.44E+05	3.78E+06	3.54E+06	1.26E+05	1.37E+05	8.42E+06	7.68E+06
Bi-210	1.50E-08	1.16E-08	1.34E-08	7.03E-09	2.81E-09	4.99E-08	7.17E-08
Bi-211	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Bi-212							3.72E-14
Bi-213	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Bi-214	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07
C-14	1.95E+03	3.37E+03	1.26E+04	1.48E+03	1.25E+03	2.06E+04	3.00E+03
Cm-242	2.22E+00	1.61E+01	1.56E+01	1.66E+01	7.19E+00	5.76E+01	5.66E+01
Cm-244	3.22E+00	2.39E+01	5.01E+01	5.34E+01	7.20E+00	1.38E+02	1.18E+02
Cm-245	2.08E-04	1.74E-03	3.83E-03	4.09E-03	5.51E-04	1.04E-02	1.04E-02
Cs-135	2.07E+01	6.79E+01	5.27E+01	1.61E+00	2.13E+00	1.45E+02	1.45E+02
Cs-137	8.93E+05	3.99E+06	3.74E+06	1.33E+05	1.44E+05	8.90E+06	8.12E+06
Fr-221	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Fr-223	7.15E-05	5.88E-05	1.22E-04	2.14E-05	3.82E-06	2.78E-04	3.06E-04
I-129	5.19E+00	1.34E+01	2.79E+01	1.82E+00	5.21E-01	4.88E+01	1.60E+01
Nb-93m	8.54E+01	6.76E+02	3.71E+02	4.05E+02	1.50E+03	3.04E+03	3.20E+03
Ni-59		1.71E+03	3.33E+03			5.03E+03	5.03E+03
Ni-63	6.83E+03	4.86E+04	5.30E+04	5.87E+04	1.09E+05	2.76E+05	2.69E+05
Np-237	8.26E+00	1.10E+01	4.96E+01	3.37E-01	4.48E-01	6.96E+01	6.97E+01
Np-238	1.28E-02	9.26E-02	9.00E-02	9.55E-02	4.15E-02	3.32E-01	3.26E-01
Np-239	1.02E+00	7.82E+00	9.57E+00	1.16E+01	3.12E+00	3.32E+01	3.32E+01
Pa-231	9.61E-03	7.33E-03	1.53E-02	3.38E-03	6.37E-04	3.62E-02	3.80E-02
Pa-233	8.26E+00	1.10E+01	4.96E+01	3.37E-01	4.48E-01	6.96E+01	6.97E+01
Pa-234	2.75E-01	1.03E-01	2.61E-01	1.03E-01	2.64E-02	7.69E-01	7.69E-01
Pa-234m	1.72E+02	6.47E+01	1.63E+02	6.45E+01	1.65E+01	4.81E+02	4.81E+02
Pb-209	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Pb-210	1.50E-08	1.16E-08	1.34E-08	7.03E-09	2.81E-09	4.99E-08	7.17E-08
Pb-211	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Pb-212							3.72E-14
Pb-214	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07
Pd-107	9.03E+00	2.33E+01	4.95E+01	3.66E+00	9.74E-01	8.65E+01	8.65E+01
Po-210	1.50E-08	1.16E-08	1.34E-08	7.03E-09	2.81E-09	4.99E-08	7.17E-08
Po-211	1.41E-05	1.16E-05	2.41E-05	4.24E-06	7.56E-07	5.49E-05	6.04E-05
Po-212							2.38E-14
Po-213	1.69E-06	2.81E-06	5.90E-06	2.20E-06	2.78E-06	1.54E-05	1.94E-05
Po-214	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07
Po-215	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Po-216							3.72E-14
Po-218	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07
Pu-238	2.10E+02	2.96E+02	1.85E+02	1.99E+02	2.24E+02	1.11E+03	1.08E+03
Pu-239	2.52E+03	4.35E+03	3.52E+03	5.87E+03	5.57E+03	2.18E+04	1.80E+04
Pu-241	3.92E+03	6.36E+03	8.46E+03	1.32E+04	1.11E+04	4.30E+04	3.55E+04
Pu-242	1.33E-05	9.59E-05	9.32E-05	9.69E-05	4.29E-05	3.44E-04	4.32E-04
Ra-223	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Ra-224							3.72E-14
Ra-225	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Ra-226	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07

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Table 3
Aggregated Inventory (Curies) of Radionuclides for Single Shell Tanks
Sheet 2 of 2

Radionuclide	Decayed to 12/31/1995					Total	
Ci	1WSS	2WSS	1ESS	2ESS	4ESS	12/31/95	12/31/99
Ra-228							7.42E-14
Rh-106	6.11E-05	1.70E-02	8.25E-02	9.73E-02	3.97E-01	5.94E-01	3.79E-02
Rn-219	5.18E-03	4.26E-03	8.84E-03	1.55E-03	2.77E-04	2.01E-02	2.21E-02
Rn-220							3.72E-14
Rn-222	6.08E-08	5.03E-08	5.20E-08	2.98E-08	1.58E-08	2.09E-07	2.70E-07
Ru-106	6.11E-05	1.70E-02	8.25E-02	9.73E-02	3.97E-01	5.94E-01	3.79E-02
Sb-126	7.94E+00	2.33E+01	6.71E+00	1.39E+01	3.59E+01	8.78E+01	8.78E+01
Sb-126m	5.67E+01	1.66E+02	4.79E+01	9.96E+01	2.57E+02	6.27E+02	6.27E+02
Se-79	9.71E+01	2.51E+02	5.21E+02	3.23E+01	9.51E+00	9.11E+02	9.11E+02
Sm-151	6.43E+04	1.89E+05	5.63E+04	1.04E+05	2.55E+05	6.69E+05	6.30E+05
Sn-126	5.67E+01	1.66E+02	4.79E+01	9.96E+01	2.57E+02	6.27E+02	6.27E+02
Sr-90	1.51E+06	1.45E+07	8.41E+06	4.95E+06	1.92E+07	4.85E+07	4.36E+07
Tc-99	3.39E+03	8.74E+03	1.81E+04	1.13E+03	3.32E+02	3.17E+04	1.10E+04
Th-227	5.11E-03	4.20E-03	8.72E-03	1.53E-03	2.73E-04	1.98E-02	2.18E-02
Th-228							3.72E-14
Th-229	1.72E-06	2.88E-06	6.03E-06	2.25E-06	2.84E-06	1.57E-05	1.98E-05
Th-230	9.00E-06	7.86E-06	7.51E-06	4.51E-06	3.11E-06	3.20E-05	3.90E-05
Th-231	7.22E+00	2.93E+00	6.92E+00	2.81E+00	6.98E-01	2.06E+01	2.06E+01
Th-232	1.85E-14	3.57E-14	3.13E-14	5.59E-14	5.27E-14	1.94E-13	6.42E-13
Th-234	1.72E+02	6.47E+01	1.63E+02	6.45E+01	1.65E+01	4.81E+02	4.81E+02
Tl-207	5.16E-03	4.25E-03	8.82E-03	1.55E-03	2.76E-04	2.01E-02	2.21E-02
Tl-208							1.34E-14
U-233	1.20E-03	1.75E-03	5.91E-03	8.07E-04	1.18E-03	1.08E-02	1.21E-02
U-234	4.91E-02	4.59E-02	4.31E-02	3.04E-02	2.52E-02	1.94E-01	2.12E-01
U-235	7.22E+00	2.93E+00	6.92E+00	2.81E+00	6.98E-01	2.06E+01	2.06E+01
U-236	2.16E-04	4.18E-04	3.67E-04	6.54E-04	6.17E-04	2.27E-03	2.88E-03
U-238	1.72E+02	6.47E+01	1.63E+02	6.45E+01	1.65E+01	4.81E+02	4.81E+02
Y-90	1.51E+06	1.45E+07	8.41E+06	4.95E+06	1.92E+07	4.85E+07	4.36E+07
Zr-93	4.54E+01	8.00E+02	2.42E+02	5.63E+02	2.29E+03	3.94E+03	3.94E+03
Total	4.85E+06	3.70E+07	2.43E+07	1.04E+07	3.90E+07	1.16E+08	1.04E+08

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Table 4
Aggregated Inventory (Metric Tons) of Nonradioactive Chemicals for Single Shell Tanks

Chemical	1WSS	2WSS	1ESS	2ESS	4ESS	Total
Ag (1)	4.11E-08	6.46E-08	2.00E-07	8.91E-09	2.68E-09	3.17E-07
Al (1)	3.32E+02	1.11E+03	8.04E+02	3.87E+02	2.64E+01	2.66E+03
Al+3	7.12E+01	7.24E+02	5.92E+02	5.80E+02	2.53E+01	1.99E+03
AlO2-	4.54E+02	1.07E+03	7.19E+02	7.58E+01	1.81E+01	2.34E+03
Ba+2 (1)	3.58E-02	1.70E-01	1.02E-01	1.09E-01	1.90E-01	6.07E-01
Bi+3	1.66E+02	2.80E-01	9.43E+01	5.95E-01		2.61E+02
C2H3O3 (1)	5.31E+00	2.85E+00	3.23E-01	1.19E-01	2.97E+00	1.16E+01
C6H5O7 (1)	5.45E+02	6.59E+02	1.23E+03	1.10E+02	2.42E+01	2.56E+03
CO3-2	7.07E+02	1.60E+02	6.40E+02	6.20E+01	3.80E+01	1.61E+03
Ca+2	1.98E-01	5.82E+00	5.47E+01	6.59E+01	1.54E+00	1.28E+02
Cd+2 (2)						
Ce+3	1.16E+02	3.16E+01	8.82E+01	2.64E-01	1.75E+00	2.38E+02
Cl-	2.19E+01	5.41E+00	1.26E+01	4.01E-02	6.03E-02	4.00E+01
Cr+3	1.26E+00	8.33E+01	7.25E-01	1.65E-01	8.24E-01	8.63E+01
CrO4-2	3.12E-01	2.07E+01	1.80E-01	4.10E-02	2.04E-01	2.14E+01
EDTA (1)	4.07E+01	2.18E+01	2.48E+00	9.11E-01	2.27E+01	8.86E+01
F-	1.44E+02	3.00E+01	2.32E+02	4.00E+02	3.08E-01	8.06E+02
Fe+3	1.70E+02	8.18E+01	1.42E+02	5.55E+01	1.78E+02	6.27E+02
Fe(CN)6-4	2.19E+00	1.37E+00	2.48E+02	7.00E+01	5.30E-02	3.22E+02
HEDTA (1)	7.41E+01	3.98E+01	4.95E+00	1.65E+00	4.13E+01	1.62E+02
Hg+ (2)						
K+ (1)	5.00E+00	2.53E+01	2.89E+01	1.84E-01	4.52E-01	5.99E+01
La+ (1)	1.48E+00		3.99E-01			1.88E+00
Mn+4	2.10E+01	1.13E+01	1.31E+01	5.12E+01	2.35E+01	1.20E+02
Na+	1.45E+04	2.11E+04	1.16E+04	2.10E+03	3.78E+03	5.31E+04
Ni+2	5.02E+00	3.33E+00	1.25E+02	4.40E+01	9.93E-01	1.78E+02
NO2-	1.76E+03	8.01E+02	2.06E+03	4.74E-01	2.32E+02	4.85E+03
NO3-	2.63E+04	4.55E+04	1.89E+04	2.59E+02	4.89E+03	9.59E+04
OH-	4.53E+02	2.30E+03	1.04E+03	1.42E+03	1.74E+02	5.39E+03
PO4-3	2.67E+03	1.10E+02	1.81E+03	2.98E+01	8.61E-01	4.62E+03
Pb (1)	2.35E+00	3.86E+00	4.23E+02	6.82E+00	1.03E-01	4.36E+02
SiO3-	5.60E+02	2.40E+02	4.04E+02	7.07E-01	2.09E+00	1.21E+03
Sn (1)			5.37E-03			5.37E-03
SO4-2	6.34E+02	2.48E+02	5.53E+02	1.34E+02	8.35E+01	1.65E+03
Sr+2	9.38E-04	6.98E-02	3.59E+01	2.53E-02	5.78E-02	3.60E+01
W+4 (2)						
Zr+4	1.40E+01	2.31E+01	6.50E+00	2.03E+02	1.28E-01	2.46E+02

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Table 5
Aggregated Inventory (Curies) of Radionuclides for Double Shell Tanks

Decayed to 12/31/1995								
Radionuclide	3WDS		3EDS		5EDS		Total	
Ci	Soluble	Insoluble	Soluble	Insoluble	Soluble	Insoluble	12/31/95	12/31/99
Na, kgs	1.30E+06	2.01E+04	5.93E+06	3.80E+04	2.57E+06	1.36E+05	9.99E+06	9.99E+06
C-14		8.06E-01	3.40E+02	1.98E+03	5.23E+00		2.33E+03	2.33E+03
Sr-90	2.16E+04	3.95E+04	6.41E+05	1.03E+07	1.34E+04	5.62E+04	1.11E+07	1.01E+07
Y-90	2.16E+04	3.95E+04	6.41E+05	1.03E+07	1.34E+04	5.62E+04	1.11E+07	1.01E+07
Tc-99	3.66E+03		1.54E+04	3.99E+02	1.60E+03		1.74E+04	2.11E+04
Cs-137	3.63E+06	3.91E+04	2.13E+07	5.44E+05	3.73E+06	1.66E+05	2.94E+07	2.68E+07
Ba-137	3.63E+06	3.91E+04	2.13E+07	5.44E+05	3.73E+06	1.66E+05	2.94E+07	2.55E+07
Eu-154	4.34E+02	4.38E+00	7.14E+04	1.93E+03	5.33E+02		7.43E+04	5.51E+04
Np-237		3.79E-01	6.76E+00	3.83E+01	1.02E-01	3.98E-02	4.56E+01	4.56E+01
Pu-238		1.05E+03	1.65E+02	5.12E+00	1.40E+02	5.46E+01	1.42E+03	1.37E+03
Pu-239	2.02E+01	2.12E+03	1.22E+03	3.72E+03	6.27E+01	1.22E+03	8.36E+03	8.36E+03
Pu-240	5.06E+00	7.59E+02	3.07E+02	9.64E+02	1.57E+01	3.44E+02	2.39E+03	2.39E+03
Pu-241	9.47E+00	1.85E+04	7.43E+02	1.00E+04	2.86E+01	1.03E+04	3.97E+04	3.94E+04
Am-241	1.63E+02	1.17E+04	5.03E+03	5.37E+04	1.47E+02	3.51E+02	7.11E+04	7.07E+04
Total	8.60E+06	2.11E+05	4.99E+07	2.18E+07	1.01E+07	5.93E+05	9.12E+07	8.27E+07