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TABLE OF CONTENTS

ATTACHMENTS

LIST OF TABLES

Revision Description

This revision to this document includes the following substantive changes to the Revision 3 document:

- Updates and revalidates the consolidation of F- and H-Area high level supernate waste into a single supernate waste stream that includes an estimated 5 Ci% (~1 wt%) sludge solids The technical basis for this is WSRC-TR-97-0055, Revision 2, "HLW Sludge Beta Screening Tool" (Reference 4), which concludes that a waste package that "passes" measurement by the beta screening tool, i.e., displays a Cs-137/Sr-90 ratio >17, may have up to 5 Ci% sludge solids. Therefore, this revised distribution represents a conservative distribution that allows for a small amount of incidental sludge contamination.

1.0 Background

Characterization of High Level Waste (HLW) Division supernate waste by the Concentration Storage and Transfer (CST) Department [now the Closure Business Unit (CBU)] is outlined in WSRC-TR-94-0290, Revision 3, *HLW Supernate Radionuclide Characterization* (Reference 1), which provided characterization and validation for the radionuclide content and distribution of supernate-contaminated waste generated during operations, maintenance, and construction activities conducted in the F- and H-Area Tank Farms. Salt managed in the F- and H-Area Tank Farms has the same radionuclide distribution as supernate and, accordingly, the supernate characterization and validation also covered salt-contaminated waste.

The characterization of supernate waste discussed in Reference 1 was based primarily on process knowledge. Validation was based on the results of analyses of samples collected and analyzed within two years prior to the publication of the document. The document did not differentiate between waste generated in the F- and H-Areas, but provided a single characterization for the entire supernate waste stream generated in these areas.

The Waste Characterization System (WCS) was established in 1996 to consolidate waste characterization information. Inventories and compositions of major radionuclide and chemical constituents are based on tank fill histories. Minor constituent inventories are based on compositions developed during DWPF design. Fill histories for each tank are also contained in the WCS (Reference 2). Subsequent analytical data is incorporated into this database as deemed appropriate.

The current document provides a recharacterization and revalidation for supernate- and salt-contaminated waste generated from the F- and H-Area Tank Farms, based on current process knowledge and available analytical data. The scaling factors developed in this document supercede those presented in Reference 1, and any other previously-developed radionuclide characterizations for F- and H-Area Tank Farm supernate- and salt-contaminated waste.

2.0 Introduction

This document will develop a radionuclide distribution for supernate-contaminated waste stored in the F- and H-Area Tank Farms in accordance with the methodology outlined in WSRC 1S SRS Waste Acceptance Criteria Manual, *Procedure 2.02 Low Level, Hazardous, TRU, Mixed, and PCB Waste Characterization Requirements*, Revision 7 (Reference 3). This distribution is based on the assumptions that (1) supernate-contaminated waste from all F- and H-Area High Level Waste Tanks could be co-mingled, and the actual contamination present on waste in a series of containers from these tanks will be representative of the mean radionuclide distribution, and (2) high level supernate waste from F- and H-Area tanks contains up to 5 Ci% sludge solids (Reference 4).

The original characterization of F- and H-Area high level supernate waste was based primarily on process knowledge and fill histories; a single, comprehensive characterization for supernate was developed from this information (Reference 1).

Most of the waste contaminated with supernate from the F- and H-Area Tank Farms will be categorized as Low Level Waste (LLW) and disposed of in the E-area Vaults (EAV). The waste does, however, have the potential to be categorized as TRU and/or mixed waste. Quantification of hazardous constituents and determination of whether the waste is classified as mixed is dependent on the amount of supernate present on the waste matrix and the nature of the waste matrix, and will be performed on a case-by-case basis. Quantification of radionuclides present in each waste package will be performed as described in Section 5.0.

The radionuclide distribution developed for LLW contaminated with supernate from the F- and H-Area Tank Farms can also be applied to waste classified as transuranic. [Neither WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure 3.06, *E-Area TRU Pads Transuranic Waste Acceptance Criteria*,

Revision 5, nor Appendix A:34, *TRU Waste Container Characterization Form (OSR 29-90) Instruction* specifies a methodology for determination of the isotopic distribution in TRU Waste; simply that the methodology be documented.]

WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure 2.02, Revision 7 (Reference 3), allows generators to use scaling factors derived from process knowledge and/or sampling and analysis data to characterize the radionuclide content of the waste. Since the available record of supernate sample data is limited (primarily due to the logistical difficulties and ALARA considerations associated with sampling the high level waste tanks), this characterization is based primarily on process knowledge of tank fill histories and compositions developed during limited supernate sampling as reflected in the WCS (Reference 2). Periodic validation of the distribution developed in this document will be performed as discussed in Section 6.

3.0 Development of a Radionuclide Distribution for Supernate-Contaminated Waste

The development of the radionuclide distribution in this section is performed per guidance outlined in WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure 2.02, Revision 7 (Reference 3). The distribution was developed assuming a potential mixture of 95 Ci% supernate to 5 Ci% sludge based on current WCS data. The technical basis for this is WSRC-TR-97-0055, Revision 2, "HLW Sludge Beta Screening Tool" (Reference 4), which concludes that a waste package that "passes" the beta screening tool, i.e., displays a Cs-137/Sr-90 ratio >17, may have up to 5 Ci% (~1 wt%) sludge solids. Therefore, the radionuclide distribution resulting from this new characterization represents a conservative distribution that allows for a small amount of incidental sludge contamination. Since dose-to-curie is the characterization method of choice for F- and H-Area Tank Farm waste, this new characterization is also conservative for waste that has less than 5 Ci% sludge solids. [Note: This is illustrated in Attachment 12 where a B-25 with 5000 lb maximum weight 100 Ci% supernate-contaminated waste (Case 1) is compared to an identical B-25 with maximum weight 95 Ci% supernate/5 Ci% sludge-contaminated waste (Case 2) each with a dose rate of 1 mrem/hr at 5 ft. The E-Area Vault PA sum-of-fractions is nearly identical while the nCi/gm of TRU components is significantly higher in Case 2.]

3.1 Determining the Initial List of Radionuclides

WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure 2.02, Revision 7 (Reference 3), stipulates that the characterization of each package of waste having a total activity greater than 2 nanocuries/gram must consider the potential presence of any radionuclide that meets any one of three criteria:

1. The radionuclide is identified in WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure 3.17, *Low Level Waste Acceptance Criteria*, Revision 7 (Reference 5), as being a Performance Assessment (PA) or Safety Authorization (SA) Basis radionuclide for a specific Treatment, Storage or Disposal (TSD) facility. For purposes of this distribution, we will use those PA and SA radionuclides for the EAV.

2. The radionuclide could be present in the waste with a relative activity greater than 1.0% of the total waste stream activity at the time of the characterization.

3. The radionuclide is a detectable transuranic or a fissile radionuclide.

The above criteria are hereafter referred to as "inclusion criteria."

Based on the three inclusion criteria and available process knowledge, the following list of 31 radionuclides (Table 3.1) will be considered when developing the radionuclide distribution of waste packages contaminated with supernate from the F- and H-Area Tank Farms.

Table 3.1. Radionuclides Important to Characterization of Supernate-Contaminated Waste				
Radionuclide	Inclusion Criteria			
	PA Limiting	SA Limiting	Potentially Present At >1% Total Activity	Detectable Fissile or TRU Radionuclide
H-3		SA		
C-14	PA			
Ni-59			X	
Co-60			X	
Ni-63			X	
Sr-90			X	
Y-90			Daughter of Sr-90	
Tc-99	PA			
I-129	PA			
Cs-137			X	
Ba-137m			Daughter of Cs-137	
Pm-147			X	
Eu-154			X	
U-233			X	Detectable Fissile
U-234	PA			
U-235			X	Detectable Fissile
U-238	PA			
Np-237			X	Detectable TRU
Np-239			X	
Pu-238			X	Detectable TRU
Pu-239			X	Detectable Fissile, TRU
Pu-240			X	Detectable TRU
Pu-241			X	Detectable Fissile
Pu-242			X	Detectable TRU
Am-241			X	Detectable TRU
Am-242m			X	Detectable Fissile, TRU
Am-243			X	Detectable TRU
Cm-244			X	
Cm-245			X	Detectable Fissile, TRU
Cm-246			X	Detectable TRU
Cm-247			X	Detectable Fissile, TRU

The supernate radionuclide distribution determined in the present characterization is based on the previous supernate characterization (Reference 1) and data presently contained in the WCS for F- and H-Area HLW tanks (Attachments 1, 2, and 3). The WCS was established in 1996 to consolidate waste characterization information. Inventories and compositions of major waste tank constituents are based on tank fill histories. Minor constituent inventories are based on compositions developed during design of the Defense Waste Processing Facility. Subsequent analytical data are incorporated into the WCS as deemed appropriate.

For the current characterization, if supernate data were not available in the WCS for a radionuclide highlighted as important in the previous characterization (Reference 1), the previous characterization distribution values were used, after correction for decay since 1999 (Attachments 4 and 5).

Scaling factors and Ci% distributions for radionuclides known to be present in sludge solids in the F- and H-Area Tank Farms were calculated from decay-corrected radionuclide inventories and tank volume data in the WCS, as well as projections for a significant transfer of a solution of americium and curium from F-

Canyon to H-Area Tank 51 that has recently occurred but not yet been incorporated into the WCS (Reference 6; Attachments 1, 6, and 7).

Waste stream averages for radionuclide distribution data and resultant scaling factors are conservatively calculated to include only those tanks that contained the particular radionuclide, i.e., zero concentrations are not included in the averages. All tanks that were reported to have both a sludge layer and a supernatant layer were used to determine average radionclide values. This is consistent with the analysis that was done in Reference 4. To be consistent with the waste stream consolidation criteria of Reference 3, PA isotope levels in the approved H- and F-Area Tank Farm waste streams (References 6 and 7) were checked to ensure that the individual values were within a factor of 10 of the average for all included tanks. This was true for all PA isotopes except I-129; for this isotope, only the tanks included in the approved waste streams were used to obtain an average that met the Reference 3 WAC 2.02 criteria.

After development of the two consolidated waste streams [supernate (Attachment 5) and sludge (Attachment 7)], these two were combined in Attachment 8 to represent the new combined 95 Ci% supernate – 5 Ci% sludge waste stream, FHW-00001.

3.2 Excluding Radionuclides from Consideration

Under WAC 2.02, Revision 7, radionuclides that meet one of the inclusion criteria outlined in section 3.1 may be excluded from further consideration for a waste stream if one or more of the following conditions exist:

1. There is no reason to expect the radionuclide to be present in the waste stream.

2. For non-SA or -PA radionuclides, or non-detectable fissile or TRU radionuclides, the individual activity contribution is less than 1% of the total radionuclide activity.

The above criteria are hereafter referred to as "exclusion criteria;" exclusion results are presented in Table 3.2.

(Note: WSRC 1S SRS Waste Acceptance Criteria Manual, Procedure WAC 2.02, Revision 7, also allows for exclusion from the waste stream distribution of radionuclides whose activities are below specific analytical laboratory Maximum Allowable Lower Limits of Detection [MALLDs]. For conservatism, this exclusion criterion will not be used for this primarily process-knowledge-based characterization of supernate waste.

Of the 31 radionuclides listed in Table 3.1, no radionuclide is excluded because it is not expected to be present; based on process knowledge and limited analytical data all the listed radionuclides could be present in supernate waste. Of the radionuclides included because they were expected to be present at more than 1% of total activity, 7 are determined to be present at less than 1% of the total activity in the waste stream. Two of these radionuclides, however, are retained in the distribution since they are near 1% of total activity. This determination is presented in Attachment 9.

Table 3.2. Radionuclides Excluded from Consideration, Supernate		
Radionuclide	**Exclusion Criteria**	
	Not Expected	**Present at <1%**
H-3		X(b)
C-14		
Ni-59		X
Co-60		
Ni-63		X
Sr-90		
Y-90		
Tc-99		
I-129		
Cs-137		
Ba-137m		
Pm-147		X(b)
Eu-154		X
U-233		
U-234		
U-235		
U-238		
Np-237		
Np-239		X
Pu-238		
Pu-239		
Pu-240		
Pu-241		
Pu-242		
Am-241		
Am-242m		
Am-243		
Cm-244		X
Cm-245		
Cm-246		
Cm-247		

(a) For those radionuclides included only because they were expected to be present at >1%

(b) Retained in distribution since they are close to 1% total activity

NOTE: Bold = PA/SA radionuclides

3.3 Development of the Supernate Distribution

Thirty-one radionuclides were determined to be important for characterization of the supernate in F-and H-Tank Farms to be quantified (Table 3.2). Current tank contents were used to update the scaling factors to create an isotopic distribution for the waste stream, assuming a potential 95 Ci% supernate 5 Ci% sludge mixture, as discussed in Section 3.2.

The radionuclides, their mean activity distribution, and mean scaling factors (to Cs-137) in the F- and H-Area Tank Farm consolidated supernate waste stream are determined in Attachment 10 and Table 3.3.

Table 3.3. Radionuclide Activity Distribution and Scaling Factors for F- and H-Area Tank Farms Supernate

Radionuclide	LAWV Limiting Category	Activity Distribution Normalized (%)	Scaling Factors (Ci/Ci Cs-137)
H-3	SA	1.59E-01	3.28E-03
C-14	PA	9.44E-05	1.96E-06
Co-60		1.01E+00	2.08E-02
Sr-90		2.29E+00	4.74E-02
Y-90		2.29E+00	4.74E-02
Tc-99	PA	9.60E-03	1.99E-04
I-129	PA	9.94E-06	2.06E-07
Cs-137		4.83E+01	1.00E+00
Ba-137m		4.57E+01	9.46E-01
Pm-147		1.04E-01	2.15E-03
U-233	Fissile	4.98E-06	1.03E-07
U-234	PA	4.71E-06	9.76E-08
U-235	Fissile	1.42E-06	2.94E-08
U-238	PA	2.04E-06	4.22E-08
Np-237	TRU	2.31E-06	4.78E-08
Pu-238	TRU	6.24E-02	1.29E-03
Pu-239	Fissile, TRU	1.30E-03	2.70E-05
Pu-240	TRU	2.70E-02	5.58E-04
Pu-241	Fissile	3.47E-02	7.18E-04
Pu-242	TRU	6.41E-04	1.33E-05
Am-241	TRU	2.39E-02	4.94E-04
Am-242m	Fissile, TRU	7.39E-04	1.53E-05
Am-243	TRU	1.82E-03	3.76E-05
Cm-245	Fissile, TRU	7.49E-06	1.55E-07
Cm-246	TRU	2.49E-05	5.15E-07
Cm-247	Fissile, TRU	1.21E-10	2.51E-12
Total Radionuclides		**1.00E+02**	**2.07E+00**
Total TRU			**2.44E-03**

3.4 Other WAC Criteria

3.4.1 Comparison to Package Guidelines

Most supernate-contaminated waste will be disposed of in the E-Area Vaults. Administrative Waste Package Radiological Concentration Guidelines apply to waste disposed of in the EAV. The guidelines applicable to the Low Activity Waste Vault (LAWV), that portion of the EAV reserved for low activity waste, will be used for comparison since they are the most restrictive of the EAV facilities. Low activity waste is defined as waste that will produce less than or equal to 200 mR/hr at 5 cm from an unshielded final disposal container. The concentration of each radionuclide in the F- and H-Area Tank Farm supernate waste stream (Table 3.3) and their corresponding LAWV limits (Reference 5) are compared in Table 3.4. Calculations supporting this comparison are in Attachment 11. LAWV limits are expressed in Ci/ft^3 waste and Ci/90 ft^3 B-25 container.

Table 3.4. Comparison of Supernate-Contaminated Waste to LAWV Limits

Radionuclide	Supernate (Ci/gal)	LAWV Limit (Ci/ft^3)	LAWV Limit (Ci/B-25)	Gallons of supernate in B-25 to reach LAWV limit
	A	B	C=B*90 ft3/B-25	D=C/A
H-3	1.59E-02	1.10E+01	9.90E+02	6.22E+04
C-14	9.48E-06	2.50E-05	2.25E-03	2.37E+02
Tc-99	9.64E-04	5.60E-05	5.04E-03	5.23E+00
I-129	9.98E-07	1.10E-08	9.90E-07	**9.92E-01**
U-234	4.73E-07	1.10E-03	9.90E-02	2.09E+05
U-238	2.05E-07	1.20E-03	1.08E-01	5.28E+05

From the container limits, the maximum volume of supernate that could be present in a B-25 container while still meeting the LAWV limits can be calculated. The most limiting isotope in waste stream FHW-00001 is I-129, for which more than 1 gallon of supernate in a B-25 would cause the waste to exceed the LAWV limit. Supernate in the F- and H-Area Tank Farms has an average total activity of 10 Ci/gallon and a total transuranic isotope activity of 1.18E-02 Ci; accordingly, 1 gallon of supernate would be equivalent to 10 Ci in a B-25, 0.01 Ci of which are transuranics. Per Table 3.5 below, a B-25 container with less than 258 lb. of waste and 1 gallon or more of supernate will fail TRU limits at the LAWV limit for I-129. At the maximum waste weight for a B-25 container (5000 lb) and the presence in the waste of the maximum volume (1 gallon) of supernate to meet the LAWV limit for I-129, the waste would be well within (5 nCi/g) the TRU limit of 100 nCi/g. In practice, very few waste boxes fail TRU limits. Any such box will, upon entry into WITS, be flagged as TRU and not be sent to the LAWV.

Table 3.5. Comparison of Maximum Amount of Supernate Present to Meet LAWV limits vs. TRU Criteria

Max gals supernate / B-25 to meet LAWV criteria	Average total Ci / gallon supernate	Average total Ci / B-25 at LAWV limit	Average total TRU Ci / gallon supernate	Average total TRU Ci / B-25 at LAWV limit	TRU nCi/g at maximum waste weight (5000 lb) in a B-25 at LAWV limit	Minimum waste weight in B-25 to not be TRU waste (lb)
A	B	C=A*B	D	E=(D/B)*C	=(E*1E+09nCi/Ci) / (5000 lb*454 g/lb)	=(E*1E+09nCi/Ci) / (454 g/lb*100 nCi/g)
9.92E-01	1.00E+01	9.96E+00	1.18E-02	1.17E-02	5.17E+00	2.58E+02

Note: Average total activity of supernate from Attachment 8 and 11 =1.00E+01 Ci/gal.
Average total TRU activity of supernate from Attachments 8 and 11 = 1.18E-02 Ci/gal.

3.4.2 Sum-of-Fractions Calculation

For acceptance of waste packages sent to the LAWV, the radiological content of the waste package must be compared to the administrative guidelines and shown to satisfy the sum-of-fractions criteria where:

activity concentration of isotope A/limit of isotope A
+ activity concentration of isotope B/limit of isotope B.....
+ activity concentration of isotope N/limit of isotope N
≤ 1

Attachment 11 and Table 3.6 calculate the maximum concentration of supernate on supernate-contaminated waste in order for the sum-of-the-fractions criteria to be met.

Table 3.6: Sum-of-Fractions for Supernate-Contaminated Waste

Radionuclide	Ci/gal supernate	Ci/ft^3 supernate	ft^3 supernate / ft^3 waste	Ci/ft^3 waste	LAWV Limit (Ci/ft^3)	Fraction
	A	B=A*7.48	C	D=B*C	E	=D/E
H-3	1.59E-02	1.19E-01	**1.23E-03**	1.47E-04	1.10E+01	1.33E-05
C-14	9.48E-06	7.09E-05	**1.23E-03**	8.74E-08	2.50E-05	3.50E-03
Tc-99	9.64E-04	7.21E-03	**1.23E-03**	8.89E-06	5.60E-05	**1.59E-01**
I-129	9.98E-07	7.46E-06	**1.23E-03**	9.20E-09	1.10E-08	**8.36E-01**
U-234	4.73E-07	3.54E-06	**1.23E-03**	4.36E-09	1.10E-03	3.97E-06
U-238	2.05E-07	1.53E-06	**1.23E-03**	1.89E-09	1.20E-03	1.57E-06
				Sum-of-Fractions		**9.99E-01**

Tc-99 and I-129 dominate the sum-of-the-fractions for supernate waste stream FHW-00001. Primarily based on this dominance, the sum-of-fractions criteria are met for a maximum of 1.23 E-03 ft^3 of supernate (Table 3.6) for each 1 ft^3 of waste, which equates to 1.11E-01 ft^3 (1.23E-03 ft^3 supernate/ft^3 waste x 90 ft^3 maximum waste volume per B-25) or 8.30E-01 gallon of supernate per 90 ft^3 volume B-25 container. Since the mean total activity and the mean total transuranic activity for supernate are, respectively, 10 Ci/gal and 1.18E-02 Ci/gal, this is equivalent to 8.3 total Ci of supernate in a B-25, or 9.81E-03 Ci of transuranic isotopes in a B-25 for this waste stream. Any B-25 waste container containing 9.81E-03 Ci (or 9.81E+06 nCi) of transuranics must contain 9.81E+04 g (or 216 lbs) or more of waste (out of the 5,000 lb limit) in order to be within the TRU limit of 100 nCi/g total transuranics. A B-25 container with less than 216 lbs of waste and 0.83 gallons or more of supernate will fail the TRU limits. At the maximum waste weight for a B-25 container (5000 lb) and the presence in the waste of the maximum volume (0.83 gallon) of supernate to meet the LAWV sum-of-fractions criteria, the waste would be well within (4.3 nCi/g) the TRU limit of 100 nCi/g. In practice, very few waste containers fail TRU limits. Any such container will, upon entry into WITS, be flagged as TRU and not be sent to the LAWV.

Table 3.7. Comparison of Maximum Amount of Supernate Present to Meet LAWV Sum-of-Fractions Limits vs. TRU Criteria

Maximum ft^3 supernate per ft^3 waste to meet sum-of-fractions criteria	Max gals supernate / B-25 to meet sum of fractions criteria	Average total TRU Ci / gallon supernate	Maximum total TRU Ci / B-25 to meet sum-of-fractions criteria	Minimum lb waste weight / B-25 to meet TRU limit of 100 nCi/g	TRU nCi/g in B-25 to meet sum-of-fractions criteria at 5000 lb maximum waste weight
A	B=A*90ft^3/B-25*7.48 gal/ft^3	C	D=B*C	=(D*1E+09 nCi/Ci) / (100 nCi/g* 454 g/lb)	=(D*1E+09 nCi/Ci) / (5000lb*454 g/lb)
1.23E-03	8.30E-01	1.18E-02	9.81E-03	2.16E+02	4.32E+00

3.5.3 Nuclear Criticality Safety Criteria

Sludge-contaminated LLW contains an insignificant quantity of fissionable material to impact nuclear criticality criteria. Attachment 11 and Table 3.8 determine the maximum quantity of sludge that could be placed in a B-25 prior to exceeding the 50-g Fissile Gram Equivalent (FGE) U-235 limit for the LAWV. This is equivalent to 713 gallons of supernate, a significantly greater volume than would meet LAWV and TRU waste limits for a B-25 waste container. Any such box will not be sent to the LAWV for disposal, therefore protecting this requirement.

Table 3.8. Calculation of FGE Equivalent for Supernate-Contaminated Waste

Radionuclide	Activity in blended waste (Ci/gal)	Maximum gallons of supernate in a B-25 to meet FGE equivalent	Maximum Curies supernate in a B-25	Specific activity (Ci/g)	Maximum mass (grams) in a B-25	Equivalence factor	FGE U-235 (g)
	A	B	C=A*B	D	E=C/D	F	G=E*F
U-233	5.00E-07	712.7	3.56E-04	9.648E-03	3.69E-02	1.4	5.17E-02
U-235	1.42E-07	712.7	1.01E-04	2.160E-06	4.70E+01	1.0	4.70E+01
Pu-239	1.31E-04	712.7	9.32E-02	6.132E-02	1.52E+00	1.6	2.43E+00
Pu-241	3.48E-03	712.7	2.48E+00	1.034E+02	2.40E-02	3.5	8.39E-02
Am-242m	7.42E-05	712.7	5.29E-02	9.717E+00	5.44E-03	54.0	2.94E-01
Cm-245	7.52E-07	712.7	5.36E-04	1.716E-01	3.12E-03	24.0	7.50E-02
Cm-247	1.22E-11	712.7	8.69E-09	9.396E-05	9.25E-05	1.6	1.48E-04
						Total FGE U-235	**4.99E+01**

3.6 Documentation of the Supernate Distribution

A low level waste stream form for F- and H-Area Tank Farm Waste Stream, FHW-00001, included as Attachment 12, documents the distribution for F- and H-Area Tank Farms supernate waste. For those packages determined to contain sufficient supernate to be determined mixed and/or transuranic, appropriate waste stream forms will be provided for each package.

4.0 Periodic Validation

Provisions of Procedure WAC 2.02, Revision 7 (Reference 3), require generators of routine wastes to review and confirm the certification of each waste stream at least periodically. Waste stream FHW-00001 is on a five-year schedule.

5.0 References

1. Ketusky, E. T. and R. F. O'Bryant, "HLW Supernate Radionuclide Characterization," WSRC-TR-94-0290, Revision 3, April 19, 1999.

2. Hester, J. R., "High Level Waste Characterization System (WCS)," WSRC-TR-96-0264, Revision 0, December 1996.

3. Procedure WAC 2.02, "Low Level Waste Characterization Requirements," WSRC 1S Savannah River Site Waste Acceptance Criteria Manual, Revision 7, Savannah River Site, November 1, 2002.

4. Ross, R. H., E. T. Ketusky, E. T., R. Petras, and L. E. Rykken, "HLW Characterization in Support of Low Level Waste Certification: HLW Sludge Beta Screening Tool," WSRC-TR-97-0555, Revision 2, March 2003.

5. Procedure WAC 3.17, "Low Level Waste Acceptance Criteria," WSRC 1S Savannah River Site Waste Acceptance Manual, Revision 7, Savannah River Site, September 16, 2002.

6. O'Bryant, R. F. and W. R. Weiss, "Characterization of Radionuclides in H-Modified and Purex Waste Sludges from H-Area High Level Waste Tanks (U)," WSRC-TR-2000-00249, Revision 2, March 2003.

7. O'Bryant, R. F. and J. K. W. Dunaway, "Characterization of Radionuclides in Purex Waste Sludges from F-Area High Level Waste Tanks (U)," WSRC-TR-2000-00215, Revision 1, January 2003.

Attachment 1

F- and H-Area Tank Farms WCS Tank Data

Attachment 1

WCS Tank Data

Tank	Date	Total Waste Volume (gal)	Sludge Volume (gal)	Free Supernate Vol. (gal)	Interstitial Sludge Supernate Vol. (gal)	Interstitial Salt Supernate Vol. (gal)	Total Supernate Vol. (gal)	Supernate Sp.G.	Precipitate Volume (gal)	Dry Precipitate Bulk Sp.G.	Estimated Dry Precipitate Weight (kg)	Precipitate Interstitial (vol. frac.)	Organic Resin Volume (gal)	Organic Resin Sp.G.	Organic Resin Weight (kg)	Zeolite Volume (gal)	Zeolite Sp.G.	Estimated Zeolite Weight (kg)	Sand Weight (kg)	Coal Weight (kg)	Grout Volume (gal)	Level (in)	Sludge Depth (in)	Salt Depth (in)	Free Supernate Depth (in)	Total Supernate Depth (in)	Supernate Concentration (Ci/gal)	Solids Concentration (Ci/gal)	Free Liquid In Tank?	Dry Tank?	Filled To AB Limit For H2 Calculations?	Organic Tank?	Tank Farm Tank?	Total Vapor Space for Empty Tank (gal)
1	03/05/01	505957	7000	18957	4900	105600	129457	1.53	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	186.7	2.6	177.1	7.0	47.8	39	221	0	0	0	0	Y	796740
2	03/05/01	540374	4000	374	2800	117920	121094	1.52	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	199.4	1.5	197.8	0.1	44.7	14	54	0	0	0	0	Y	796740
3	03/05/01	540645	4000	645	2800	117920	121365	1.53	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	199.5	1.5	197.8	0.2	44.8	14	50	0	0	0	0	Y	796740
4	01/05/03	484006	127000	323006	88900	7480	419386	1.32	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	178.6	46.9	12.5	119.2	154.8	17	83	Y	0	0	0	Y	796740
5	01/05/03	60704	28152	32552	15765	0	48317	1.28	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	22.4	10.4	0.0	12.0	17.8	4	219	Y	0	0	0	Y	796740
6	01/05/03	301623	25000	276623	17500	0	294123	1.12	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	111.3	9.2	0.0	102.1	108.5	0	283	Y	0	0	0	Y	796740
7	01/05/03	406310	209000	197310	146300	0	343610	1.36	0	1.1	0	0.9	0	0.761	0	0	0.761	0	4545	3178	0	149.9	77.1	0.0	72.8	126.8	6	43	Y	0	0	0	Y	796740
8	01/05/03	308398	6448	301950	4514	0	306464	1.11	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	113.8	2.4	0.0	111.4	113.1	1	41	Y	0	0	0	Y	796740
9	03/05/01	543626	4000	1626	2800	118360	122786	1.41	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	200.6	1.5	198.5	0.6	45.3	14	57	0	0	0	0	Y	796740
10	03/05/01	192410	4000	0	2800	46860	49660	1.31	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	71.0	1.5	78.6	0.0	18.3	2	7	0	0	0	0	Y	796740
11	01/05/03	278859	140000	138859	98000	0	236859	1.46	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	102.9	51.7	0.0	51.2	87.4	3	86	Y	0	0	0	Y	796740
12	06/08/99	173711	173711	0	0	0	0	1.53	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	64.1	64.1	34.0	0.0	0.0	0	103	0	Y	0	0	Y	796740
13	01/05/03	858550	223000	635550	156100	0	791650	1.41	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	245.3	63.7	0.0	181.6	226.2	25	97	Y	0	0	0	Y	1134000
14	03/05/01	173950	27000	0	18900	34320	53220	1.40	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	49.7	7.7	44.6	0.0	15.2	33	45	0	0	0	0	Y	1134000
15	02/26/98	213500	213500	0	0	0	0	1.27	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	61.0	61.0	29.3	0.0	0.0	0	75	0	Y	0	0	Y	1134000
16	08/12/80	0	0	0	0	0	0	0.00	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0	0	0	Y	0	0	Y	1134000
17	07/01/97	0	0	0	0	0	0	0.00	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	1300000	0.0	0.0	0.0	0.0	0.0	0	0	0	Y	0	0	Y	1693640
18	01/05/03	318600	47000	271600	32900	0	304500	1.18	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	90.0	13.3	0.0	76.7	86.0	0	0	Y	0	Y	0	Y	1693640
19	01/05/03	10620	2542	8078	1779	0	9857	1.18	0	1.1	0	0.9	0	0.761	0	12440	0.761	35835	0	0	0	3.0	0.7	0.0	2.3	2.8	0	0	Y	0	0	0	Y	1693640
20	05/08/97	0	0	0	0	0	0	0.00	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	1300000	0.0	0.0	0.0	0.0	0.0	0	0	0	Y	0	0	Y	1693640
21	01/24/03	882168	14000	868168	9800	0	877968	1.04	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	249.2	4.0	0.0	245.2	248.0	0	8	Y	0	Y	0	Y	1693640
22	01/05/03	764498	21000	743498	14700	0	758198	1.04	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	216.0	5.9	0.0	210.0	214.2	0	12	Y	0	Y	0	Y	1693640
23	01/05/03	1274754	43000	1231754	30100	0	1261854	1.02	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	360.1	12.1	0.0	348.0	356.5	0	0	Y	0	Y	0	Y	1693640
24	01/05/03	1231566	0	1231566	0	0	1231566	1.04	0	1.1	0	0.9	0	0.761	0	4000	0.761	11522	0	0	0	347.9	0.0	0.0	347.9	347.9	0	0	Y	0	0	0	Y	1693640
25	01/05/03	1284695	0	176695	0	243760	420455	1.41	0	1.1	0	0.9	0	0.761	0	1050	0.761	3025	0	0	0	366.0	0.0	315.7	50.3	119.8	7	6	Y	0	0	0	Y	1389960
26	01/29/03	1221480	281000	940480	196700	0	1137180	1.36	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	348.0	80.1	0.0	267.9	324.0	8	9	Y	0	Y	Y	Y	1389960
27	01/05/03	1281641	0	818641	0	101860	920501	1.48	0	1.1	0	0.9	0	0.761	0	4990	0.761	14374	0	0	0	365.1	0.0	131.9	233.2	262.3	8	7	Y	0	0	0	Y	1389960
28	01/05/03	1223586	0	191586	0	227040	418626	1.46	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	348.6	0.0	294.0	54.6	119.3	9	8	Y	0	0	0	Y	1389960
29	01/05/03	1086415	0	86415	0	220000	306415	1.21	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	309.5	0.0	284.9	24.6	87.3	10	9	Y	0	0	0	Y	1389960
30	01/05/03	1273533	500	1207045	350	14517	1221913	1.47	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	362.8	0.1	18.8	343.9	348.1	20	213	Y	0	Y	0	Y	1389960
31	01/05/03	1259844	0	245844	0	223080	468924	1.47	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	358.9	0.0	288.9	70.0	133.6	22	20	Y	0	0	0	Y	1389960
32	01/05/03	718357	182871	535486	128010	0	663495	1.51	0	1.1	0	0.9	0	0.761	0	6700	0.761	19300	0	0	0	204.7	52.1	0.0	152.6	189.0	19	141	Y	0	0	0	Y	1389960
33	01/05/03	542120	39000	276120	27300	49940	353360	1.17	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	154.5	11.1	64.7	78.7	100.7	1	325	Y	0	0	Y	Y	1389960
34	01/05/03	1256475	25000	1019475	17500	46640	1083615	1.17	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	358.0	7.1	60.4	290.4	308.7	8	760	Y	0	0	0	Y	1389960
35	01/05/03	1108704	64584	1044120	45209	0	1089329	1.30	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	315.9	18.4	0.0	297.5	310.4	15	336	Y	0	0	0	Y	1389960
36	01/05/03	1255316	150	161166	105	240680	401951	1.47	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	357.6	0.0	311.7	45.9	114.5	41	188	Y	0	0	0	Y	1389960
37	01/05/03	661740	0	0	0	214060	214060	1.43	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	188.5	0.0	277.2	0.0	61.0	27	25	Y	0	Y	0	Y	1389960
38	01/28/03	981747	0	95472	0	194981	290453	1.49	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	279.7	0.0	252.5	27.2	82.8	2	2	Y	0	Y	0	Y	1389960
39	01/05/03	693401	92664	600737	64865	0	665601	1.34	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	197.6	26.4	0.0	171.2	189.6	7	235	Y	0	0	0	Y	1389960
40	01/05/03	508950	508950	0	356265	0	356265	1.04	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	145.0	145.0	0.0	0.0	101.5	0	16	Y	0	0	0	Y	1389960
41	01/05/03	1221831	0	0	0	268957	268957	1.38	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	348.1	0.0	348.3	0.0	76.6	3	3	Y	0	0	0	Y	1389960
42	01/05/03	1264653	13575	1251078	10860	0	1261938	1.31	0	1.1	0	0.9	0	0.761	0	765	0.761	2204	0	0	0	360.3	3.9	0.0	356.4	359.5	2	52	Y	0	0	0	Y	1389960
43	01/28/03	1132010	58756	950170	41129	27078	1018378	1.12	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	322.5	16.7	35.1	270.7	290.1	1	40	Y	0	0	Y	Y	1389960
44	01/05/03	1277745	0	286745	0	217580	506325	1.52	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	364.0	0.0	281.8	82.3	144.3	10	9	Y	0	0	0	Y	1389960
45	01/05/03	1278307	0	148307	0	248600	396907	1.49	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	364.2	0.0	321.9	42.3	113.1	10	9	Y	0	0	0	Y	1389960
46	01/29/03	928395	0	260582	0	146919	407501	1.50	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	264.5	0.0	190.3	74.2	116.1	10	9	Y	0	Y	0	Y	1389960
47	01/05/03	1201789	248000	85789	173600	190960	450349	1.32	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	342.4	70.7	247.3	24.4	128.3	3	4	Y	0	0	0	Y	1389960
48	01/05/03	235170	0	235170	0	0	235170	1.15	24570	1.1	102305	0.9	0	0.761	0	0	0.761	0	0	0	0	67.0	0.0	0.0	67.0	67.0	0	32	Y	0	0	0	Y	1389960
49	01/05/03	848016	0	821340	0	5869	827209	1.16	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	241.6	0.0	7.6	234.0	235.7	20	19	Y	0	0	0	Y	1389960
50	01/05/03	58266	0	58266	0	0	58266	1.06	0	1.1	0	0.9	0	0.761	0	0	0.761	0	0	0	0	16.6	0.0	0.0	16.6	16.6	0	0	Y	0	0	0	Y	1389960
51	01/05/03	435240	435240	0	348192	0	348192	1.01	0	1.1	0	0.9	0	0.761	0	4335	0.761	12487	0	0	0	124.0	124.0	0.0	0.0	99.2	0	2	Y	0	0	0	Y	1389960
Total		36304256	3273643	17780846	2061443	3430981	23273270		24570				0		0	34280		98747	4545	3178	2600000													

Reference:
M:\WASTE8\Hlcats\WCSystem\[WCSystem.xls]TankData
Reference Date: 9/11/02; Latest Data Update: 1/29/03;
Date Retrieved: 2/20/03

Attachment 2

F- and H-Area Tank Farms WCS Supernate Inventory

Attachment 2

F- and H-Area Tank Farms WCS Supernate Inventory

Tank	H-3 (Ci)	C-14 (Ci)	Co-60 (Ci)	Ni-59 (Ci)	Ni-63 (Ci)	Se-79 (Ci)	Sr-90 (Ci)	Y-90 (Ci)	Nb-94 (Ci)	Tc-99 (Ci)	Ru-106 (Ci)	Rh-106 (Ci)	Sb-125 (Ci)	Sn-126 (Ci)	I-129 (Ci)	Cs-134 (Ci)	Cs-135 (Ci)	Cs-137 (Ci)	Ba-137m (Ci)	Ce-144 (Ci)	Pr-144 (Ci)
1																		2.57E+06	2.43E+06		
2																		8.91E+05	8.42E+05		
3																		8.93E+05	8.44E+05		
4																		3.69E+06	3.49E+06		
5																		8.71E+04	8.24E+04		
6																		1.07E+04	1.01E+04		
7																		1.01E+06	9.55E+05		
8																		1.10E+05	1.04E+05		
9																		8.85E+05	8.37E+05		
10																		6.25E+04	5.91E+04		
11																		3.09E+05	2.92E+05		
12																		0.00E+00	0.00E+00		
13																		1.03E+07	9.79E+06		
14																		8.89E+05	8.41E+05		
15																		0.00E+00	0.00E+00		
16																		0.00E+00	0.00E+00		
17																		0.00E+00	0.00E+00		
18																		5.82E+03	5.50E+03		
19																		1.88E+02	1.78E+02		
20																		0.00E+00	0.00E+00		
21																		4.08E+03	3.86E+03		
22																		1.78E+03	1.68E+03		
23																		1.74E+02	1.65E+02		
24																		1.84E+03	1.74E+03		
25																		1.49E+06	1.41E+06		
26																		4.81E+06	4.55E+06		
27																		3.75E+06	3.55E+06		
28																		1.87E+06	1.77E+06		
29																		1.56E+06	1.48E+06		
30																		1.26E+07	1.21E+07		
31																		5.32E+06	5.04E+06		
32																		6.44E+06	6.09E+06		
33																		1.82E+05	1.72E+05		
34																		4.30E+06	4.06E+06		
35																		8.43E+06	7.97E+06		
36																		8.40E+06	7.95E+06		
37																		2.94E+06	2.78E+06		
38																		2.81E+05	2.65E+05		
39																		2.38E+06	2.25E+06		
40																		3.73E+03	3.53E+03		
41																		4.20E+05	3.97E+05		
42																		1.21E+06	1.15E+06		
43																		7.75E+05	7.33E+05		
44																		2.68E+06	2.54E+06		
45																		1.99E+06	1.88E+06		
46																		2.07E+06	1.96E+06		
47																		7.31E+05	6.92E+05		
48																		1.41E+04	1.33E+04		
49																		8.59E+06	8.12E+06		
50																		1.22E+00	1.15E+00		
51																		1.56E+04	1.48E+04		
Total																		1.05E+08	9.95E+07		

Attachment 2

F- and H-Area Tank Farms WCS Supernate Inventory

Tank	Pm-147 (Ci)	Eu-154 (Ci)	Th-232 (Ci)	U-232 (Ci)	U-233 (Ci)	U-234 (Ci)	U-235 (Ci)	U-236 (Ci)	U-238 (Ci)	Np-237 (Ci)	Pu-238 (Ci)	Pu-239 (Ci)	Pu-240 (Ci)	Pu-241 (Ci)	Pu-242 (Ci)	iAm-241 (Ci)	Am-241 (Ci)	Am-242m (Ci)	Cm-244 (Ci)	Cm-245 (Ci)
1				5.45E-05			2.41E-04		5.81E-03	5.33E-03	1.54E+01	2.33E+00	5.56E-01	4.52E+00	1.79E-04	8.19E-01	8.06E+00	1.01E-02	1.59E-03	1.84E-09
2				5.10E-05			2.25E-04		5.44E-03	4.99E-03	1.44E+01	2.18E+00	5.20E-01	4.23E+00	1.68E-04	7.66E-01	7.54E+00	9.46E-03	1.49E-03	1.72E-09
3				5.11E-05			2.26E-04		5.45E-03	5.00E-03	1.44E+01	2.18E+00	5.21E-01	4.24E+00	1.68E-04	7.68E-01	7.55E+00	9.46E-03	1.49E-03	1.72E-09
4				4.96E-04			5.36E-04		2.32E-02	2.07E-02	4.19E+00	4.14E+00	9.26E-01	8.89E+00	1.90E-04	1.21E+00	7.75E+01	1.00E-01	2.22E-02	1.67E-08
5				4.48E-05			8.24E-05		1.95E-03	3.30E-03	2.27E+00	3.79E-01	9.06E-02	6.89E-01	2.67E-05	1.35E-01	7.26E+00	9.25E-03	1.65E-03	1.58E-09
6				3.69E-04			3.97E-04		1.48E-02	5.15E-03		1.52E+00	5.28E-01	6.73E+00	1.04E-03	1.03E+00	5.86E+01	7.56E-02	1.52E-02	1.26E-08
7				1.45E-04			6.39E-04		1.54E-02	1.41E-02	4.09E+01	6.18E+00	1.48E+00	1.20E+01	4.76E-04	2.17E+00	2.14E+01	2.68E-02	4.22E-03	4.88E-09
8				1.67E-04			3.86E-04		1.78E-02	8.07E-03	3.23E+01	5.07E+00	1.19E+00	1.29E+01	1.51E-03	1.22E+00	2.45E+01	3.17E-02	6.82E-03	5.39E-09
9			6.68E-05	1.87E-05	1.37E-02	1.93E-03	5.28E-05	1.99E-04	6.17E-04	4.97E-03	1.87E+01	4.91E-01	2.03E-01	4.07E+00	1.35E-04	7.52E-01	5.57E+00	6.76E-03	1.53E-02	2.02E-06
10			2.70E-05	7.56E-06	5.54E-03	7.81E-04	2.14E-05	8.05E-05	2.50E-04	2.01E-03	7.58E+00	1.99E-01	8.22E-02	1.64E+00	5.45E-05	3.04E-01	2.25E+00	2.73E-03	6.20E-03	8.15E-07
11			4.23E-06	4.91E-08	6.03E-04	4.95E-04	9.33E-06	7.65E-05	1.73E-05	3.27E-04	4.52E+01	4.39E-01	2.76E-01	1.79E+01	5.87E-04	1.76E+00	2.10E+00	2.50E-03	1.44E-02	1.60E-06
12																				
13			4.31E-04	1.20E-04	8.82E-02	1.25E-02	3.40E-04	1.28E-03	3.98E-03	3.20E-02	1.21E+02	3.17E+00	1.31E+00	2.62E+01	8.69E-04	4.85E+00	3.59E+01	4.36E-02	9.88E-02	1.30E-05
14			1.20E-04	3.66E-05	4.24E-03	5.82E-04	4.71E-05	5.01E-05	8.98E-04	6.22E-03	2.84E+00	6.86E-01	2.22E-01	1.27E+00	4.06E-05	2.76E-01	7.13E+00	8.85E-03	5.26E-03	6.93E-07
15																				
16																				
17																				
18				2.94E-05			2.23E-04		1.20E-02		5.11E+01	7.30E+00	1.86E+00	3.41E+01	2.39E-03	3.69E+00			3.70E-04	2.90E-10
19				5.31E-07			3.50E-06		3.20E-04		1.31E+00	1.88E-01	4.19E-02	5.45E+00	8.63E-05	5.26E-01			7.56E-06	5.01E-12
20																				
21			1.04E-06		3.19E-02	3.15E-02	4.34E-04	6.44E-03	2.94E-04	1.94E-02	1.75E+02	2.02E-01	1.17E-01	4.35E+00	9.81E-05	5.02E-01	8.40E+00	1.01E-02	9.60E-02	8.64E-06
22				9.94E-02	3.57E-02	5.46E-04	5.88E-03	7.95E-04	2.17E-02	1.50E+02							8.69E+00	1.05E-02	1.01E-01	9.19E-06
23																				
24																				
25				1.44E-03			3.27E-03		2.99E-01		2.48E+03	3.54E+02	7.90E+01	1.96E+03	1.63E-02	7.66E+01			2.88E-02	1.21E-08
26				3.89E-03			8.84E-03		8.08E-01		6.70E+03	9.56E+02	2.14E+02	5.29E+03	4.40E-02	2.07E+02			7.79E-02	3.27E-08
27				3.15E-03			7.16E-03		6.54E-01		5.42E+03	7.74E+02	1.73E+02	4.28E+03	3.56E-02	1.68E+02			6.30E-02	2.65E-08
28				1.43E-03			3.26E-03		2.97E-01		2.46E+03	3.52E+02	7.87E+01	1.95E+03	1.62E-02	7.63E+01			2.87E-02	1.21E-08
29			1.67E-04	4.66E-05	3.42E-02	4.82E-03	1.32E-04	4.97E-04	1.54E-03	1.24E-02	4.68E+01	1.23E+00	5.07E-01	1.01E+01	3.37E-04	1.88E+00	1.39E+01	1.69E-02	3.83E-02	5.03E-06
30			6.65E-04	1.86E-04	1.36E-01	1.92E-02	5.25E-04	1.98E-03	6.14E-03	4.94E-02	1.86E+02	4.89E+00	2.02E+00	4.05E+01	1.34E-03	7.48E+00	5.54E+01	6.73E-02	1.53E-01	2.01E-05
31			2.55E-04	7.14E-05	5.23E-02	7.37E-03	2.02E-04	7.60E-04	2.36E-03	1.90E-02	7.15E+01	1.88E+00	7.76E-01	1.55E+01	5.15E-04	2.87E+00	2.13E+01	2.58E-02	5.85E-02	7.70E-06
32						2.95E-02	4.22E-04	6.61E-03	1.98E-04	1.22E-02	4.37E+03	3.75E+01	2.79E+01	2.17E+03	5.87E-02	1.51E+02	1.26E+02	1.53E-01	1.05E+00	9.53E-05
33				1.02E-02	4.87E-08	4.06E-04	2.19E-02	9.73E-03	3.21E+00	1.25E+00	2.97E+00	8.98E+02	1.64E+02	5.13E+03	8.38E-03	3.58E+01	1.40E+03	1.91E+00	6.99E-01	2.94E-07
34				4.97E-02			4.74E-02		3.34E+00	2.58E+00		5.40E+02	1.21E+02	2.84E+03	2.50E-02	1.20E+02	6.90E+03	9.35E+00	3.31E+00	1.45E-06
35						4.72E-02	8.20E-04	1.39E-02	4.84E-04	1.71E-02	7.22E+03	5.72E+01	4.38E+01	3.86E+03	9.82E-02	2.38E+02	1.74E+02	2.13E-01	1.65E+00	1.30E-04
36			2.19E-04	6.12E-05	4.48E-02	6.32E-03	1.73E-04	6.52E-04	2.02E-03	1.63E-02	6.13E+01	1.61E+00	6.65E-01	1.33E+01	4.41E-04	2.46E+00	1.82E+01	2.21E-02	5.02E-02	6.60E-06
37			1.16E-04	3.26E-05	2.39E-02	3.37E-03	9.21E-05	3.47E-04	1.08E-03	8.66E-03	3.27E+01	8.57E-01	3.54E-01	7.09E+00	2.35E-04	1.31E+00	9.71E+00	1.18E-02	2.67E-02	3.51E-06
38						7.47E-02	7.53E-04	1.14E-02	1.06E-04	6.51E-02	2.03E+03	6.33E+00	4.19E+00	3.28E+02	7.86E-02	6.97E+00	1.09E+01	1.36E-02	1.76E-01	1.14E-05
39						4.72E-02	2.78E-04	4.40E-03	2.39E-05	1.98E-02	3.46E+03	2.84E+01	1.95E+01	2.03E+03	6.45E-02	8.86E+01	4.38E+01	7.58E-02	1.09E+03	8.65E-02
40			1.95E-03	4.52E-03	1.24E-01	4.47E-02	1.27E-02	7.04E-03	5.62E-01	2.33E-01	1.57E+03	2.00E+02	4.89E+01	5.75E+02	5.95E-02	6.13E+01	6.49E+02	8.36E-01	3.93E-01	2.49E-05
41						6.92E-02	6.97E-04	1.05E-02	9.80E-05	6.03E-02	1.88E+03	5.86E+00	3.88E+00	3.03E+02	7.28E-02	6.45E+00	1.01E+01	1.26E-02	1.63E-01	1.06E-05
42			1.03E-01	5.53E-04	1.45E+00	5.32E-01	1.26E-02	7.12E-02	2.20E-01	4.38E-01	7.26E+03	2.47E+02	8.85E+01	1.72E+03	8.11E-02	2.85E+02	1.07E+03	1.25E+00	6.22E+00	8.34E-04
43						2.62E-01	2.64E-03	3.99E-02	3.71E-04	2.28E-01	7.13E+03	2.22E+01	1.47E+01	1.15E+03	2.76E-01	2.44E+01	3.84E+01	4.76E-02	6.16E-01	4.00E-05
44				1.73E-03			3.94E-03		3.60E-01		2.98E+03	4.26E+02	9.52E+01	2.35E+03	1.96E-02	9.23E+01			3.47E-02	1.46E-08
45				1.36E-03			3.09E-03		2.82E-01		2.34E+03	3.34E+02	7.46E+01	1.85E+03	1.54E-02	7.23E+01			2.72E-02	1.14E-08
46				1.39E-03			3.17E-03		2.90E-01		2.40E+03	3.43E+02	7.66E+01	1.90E+03	1.58E-02	7.43E+01			2.79E-02	1.17E-08
47				1.54E-03			3.50E-03		3.20E-01		2.65E+03	3.79E+02	8.47E+01	2.09E+03	1.74E-02	8.21E+01			3.08E-02	1.30E-08
48																				
49																				
50																				
51			7.34E-03	6.59E-05	7.00E-01	4.66E-01	4.51E-03	1.18E-02	1.04E-01	2.07E-01	1.56E+03	6.93E+02	2.86E+01	3.90E+02	5.97E-02	2.28E+01	1.06E+02	9.01E-02	6.27E+01	6.02E-05
Total			1.14E-01	8.30E-02	2.81E+00	1.70E+00	1.46E-01	2.05E-01	1.09E+01	5.37E+00	6.50E+04	6.70E+03	1.45E+03	4.24E+04	1.07E+00	1.93E+03	1.09E+04	1.45E+01	1.16E+03	8.78E-02

Attachment 3

Calculation of Supernate Concentrations from WCS Supernate Inventory and Tank Data

Attachment 3
Calculation of Supernate Concentrations from WCS Supernate Inventory and Tank Data

Tank	H-3 (Ci/gal)	C-14 (Ci/gal)	Co-60 (Ci/gal)	Ni-59 (Ci/gal)	Se-79 (Ci/gal)	Sr-90 (Ci/gal)	Y-90 (Ci/gal)	Tc-99 (Ci/gal)	Ru-106 (Ci/gal)	Rh-106 (Ci/gal)	Sb-125 (Ci/gal)	Sn-126 (Ci/gal)	I-129 (Ci/gal)	Cs-134 (Ci/gal)	Cs-135 (Ci/gal)	Cs-137 (Ci/gal)	Ba-137m (Ci/gal)	Ce-144 (Ci/gal)	Pr-144 (Ci/gal)	Pm-147 (Ci/gal)	Eu-154 (Ci/gal)	Th-232 (Ci/gal)	U-232 (Ci/gal)
1																1.98E+01	1.88E+01						4.21E-10
2																7.35E+00	6.96E+00						4.21E-10
3																7.35E+00	6.96E+00						4.21E-10
4																8.80E+00	8.32E+00						1.18E-09
5																1.80E+00	1.71E+00						9.27E-10
6																3.64E-02	3.44E-02						1.26E-09
7																2.94E+00	2.78E+00						4.21E-10
8																3.59E-01	3.39E-01						5.46E-10
9																7.21E+00	6.82E+00					5.44E-10	1.52E-10
10																1.26E+00	1.19E+00					5.44E-10	1.52E-10
11																1.30E+00	1.23E+00					1.78E-11	2.07E-13
12																							
13																1.31E+01	1.24E+01					5.44E-10	1.52E-10
14																1.67E+01	1.58E+01					2.26E-09	6.87E-10
15																							
16																							
17																							
18																1.91E-02	1.81E-02						9.64E-11
19																1.91E-02	1.81E-02						5.39E-11
20																							
21																4.65E-03	4.40E-03					1.19E-12	
22																2.34E-03	2.22E-03						
23																1.38E-04	1.30E-04						
24																1.49E-03	1.41E-03						
25																3.53E+00	3.34E+00						3.42E-09
26																4.23E+00	4.00E+00						3.42E-09
27																4.07E+00	3.85E+00						3.42E-09
28																4.47E+00	4.23E+00						3.42E-09
29																5.10E+00	4.83E+00					5.44E-10	1.52E-10
30																1.04E+01	9.88E+00					5.44E-10	1.52E-10
31																1.14E+01	1.07E+01					5.44E-10	1.52E-10
32																9.70E+00	9.18E+00						
33																5.15E-01	4.88E-01						2.89E-08
34																3.96E+00	3.75E+00						4.59E-08
35																7.74E+00	7.32E+00						
36																2.09E+01	1.98E+01					5.44E-10	1.52E-10
37																1.37E+01	1.30E+01					5.44E-10	1.52E-10
38																9.66E-01	9.14E-01						
39																3.57E+00	3.38E+00						
40																1.05E-02	9.91E-03					5.48E-09	1.27E-08
41																1.56E+00	1.48E+00						
42																9.61E-01	9.09E-01					8.14E-08	4.39E-10
43																7.61E-01	7.20E-01						
44																5.30E+00	5.01E+00						3.42E-09
45																5.01E+00	4.74E+00						3.42E-09
46																5.08E+00	4.81E+00						3.42E-09
47																1.62E+00	1.54E+00						3.42E-09
48																5.98E-02	5.66E-02						
49																1.04E+01	9.82E+00						
50																2.09E-05	1.98E-05						
51																4.49E-02	4.25E-02					2.11E-08	1.89E-10
Average																4.85E+00	4.59E+00					8.19E-09	3.73E-09

References:
Tank Data - Attachment 1; Supernate Inventory - Attachment 2

Attachment 3
Calculation of Supernate Concentrations from WCS Supernate Inventory and Tank Data

Tank	U-233 (Ci/gal)	U-234 (Ci/gal)	U-235 (Ci/gal)	U-236 (Ci/gal)	U-238 (Ci/gal)	Np-237 (Ci/gal)	Pu-238 (Ci/gal)	Pu-239 (Ci/gal)	Pu-240 (Ci/gal)	Pu-241 (Ci/gal)	Pu-242 (Ci/gal)	Ingrown Am-241 (Ci/gal)	Am-241 (Ci/gal)	Am-242m (Ci/gal)	Cm-244 (Ci/gal)	Cm-245 (Ci/gal)	Total (Ci/gal)
1	4.21E-10				1.86E-09		4.49E-08	4.12E-08	1.19E-04	1.80E-05	4.29E-06	3.49E-05	1.38E-09	6.33E-06	6.22E-05	7.81E-08	3.86E+01
2	4.21E-10				1.86E-09		4.49E-08	4.12E-08	1.19E-04	1.80E-05	4.29E-06	3.49E-05	1.38E-09	6.33E-06	6.22E-05	7.81E-08	1.43E+01
3	4.21E-10				1.86E-09		4.49E-08	4.12E-08	1.19E-04	1.80E-05	4.29E-06	3.49E-05	1.38E-09	6.33E-06	6.22E-05	7.81E-08	1.43E+01
4	1.18E-09				1.28E-09		5.52E-08	4.93E-08	1.00E-05	9.88E-06	2.21E-06	2.12E-05	4.54E-10	2.89E-06	1.85E-04	2.40E-07	1.71E+01
5	9.27E-10				1.71E-09		4.04E-08	6.82E-08	4.70E-05	7.85E-06	1.88E-06	1.43E-05	5.53E-10	2.79E-06	1.50E-04	1.91E-07	3.51E+00
6	1.26E-09				1.35E-09		5.05E-08	1.75E-08		5.17E-06	1.80E-06	2.29E-05	3.53E-09	3.52E-06	1.99E-04	2.57E-07	7.11E-02
7	4.21E-10				1.86E-09		4.49E-08	4.12E-08	1.19E-04	1.80E-05	4.29E-06	3.49E-05	1.38E-09	6.33E-06	6.22E-05	7.81E-08	5.72E+00
8	5.46E-10				1.26E-09		5.80E-08	2.63E-08	1.05E-04	1.66E-05	3.90E-06	4.21E-05	4.91E-09	3.98E-06	8.00E-05	1.03E-07	6.98E-01
9	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	1.40E+01
10	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	2.45E+00
11	2.07E-13	2.54E-09	2.09E-09	3.23E-10	3.94E-11	3.23E-10	7.31E-11	1.38E-09	1.91E-04	1.85E-06	1.16E-06	7.57E-05	2.48E-09	7.43E-06	8.85E-06	1.05E-08	2.54E+00
12																	
13	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	2.54E+01
14	6.87E-10	7.97E-08	1.09E-08	9.41E-10	8.85E-10	9.41E-10	1.69E-08	1.17E-07	5.34E-05	1.29E-05	4.16E-06	2.39E-05	7.63E-10	5.19E-06	1.34E-04	1.66E-07	3.25E+01
15																	
16																	
17																	
18	9.64E-11				7.32E-10		3.94E-08		1.68E-04	2.40E-05	6.12E-06	1.12E-04	7.85E-09	1.21E-05			3.75E-02
19	5.39E-11				3.55E-10		3.25E-08		1.33E-04	1.90E-05	4.26E-06	5.52E-04	8.75E-09	5.34E-05			3.79E-02
20																	
21		3.63E-08	3.59E-08	7.34E-09	4.94E-10	7.34E-09	3.35E-10	2.21E-08	1.99E-04	2.30E-07	1.33E-07	4.95E-06	1.12E-10	5.71E-07	9.57E-06	1.16E-08	9.26E-03
22		1.31E-07	4.71E-08	7.76E-09	7.20E-10	7.76E-09	1.05E-09	2.86E-08	1.98E-04						1.15E-05	1.39E-08	4.77E-03
23																	2.68E-04
24																	2.91E-03
25	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			6.89E+00
26	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			8.24E+00
27	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			7.94E+00
28	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			8.71E+00
29	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	9.93E+00
30	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	2.03E+01
31	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	2.21E+01
32			4.44E-08	9.97E-09	6.36E-10	9.97E-09	2.99E-10	1.84E-08	6.58E-03	5.66E-05	4.20E-05	3.27E-03	8.85E-08	2.28E-04	1.91E-04	2.31E-07	1.89E+01
33	2.89E-08	1.38E-13	1.15E-09	2.75E-08	6.19E-08	2.75E-08	9.08E-06	3.53E-06	8.39E-06	2.54E-03	4.63E-04	1.45E-02	2.37E-08	1.01E-04	3.97E-03	5.39E-06	1.02E+00
34	4.59E-08				4.37E-08		3.09E-06	2.38E-06		4.99E-04	1.11E-04	2.62E-03	2.31E-08	1.10E-04	6.37E-03	8.63E-06	7.72E+00
35			4.33E-08	1.28E-08	7.53E-10	1.28E-08	4.45E-10	1.57E-08	6.63E-03	5.25E-05	4.02E-05	3.54E-03	9.02E-08	2.18E-04	1.60E-04	1.96E-07	1.51E+01
36	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	4.07E+01
37	1.52E-10	1.11E-07	1.57E-08	1.62E-09	4.30E-10	1.62E-09	5.03E-09	4.04E-08	1.53E-04	4.00E-06	1.66E-06	3.31E-05	1.10E-09	6.12E-06	4.53E-05	5.51E-08	2.67E+01
38			2.57E-07	3.92E-08	2.59E-09	3.92E-08	3.64E-10	2.24E-07	7.00E-03	2.18E-05	1.44E-05	1.13E-03	2.71E-07	2.40E-05	3.77E-05	4.67E-08	1.89E+00
39			7.09E-08	6.61E-09	4.18E-10	6.61E-09	3.60E-11	2.97E-08	5.20E-03	4.27E-05	2.92E-05	3.06E-03	9.70E-08	1.33E-04	6.59E-05	1.14E-07	6.95E+00
40	1.27E-08	3.47E-07	1.25E-07	1.98E-08	3.57E-08	1.98E-08	1.58E-06	6.55E-07	4.40E-03	5.61E-04	1.37E-04	1.61E-03	1.67E-07	1.72E-04	1.82E-03	2.35E-06	2.91E-02
41			2.57E-07	3.92E-08	2.59E-09	3.92E-08	3.64E-10	2.24E-07	7.00E-03	2.18E-05	1.44E-05	1.13E-03	2.71E-07	2.40E-05	3.77E-05	4.67E-08	3.05E+00
42	4.39E-10	1.15E-06	4.22E-07	5.64E-08	9.95E-09	5.64E-08	1.75E-07	3.47E-07	5.76E-03	1.95E-04	7.01E-05	1.36E-03	6.42E-08	2.25E-04	8.46E-04	9.92E-07	1.88E+00
43			2.57E-07	3.92E-08	2.59E-09	3.92E-08	3.64E-10	2.24E-07	7.00E-03	2.18E-05	1.44E-05	1.13E-03	2.71E-07	2.40E-05	3.77E-05	4.67E-08	1.49E+00
44	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			1.03E+01
45	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			9.76E+00
46	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			9.90E+00
47	3.42E-09				7.78E-09		7.10E-07		5.89E-03	8.41E-04	1.88E-04	4.65E-03	3.87E-08	1.82E-04			3.17E+00
48																	1.16E-01
49																	2.02E+01
50																	4.07E-05
51	1.89E-10	2.01E-06	1.34E-06	3.40E-08	1.30E-08	3.40E-08	2.98E-07	5.95E-07	4.47E-03	1.99E-03	8.20E-05	1.12E-03	1.72E-07	6.54E-05	3.05E-04	2.59E-07	9.54E-02
Average	3.73E-09	2.90E-07	1.38E-07	1.43E-08	6.24E-09	1.43E-08	4.98E-07	2.92E-07	2.67E-03	3.23E-04	6.45E-05	1.82E-03	4.72E-08	7.38E-05	4.91E-04	6.47E-07	9.45E+00

References:
Tank Data - Attachment 1; Supernate Inventory - Attachment 2

Attachment 4

Conversion of March 1999 Supernate Ci/gal Values for Decay to March 2003

Attachment 4

Conversion of March 1999 Supernate Ci/gal Values for Decay to March 2003

Supernate 1999 Report Conc. Values converted for decay to 3/2003

Radionuclide	H-3	C-14	Co-60	Ni-59	Sr-90	Y-90	Tc-99	I-129	Am-243	Cm-243	Cm-246	Cm-247	Cm-248	Cf-249	Cf-251	Cs-137
Half Life (years)	12.33	5730	5.271	75000	28.5	28.5	213000	15700000	7370	28	4760	15400000	350000	352	900	30.17
WSRC-TR-9400290, Rev. 3 Table 3 Supernate Values (Ci/gal) = Ci/gal at $t_{0=3/1999}$	2.00E-02	9.50E-06	1.70E-01	9.40E-05	4.70E-03	4.70E-03	9.00E-04	1.00E-06	1.50E-09	5.70E-10	1.40E-13	1.70E-19	1.80E-19	1.00E-18	2.00E-20	5

$Ci_{t_x} = Ci_{t_0} \times (0.5)^{nth}$
where n = # half-lives passed
or
n = *(elapsed time yrs) / (half-life yrs)*

t_0 = 3/1999
t_x = 3/2003
therefore, elapsed time = 4 yrs

n = elapsed time 4 yrs) / (half-life yrs)	0.324412	0.00069808	0.75886928	5.3333E-05	0.14035088	0.14035088	1.8779E-05	2.5478E-07	0.00054274	0.14285714	0.00084034	2.5974E-07	1.1429E-05	0.01136364	0.00444444	0.13258204
$Ci/gal_{t=3/2003} = Ci/gal_{t=3/1999} \times (0.5)^{nth}$	1.60E-02	9.50E-06	1.00E-01	9.40E-05	4.26E-03	4.26E-03	9.00E-04	1.00E-06	1.50E-09	5.16E-10	1.40E-13	1.70E-19	1.80E-19	9.92E-19	1.99E-20	4.56E+00

Attachment 5

F- and H-Area Tank Farm Historic Supernate Data

Attachment 5

F- and H-Area Tank Farm Historic Supernate Data

WCS vs. 1999 Sample Data	H-3 (Ci/gal)	C-14 (Ci/gal)	Co-60 (Ci/gal)	Ni-59 (Ci/gal)	Ni-63 (Ci/gal)	Se-79 (Ci/gal)	Sr-90 (Ci/gal)	Y-90 (Ci/gal)	Nb-94 (Ci/gal)	Tc-99 (Ci/gal)	Ru-106 (Ci/gal)	Rh-106 (Ci/gal)	Sb-125 (Ci/gal)	Sn-126 (Ci/gal)	I-129 (Ci/gal)	Cs-134 (Ci/gal)	Cs-135 (Ci/gal)	Cs-137 (Ci/gal)	Ba-137m (Ci/gal)	Ce-144 (Ci/gal)	Pr-144 (Ci/gal)	Pm-147 (Ci/gal)	Eu-154 (Ci/gal)
Average WCS Ref Date 9/11/02																		**4.85E+00**	**4.59E+00**				
-00290 Rev. 2/3 Baseline Value	**2.00E-02**	**9.50E-06**	**1.70E-01**	**9.40E-05**			**4.70E-03**	**4.70E-03**		**9.00E-04**					**1.00E-06**			5.00E+00	4.70E+00				
Value Corrected for Decay to 3/2003	**1.60E-02**	**9.50E-06**	**1.00E-01**	**9.40E-05**			*4.26E-03*	*4.26E-03*		**9.00E-04**					**1.00E-06**								
PK 1999 Baseline	*2.00E-02*		1.70E-01				4.70E-03			9.00E-04					1.00E-06								
2002-2001 Sample Data (Max)																							
"Historical" (as of 1999) Samp. Aver.		9.46E-06	2.49E-02				2.50E-03			4.70E-04					6.60E-07			5.00E+00					
"Historical" (as of 1999) Samp. Max.			1.70E-01																				
"Historical" Sample Data Other		5.36E-06																					
1999 Sample Data Maximum	4.00E-04		2.90E-07	9.35E-05			6.30E-05			4.20E-05								*6.40E+00*					
1999 Sample Data Average	1.20E-05		1.40E-07				1.20E-05			2.30E-05					0.00E+00			1.30E+00					
Higher Value WCS vs. Samples	2.00E-02	9.50E-06	1.70E-01	9.40E-05	*0.00E+00*	*0.00E+00*	4.70E-03	4.70E-03	0.00E+00	9.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-06	0.00E+00	0.00E+00	6.40E+00	4.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Scal. Fact. Higher Val. (Ci/Ci Cs-137	*3.13E-03*	1.48E-06	2.66E-02	1.47E-05	0.00E+00	0.00E+00	7.34E-04	7.34E-04	0.00E+00	1.41E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-07	0.00E+00	0.00E+00	1.00E+00	7.34E-01	0.00E+00	0.00E+00	0.00E+00	*0.00E+00*
Selected Value for Rev. 4	**1.60E-02**	**9.50E-06**	**1.00E-01**	**9.40E-05**			**4.26E-03**	**4.26E-03**		**9.00E-04**					**1.00E-06**			***4.85E+00***	***4.59E+00***				

WCS vs. 1999 Sample Data	Th-232 (Ci/gal)	U-232 (Ci/gal)	U-233 (Ci/gal)	U-234 (Ci/gal)	U-235 (Ci/gal)	U-236 (Ci/gal)	U-238 (Ci/gal)	Np-237 (Ci/gal)	Pu-238 (Ci/gal)	Pu-239 (Ci/gal)	Pu-240 (Ci/gal)	Pu-241 (Ci/gal)	Pu-242 (Ci/gal)	Am-241 (Ci/gal)	Am-241 (Ci/gal)	Total Am-241 (Ci/gal)	Am-242m (Ci/gal)	Am-243 (Ci/gal)	Cm-243 (Ci/gal)	Cm-244 (Ci/gal)	Cm-246 (Ci/gal)	Cm-245 (Ci/gal)	Cm-247 (Ci/gal)	Cm-248 (Ci/gal)	Bk-247 (Ci/gal)	Cf-249 (Ci/gal)	Cf-251 (Ci/gal)
Average WCS Ref. Date 9/11/02	**8.19E-09**	**3.73E-09**	**3.73E-09**	**2.90E-07**	**1.38E-07**	**1.43E-08**	**6.24E-09**	***1.43E-08***	***4.98E-07***	**2.92E-07**	**2.67E-03**	**3.23E-04**	**6.45E-05**	**1.82E-03**	**4.72E-08**	**1.82E-03**	**7.38E-05**			**4.91E-04**	**6.47E-07**						
-00290 Rev. 2/3 Baseline Value			*2.60E-05*	*7.10E-06*	4.10E-07		2.50E-06	4.20E-07	2.50E-02	2.90E-04	1.30E-04	1.90E-02	2.30E-07		1.80E-03	1.80E-03	8.00E-07	**1.50E-09**	**5.70E-10**		7.20E-11	**1.40E-13**	**1.70E-19**	**1.80E-19**		***1.00E-18***	***2.00E-20***
Value Corrected for Decay to 3/2003																		**1.50E-09**	**5.16E-10**			**1.40E-13**	**1.70E-19**	**1.80E-19**		**9.92E-19**	**1.99E-20**
PK 1999 Baseline				7.10E-06										4.00E-05	5.25E-04	5.65E-04	7.40E-07				4.10E-03						
2002-2001 Sample Data (Max)				3.50E-07	1.44E-09	7.00E-09	3.44E-08																				
"Historical" (as of 1999) Samp. Aver.																											
"Historical" (as of 1999) Samp. Max.																											
"Historical" Sample Data Other																											
1999 Sample Data Maximum																											
1999 Sample Data Average				6.10E-04																							
Higher Value WCS vs. Samples	8.19E-09	3.73E-09	2.60E-05	6.10E-04	4.10E-07	1.43E-08	3.44E-08	4.20E-07	2.50E-02	2.90E-04	*2.67E-03*	1.90E-02	6.45E-05			1.82E-03	7.38E-05	1.50E-09	5.70E-10	4.91E-04	4.10E-03	1.40E-13	1.70E-19	1.80E-19	0.00E+00	1.00E-18	2.00E-20
Scal. Fact. Higher Val. (Ci/Ci Cs-137	1.28E-09	5.83E-10	4.06E-06	*1.27E-04*	*6.41E-09*	2.23E-09	5.38E-09	6.56E-08	3.91E-03	4.53E-05	4.16E-04	2.97E-03	1.01E-05			2.85E-04	1.15E-05	2.34E-10	8.91E-11	7.68E-05	6.41E-04	2.19E-14	2.66E-20	2.81E-20	0.00E+00	1.56E-19	3.13E-21
Selected Value for Rev. 4	**8.19E-09**	**3.73E-09**	**3.73E-09**	**2.90E-07**	**1.38E-07**	**1.43E-08**	**6.24E-09**	***1.43E-08***	***4.98E-07***	**2.92E-07**	**2.67E-03**	**3.23E-04**	**6.45E-05**	**1.82E-03**	**4.72E-08**	**1.82E-03**	**7.38E-05**	**1.50E-09**	**5.16E-10**	**4.91E-04**	***6.47E-07***	***1.40E-13***	***1.70E-19***	***1.80E-19***		**9.92E-19**	**1.99E-20**

Attachment 6

Projected Americium/Curium Transfer from F-Canyon to H-Area Tank 51

Attachment 6

Projected Americium/Curium Transfer Transfer from F Canyon to Tank 51

Radionuclide	WCS Retr. 2-20-03 *Tank 51 Prior to* Am/Cm Addition *Sludge Ci* (Sludge Volume = 435,240 gal) (Ci)	Final *Hot Run Ci* (Sludge Volume = 30,000 gal) (Ci)	Projected Total Curies of *Radionuclides in* Tank 51 Sludge Slurry after Am/Cm Addition (SldgVol=465,240gal) (Ci)
H-3			
C-14	5.29E-01		5.29E-01
Co-60	6.86E+01		6.86E+01
Ni-59	7.84E+00		7.84E+00
Ni-63	3.89E+00		3.89E+00
Se-79	1.02E+01		1.02E+01
Sr-90	4.69E+05		4.69E+05
Y-90	4.69E+05		4.69E+05
Nb-94			
Tc-99	2.25E+01		2.25E+01
Ru-106	9.11E-03		9.11E-03
Rh-106	9.11E-03		9.11E-03
Sb-125	3.44E+01		3.44E+01
Sn-126	4.06E+00		4.06E+00
I-129	1.31E-01		1.31E-01
Cs-134	1.67E+00		1.67E+00
Cs-135	8.81E-01		8.81E-01
Cs-137	1.55E+03	1.63E+03	3.18E+03
Ba-137m	1.47E+03	1.53E+03	3.00E+03
Ce-144	1.39E-03		1.39E-03
Pr-144	1.39E-03		1.39E-03
Pm-147	8.64E+02		8.64E+02
Eu-154	1.08E+03	5.83E+03	6.91E+03
Th-230		1.29E-05	1.29E-05
Th-231		4.41E-05	4.41E-05
Th-232	5.48E-02		5.48E-02
Th-234		3.44E-03	3.44E-03
U-232	4.91E-04		4.91E-04
U-233	5.22E+00		5.22E+00
U-234	3.47E+00	1.95E-01	3.67E+00
U-235	3.37E-02	4.41E-05	3.37E-02
U-236	8.84E-02	4.06E-04	8.88E-02
U-238	7.74E-01	9.45E-01	1.72E+00
Pa-233		2.49E-02	2.49E-02
Pa-234m		3.44E-03	3.44E-03
Pa-234		4.48E-06	4.48E-06
Np-237	1.55E+00	2.49E-02	1.57E+00
Np-239		2.12E+03	2.12E+03
Pu-238	1.16E+04	2.53E+03	1.42E+04
Pu-239	5.17E+03	4.71E+00	5.18E+03
Pu-240	2.13E+02	7.11E+02	9.24E+02
Pu-241	2.91E+03	1.13E+02	3.03E+03
Pu-242	4.46E-01	5.31E-01	9.77E-01
Am-241	9.62E+02	1.71E+03	2.67E+03
Am-242m	6.72E-01	2.08E+01	2.15E+01
Am-243		2.12E+03	2.12E+03
Cm-244	4.68E+02	1.65E+05	1.65E+05
Cm-245	4.49E-04	1.87E+01	1.87E+01
Cm-246		2.90E+01	2.90E+01
Cm-247		1.42E-04	1.42E-04
Total	9.64E+05	1.83E+05	1.15E+06

Reference: WSRC-TR-2000-00249, Revision 2, Attachment 4 (Reference 6)

Attachment 7

F-Area Tank Farm Sludge Inventory from WCS

Attachment 7

F-Area Tank Farm Sludge Inventory from WCS
Reference Data: 9/11/02
Latest Data Update: 1/29/03
Date Retrieved: 2/20/03

Tank	H-3 (Ci)	C-14 (Ci)	Ni-59 (Ci)	Co-60 (Ci)	Ni-63 (Ci)	Se-79 (Ci)	Sr-90 (Ci)	Y-90 (Ci)	Nb-94 (Ci)	Tc-99 (Ci)	Ru-106 (Ci)	Rh-106 (Ci)	Sb-125 (Ci)	Sn-126 (Ci)	I-129 (Ci)	Cs-134 (Ci)	Cs-135 (Ci)	Cs-137 (Ci)	Ba-137m (Ci)	Ce-144 (Ci)	Pr-144 (Ci)	Pm-147 (Ci)	Eu-154 (Ci)	Th-232 (Ci)	U-232 (Ci)
1		1.28E-02	2.34E+01	2.96E+02		*1.63E+01*	*6.04E+05*	*6.04E+05*		2.81E+02	3.03E-05	3.03E-05	2.53E+01	3.02E+01	1.34E-03	2.95E-02	1.88E-01	4.26E+04	4.03E+04	5.46E-08	5.46E-08	3.60E+02	1.18E+03		1.27E-02
2		2.86E-03	3.37E+00	1.92E+01		2.31E+00	7.58E+04	7.58E+04		3.99E+01	1.85E-08	1.85E-08	6.52E-01	4.29E+00	1.90E-04	3.87E-04	2.67E-02	5.39E+03	5.10E+03	4.51E-12	4.51E-12	8.57E+00	1.08E+02		*1.73E-03*
3		*2.48E-03*	*2.92E+00*	*2.19E+01*		2.00E+00	6.87E+04	6.87E+04		3.46E+01	1.24E-07	1.24E-07	1.01E+00	3.72E+00	1.65E-04	7.56E-04	2.31E-02	4.87E+03	4.61E+03	7.49E-11	7.49E-11	1.36E+01	1.10E+02		1.52E-03
4		3.34E-03	1.18E+02	6.86E+03		8.47E+01	3.95E+06	3.95E+06		1.46E+03	1.46E+00	1.46E+00	3.17E+03	1.58E+02	6.98E-03	1.18E+01	9.81E-01	2.75E+05	2.60E+05	*4.57E-02*	*4.57E-02*	*5.23E+04*	*1.41E+04*		7.16E-02
5		*4.45E-02*	1.01E+02	1.98E+03		7.07E+01	2.84E+06	2.84E+06		1.22E+03	1.32E-03	1.32E-03	2.55E+02	1.31E+02	5.82E-03	3.97E-01	8.18E-01	2.00E+05	1.89E+05	4.48E-06	4.48E-06	3.78E+03	6.64E+03		5.69E-02
6			1.04E+02	3.25E+03		7.45E+01	3.29E+06	3.29E+06		1.29E+03	9.45E-03	9.45E-03	5.82E+02	1.39E+02	*6.14E-03*	*1.11E+00*	*8.63E-01*	2.30E+05	2.18E+05	5.95E-05	5.95E-05	8.84E+03	9.29E+03		6.18E-02
7		8.62E-01	1.87E+02	1.51E+03		1.02E+02	3.64E+06	3.64E+06		1.76E+03	1.26E-04	1.26E-04	1.12E+02	1.90E+02	8.40E-03	1.24E-01	1.18E+00	2.58E+05	2.44E+05	2.45E-07	2.45E-07	1.58E+03	6.53E+03		8.59E-02
8		1.15E-02	4.32E+00	1.55E+02		2.67E+00	1.21E+05	1.21E+05		*4.61E+01*	*5.46E-03*	*5.46E-03*	*4.24E+01*	*4.96E+00*	2.20E-04	*1.11E-01*	3.09E-02	8.45E+03	7.99E+03	1.60E-04	1.60E-04	6.70E+02	3.81E+02		2.35E-03
9		3.09E-03	3.64E+00	2.07E+01		2.49E+00	8.17E+04	8.17E+04		4.31E+01	1.96E-08	1.96E-08	6.99E-01	4.63E+00	2.05E-04	4.14E-04	2.88E-02	5.81E+03	5.49E+03	4.74E-12	4.74E-12	9.18E+00	1.17E+02		1.87E-03
10		3.24E-04	3.81E-01	2.46E+00		2.60E-01	*8.73E+03*	*8.73E+03*		*4.49E+00*	*3.81E-09*	*3.81E-09*	*8.82E-02*	4.78E-01	2.13E-05	7.32E-05	3.01E-03	6.16E+02	5.83E+02	1.36E-12	1.36E-12	1.18E+00	1.38E+01		1.92E-04
11		1.59E-01	1.64E+02	1.33E+04		9.05E+01	5.42E+06	5.42E+06		1.53E+03	1.41E-01	1.41E-01	7.88E+02	8.29E+01	5.31E-03	4.52E+01	1.03E+00	2.98E+05	2.82E+05	2.19E-02	2.19E-02	2.05E+04	5.99E+04	1.43E-02	1.66E-04
13		2.92E-01	2.78E+02	*7.46E+03*		*1.72E+02*	*7.70E+06*	*7.70E+06*		2.93E+03	3.17E-03	3.17E-03	2.48E+02	2.25E+02	1.18E-02	8.08E+00	1.96E+00	4.64E+05	4.38E+05	1.10E-04	1.10E-04	5.79E+03	4.71E+04	1.98E-01	5.54E-02
14		1.51E-03	7.72E+00	8.40E+01		5.26E+00	1.96E+05	1.96E+05		9.06E+01	4.33E-07	4.33E-07	2.88E+00	8.82E+00	4.09E-04	1.03E-02	6.06E-02	1.32E+04	1.25E+04	1.39E-09	*1.39E-09*	*4.30E+01*	*5.31E+02*	*1.06E-02*	3.22E-03
16		*4.01E-02*	2.36E+00	1.26E+01		1.95E-01	9.01E+03	9.01E+03		3.38E+00	4.59E-04	4.59E-04	3.80E+00	3.62E-01	1.61E-05	1.06E-02	2.26E-03	6.28E+02	5.94E+02	8.20E-06	8.20E-06	6.06E+01	2.95E+01		5.66E-04
21		8.96E-05	1.04E+00	1.89E+02		7.82E-01	5.37E+04	5.37E+04		1.32E+01	1.23E-02	1.23E-02	2.48E+01	7.15E-01	4.58E-05	*1.96E+00*	*8.84E-03*	*2.92E+03*	*2.76E+03*	*1.97E-03*	*1.97E-03*	6.73E+02	8.04E+02	5.67E-06	
22			2.13E+00	3.70E+02		1.66E+00	1.14E+05	1.14E+05		2.80E+01	1.48E-02	1.48E-02	4.30E+01	1.51E+00	9.70E-05	3.14E+00	1.87E-02	6.17E+03	5.83E+03	2.07E-03	2.07E-03	1.16E+03	1.65E+03		
23				5.26E-01												*2.71E-02*		*4.49E+02*	4.25E+02						
26		5.88E-01	3.45E+01	1.37E+03		2.86E+00	1.97E+05	1.97E+05		4.95E+01	7.83E+01	7.83E+01	2.22E+03	5.31E+00	2.35E-04	1.86E+01	3.31E-02	1.34E+04	1.27E+04	2.39E+01	2.39E+01	4.06E+04	1.50E+03		9.73E-03
30		7.80E-04	8.56E-01	4.52E+02		4.71E-01	4.06E+04	4.06E+04		*7.98E+00*	*1.15E+00*	*1.15E+00*	*1.22E+02*	4.31E-01	2.76E-05	1.76E+01	5.33E-03	2.19E+03	2.07E+03	6.98E-01	6.98E-01	3.58E+03	9.82E+02		
32		2.45E-01	2.71E+02	4.98E+04		1.49E+02	1.02E+07	1.02E+07		2.53E+03	7.30E+01	7.30E+01	8.19E+03	1.37E+02	8.75E-03	1.04E+03	1.69E+00	5.56E+05	5.26E+05	5.16E+01	5.16E+01	2.35E+05	1.55E+05		
33			1.11E+02	3.50E+04		*7.95E+01*	*5.42E+06*	*5.42E+06*		1.38E+03	1.07E+03	1.07E+03	5.02E+04	1.48E+02	6.55E-03	3.80E+02	9.21E-01	3.70E+05	3.50E+05	2.87E+02	2.87E+02	9.06E+05	4.00E+04		7.84E-02
34			1.71E+02	4.88E+04		1.23E+02	8.15E+06	8.15E+06		2.12E+03	1.62E+03	1.62E+03	6.88E+04	2.28E+02	1.01E-02	5.30E+02	1.42E+00	5.57E+05	5.27E+05	3.92E+02	3.92E+02	*1.24E+06*	*5.74E+04*		*1.20E-01*
35		*2.07E-01*	*2.27E+02*	*5.88E+04*		*1.25E+02*	9.31E+06	9.31E+06		2.12E+03	1.14E+02	1.14E+02	1.02E+04	1.14E+02	7.32E-03	1.28E+03	1.41E+00	5.05E+05	4.78E+05	1.11E+02	1.11E+02	2.94E+05	1.66E+05		
36		2.34E-04	2.57E-01	4.84E+01		1.41E-01	1.01E+04	1.01E+04		2.39E+00	1.69E-03	1.69E-03	5.00E+00	1.29E-01	8.28E-06	3.80E-01	1.60E-03	*5.46E+02*	*5.16E+02*	*1.99E-04*	*1.99E-04*	*1.35E+02*	*1.59E+02*		
39		1.81E-01	1.98E+02	8.46E+04		1.09E+02	9.01E+06	9.01E+06		1.85E+03	2.06E+02	2.06E+02	1.97E+04	9.98E+01	6.39E-03	2.67E+03	1.23E+00	4.86E+05	4.60E+05	2.13E+02	2.13E+02	5.72E+05	1.99E+05		
40		6.14E-01	1.43E+02	5.05E+03		7.90E+01	3.67E+06	3.67E+06		1.36E+03	1.73E-01	1.73E-01	*1.24E+03*	*1.41E+02*	*6.36E-03*	*8.12E+00*	*9.13E-01*	*2.51E+05*	2.37E+05	7.75E-03	7.75E-03	2.03E+04	1.44E+04	2.90E-02	6.72E-02
42		2.57E-02	1.15E+01	4.83E+02		5.97E+00	3.17E+05	3.17E+05		1.01E+02	6.33E-03	6.33E-03	2.47E+01	5.54E+00	3.52E-04	1.35E+00	6.77E-02	1.76E+04	1.66E+04	9.78E-04	9.78E-04	6.24E+02	2.73E+03	4.36E-02	2.35E-04
43			1.44E+01	8.01E+03		1.12E+01	9.49E+05	9.49E+05		*1.89E+02*	*8.35E+01*	*8.35E+01*	*2.91E+03*	*1.02E+01*	*6.56E-04*	4.71E+02	1.27E-01	5.09E+04	4.82E+04	1.25E+02	1.25E+02	8.64E+04	2.23E+04		
47		4.37E-01	2.57E+01	7.73E+02		2.12E+00	1.40E+05	1.40E+05		3.68E+01	7.10E+00	7.10E+00	9.08E+02	3.94E+00	1.75E-04	5.94E+00	2.48E-02	9.55E+03	9.04E+03	8.68E-01	8.68E-01	1.61E+04	9.52E+02		7.11E-03
51		5.29E-01	7.84E+00	6.86E+01	3.89E+00	1.02E+01	*4.69E+05*	*4.69E+05*		2.25E+01	9.11E-03	9.11E-03	3.44E+01	4.06E+00	1.31E-01	1.87E+00	8.81E-01	3.18E+03	3.00E+03	1.39E-03	1.39E-03	8.64E+02	6.91E+03	5.48E-02	4.91E-04
Total		4.75E+00	2.76E+03	3.52E+05	3.89E+00	1.63E+03	9.19E+07	9.19E+07		2.77E+04	3.26E+03	3.26E+03	1.71E+05	2.18E+03	2.43E-01	6.53E+03	1.94E+01	5.56E+06	5.26E+06	1.20E+03	1.20E+03	3.53E+06	9.43E+05	2.85E+00	6.53E-01
Average		**1.78E-01**	**7.66E+01**	**1.10E+04**	**3.89E+00**	**4.57E+01**	**2.62E+06**	**2.62E+06**		**7.78E+02**	**1.12E+02**	**1.12E+02**	**5.85E+03**	**6.49E+01**	7.75E-03	**2.17E+02**	**5.50E-01**	**1.55E+05**	**1.46E+05**	**4.15E+01**	**4.15E+01**	**1.21E+05**	***2.81E+04***	***5.01E-02***	***3.04E-02***
Mod. Aver.															8.37E-03										

Reference:
M:\WASTE6\Hlcats\WCSystem\[WCSystem.xls]Sldginv

F-Area Tank Farm Sludge Inventory from WCS
***Reference Date:* 9/11/02**
Latest Data Update: 1/29/03
Date Retrieved: 2/20/03

Tank	U-233 (Ci)	U-234 (Ci)	U-235 (Ci)	U-236 (Ci)	U-238 (Ci)	Np-237 (Ci)	Np-239 (Ci)	Pu-238 (Ci)	Pu-239 (Ci)	Pu-240 (Ci)	Pu-241 (Ci)	Pu-242 (Ci)	Ingrown Am-241 (Ci)	Am-241 (Ci)	Total Am-241 (Ci)	Am-242m (Ci)	Am-243 Ci	Cm-244 (Ci)	Cm-245 (Ci)	Cm-246 (Ci)	Cm-247 (Ci)	Total (Ci)
1			1.76E-02		4.39E-01	6.41E-01		5.19E+02	1.33E+02	2.97E+01	1.85E+02	6.12E-03	4.06E+01	2.11E+03	2.15E+03	2.68E+00		4.25E-01	4.62E-07			1.30E+06
2			8.12E-04		2.02E-02	2.12E-01		1.38E+02	1.98E+01	4.42E+00	2.10E+01	9.08E-04	6.02E+00	2.97E+02	3.03E+02	3.89E-01		4.94E-02	6.55E-08			1.63E+05
3			2.03E-03		5.06E-02	3.78E-01		1.66E+02	2.38E+01	5.31E+00	3.05E+01	1.09E-03	7.30E+00	2.57E+02	2.65E+02	3.22E-01		4.61E-02	5.67E-08			1.48E+05
4			7.77E-02		3.34E+00	2.98E+00		6.05E+02	5.98E+02	1.34E+02	1.28E+03	2.75E-02	1.75E+02	1.12E+04	1.14E+04	1.45E+01		3.21E+00	2.40E-06			8.55E+06
5			1.05E-01		2.48E+00	4.19E+00		2.89E+03	4.82E+02	1.15E+02	8.75E+02	3.40E-02	1.72E+02	9.23E+03	9.40E+03	1.18E+01		2.09E+00	2.01E-06			8.11E+06
6			6.65E-02		2.49E+00	8.63E-01			2.55E+02	8.84E+01	1.13E+03	1.74E-01	1.73E+02	9.82E+03	1.00E+04	1.27E+01		2.55E+00	2.12E-06			7.07E+06
7			3.79E-01		9.16E+00	8.40E+00		2.43E+04	3.67E+03	8.76E+02	7.12E+03	2.82E-01	1.29E+03	1.27E+04	1.40E+04	1.59E+01		2.50E+00	2.90E-06			7.86E+06
8			5.43E-03		2.50E-01	1.13E-01		4.54E+02	7.13E+01	1.68E+01	1.81E+02	2.12E-02	1.72E+01	3.45E+02	3.62E+02	4.45E-01		9.59E-02	7.57E-08			2.61E+05
9			1.18E-03		2.94E-02	2.01E-01		4.37E+01	6.24E+00	1.39E+00	6.57E+00	2.87E-04	1.88E+00	3.20E+02	3.22E+02	3.98E-01		5.33E-02	7.07E-08			1.76E+05
10			2.28E-04		5.69E-03	4.35E-02		2.21E+01	3.16E+00	7.06E-01	3.56E+00	1.45E-04	9.72E-01	3.32E+01	3.41E+01	4.13E-02		7.22E-03	2.98E-07			1.88E+04
11	2.04E+00	1.68E+00	3.16E-02	2.59E-01	5.86E-02	1.11E+00		1.53E+05	1.49E+03	9.34E+02	6.08E+04	1.99E+00	5.96E+03	7.10E+03	1.31E+04	8.46E+00		4.87E+01	5.43E-03			1.18E+07
13	4.06E+01	5.73E+00	1.57E-01	5.91E-01	1.83E+00	1.47E+01		5.56E+04	1.46E+03	6.03E+02	1.21E+04	4.00E-01	2.23E+03	1.65E+04	1.87E+04	2.01E+01		4.55E+01	5.98E-03			1.65E+07
14	3.74E-01	5.13E-02	4.15E-03	4.41E-03	7.91E-02	5.48E-01		2.50E+02	6.04E+01	1.95E+01	1.12E+02	3.57E-03	2.43E+01	6.28E+02	6.52E+02	7.80E-01		4.63E-01	6.11E-05			4.20E+05
18			4.30E-03		2.31E-01			9.85E+02	1.41E+02	3.60E+01	6.58E+02	4.61E-02	7.12E+01		7.12E+01			7.14E-03	5.60E-09			2.13E+04
21	1.73E-01	1.71E-01	2.36E-03	3.50E-02	1.60E-03	1.05E-01		9.50E+02	1.09E+00	6.34E-01	2.36E+01	5.33E-04	2.72E+00	4.56E+01	4.83E+01	5.51E-02		5.22E-01	4.69E-05			1.16E+05
22	1.07E+00	3.86E-01	5.91E-03	6.36E-02	8.60E-03	2.35E-01		1.63E+03						9.40E+01	9.40E+01	1.14E-01		1.10E+00	9.94E-05			2.44E+05
23															0.00E+00							8.75E+02
26			2.21E-02		2.02E+00			1.68E+04	2.39E+03	5.35E+02	1.32E+04	1.10E-01	5.19E+02		5.19E+02			1.95E-01	8.19E-08			5.00E+05
30		1.83E-02	3.25E-04	3.37E-03	1.20E-05	8.25E-03		3.60E+03	3.08E+01	2.20E+01	2.57E+03	5.26E-02	9.96E+01	3.82E+01	1.38E+02	4.76E-02		4.48E-01	2.83E-05			9.72E+04
32		2.77E+00	3.97E-02	6.22E-01	1.86E-02	1.15E+00		4.11E+05	3.53E+03	2.62E+03	2.04E+05	5.53E+00	1.42E+04	1.19E+04	2.61E+04	1.44E+01		9.92E+01	8.97E-03			2.26E+07
33	3.74E-07	3.12E-03	1.68E-01	7.48E-02	2.47E+01	9.59E+00		2.28E+01	6.91E+03	1.26E+03	3.95E+04	6.45E-02	2.75E+02	1.08E+04	1.11E+04	1.47E+01		5.38E+00	2.26E-06			1.27E+07
34			1.14E-01		8.05E+00	6.22E+00			1.30E+03	2.91E+02	6.83E+03	6.03E-02	2.88E+02	1.66E+04	1.69E+04	2.25E+01		7.98E+00	3.49E-06			1.88E+07
35		2.72E+00	4.72E-02	8.02E-01	2.79E-02	9.83E-01		4.16E+05	3.29E+03	2.52E+03	2.22E+05	5.66E+00	1.37E+04	1.00E+04	2.37E+04	1.23E+01		9.48E+01	7.51E-03			2.08E+07
36		7.26E-03	1.41E-04	2.56E-03	4.60E-05	2.03E-03		6.43E+02	4.90E+00	3.90E+00	2.90E+02	8.42E-03	2.08E+01	1.13E+01	3.21E+01	1.38E-02		9.97E-02	8.49E-06			2.26E+04
39		9.58E+00	5.64E-02	8.93E-01	4.86E-03	4.01E+00		7.02E+05	5.77E+03	3.95E+03	4.13E+05	1.31E+01	1.80E+04	8.90E+03	2.69E+04	1.54E+01		2.21E+05	1.76E+01			2.12E+07
40	1.84E+00	6.65E-01	1.89E-01	1.05E-01	8.36E+00	3.47E+00		2.33E+04	2.97E+03	7.27E+02	8.54E+03	8.84E-01	9.12E+02	9.65E+03	1.06E+04	1.24E+01		5.84E+00	3.70E-04			7.92E+06
42	6.14E-01	2.26E-01	5.33E-03	3.02E-02	9.35E-02	1.86E-01		3.08E+03	1.05E+02	3.76E+01	7.30E+02	3.44E-02	1.21E+02	4.53E+02	5.74E+02	5.31E-01		2.64E+00	3.54E-04			6.78E+05
43		4.40E+00	4.44E-02	6.71E-01	6.23E-03	3.84E+00		1.20E+05	3.73E+02	2.47E+02	1.93E+04	4.83E+00	4.10E+02	6.45E+02	1.05E+03	8.00E-01		1.04E+01	6.72E-04			2.26E+06
47			1.86E-02		1.48E+00			1.58E+04	2.26E+03	5.06E+02	1.12E+04	1.04E-01	5.23E+02		5.23E+02			1.35E-01	6.09E-08			3.48E+05
51	5.22E+00	3.67E+00	3.37E-02	8.88E-02	1.72E+00	1.57E+00	2.12E+03	1.42E+04	5.18E+03	9.24E+02	3.03E+03	9.77E-01			2.67E+03	2.15E+01	2.12E+03	1.65E+05	1.87E+01	2.90E+01	1.42E-04	1.15E+06
Total	1.04E+02	3.93E+01	1.73E+00	4.89E+00	6.67E+01	7.73E+01		2.16E+06	4.61E+04	1.77E+04	1.08E+06	3.60E+01				2.11E+02		2.21E+05	1.76E+01			
Average	**5.77E+00**	**2.14E+00**	**5.52E-02**	**2.83E-01**	**2.31E+00**	**2.53E+00**	**2.12E+03**	**7.29E+04**	**1.52E+03**	**5.89E+02**	**3.67E+04**	**1.22E+00**			**6.72E+03**	**7.81E+00**	**2.12E+03**	**1.33E+04**	**1.25E+00**	**2.90E+01**	**1.42E-04**	**5.85E+06**
Mod. Aver.																						

Reference:
M:\WASTE8\Hlcats\WCSystem\[WCSystem.xls]SldgInv

Attachment 8

Calculation of 95 Ci% Supernate/5 Ci% Sludge Scaling Factors

Attachment 8

Calculation of 95 Ci% Supernate/5 Ci% Sludge Scaling Factors

	Sludge		Supernate		95 Ci% Supernate / 5 Ci% Sludge Mixture			
Isotope	Ci	Ci%	Ci/gal	Ci%	Ci%	Ci/Ci Cs-137	CiTRU/Ci Cs-137	Ci/gal
H-3			1.60E-02	1.67E-01	1.59E-01	3.28E-03		1.59E-02
C-14	1.78E-01	3.04E-06	9.50E-06	9.92E-05	9.44E-05	1.96E-06		9.48E-06
Ni-59	7.66E+01	1.31E-03	9.40E-05	9.82E-04	9.98E-04	2.07E-05		
Co-60	1.10E+04	1.87E-01	1.00E-01	1.05E+00	1.01E+00	2.08E-02		1.01E-01
Ni-63	3.89E+00	6.66E-05			3.33E-06	6.89E-08		
Sr-90	2.62E+06	4.49E+01	4.26E-03	4.45E-02	2.29E+00	4.74E-02		2.30E-01
Y-90	2.62E+06	4.49E+01	4.26E-03	4.45E-02	2.29E+00	4.74E-02		2.30E-01
Tc-99	7.78E+02	1.33E-02	9.00E-04	9.40E-03	9.60E-03	1.99E-04		9.64E-04
I-129	8.37E-03	1.43E-07	1.00E-06	1.04E-05	9.93E-06	2.06E-07		9.98E-07
Cs-137	1.55E+05	2.65E+00	4.85E+00	5.07E+01	4.83E+01	1.00E+00		4.85E+00
Ba-137m	1.46E+05	2.50E+00	4.59E+00	4.79E+01	4.57E+01	9.46E-01		4.59E+00
Pm-147	1.21E+05	2.07E+00			1.04E-01	2.15E-03		1.04E-02
Eu-154	2.81E+04	4.81E-01			2.41E-02	4.98E-04		
U-233	5.77E+00	9.88E-05	3.73E-09	3.90E-08	4.97E-06	1.03E-07		5.00E-07
U-234	2.14E+00	3.66E-05	2.90E-07	3.03E-06	4.71E-06	9.76E-08		4.73E-07
U-235	5.52E-02	9.44E-07	1.38E-07	1.44E-06	1.42E-06	2.94E-08		1.42E-07
U-238	2.31E+00	3.95E-05	6.24E-09	6.52E-08	2.04E-06	4.22E-08		2.05E-07
Np-237	2.53E+00	4.33E-05	1.43E-08	1.49E-07	2.31E-06	4.78E-08	4.78E-08	2.32E-07
Np-239	2.12E+03	3.63E-02			1.82E-03	3.76E-05		
Pu-238	7.29E+04	1.25E+00	4.98E-07	5.20E-06	6.23E-02	1.29E-03	1.29E-03	6.26E-03
Pu-239	1.52E+03	2.60E-02	2.92E-07	3.05E-06	1.30E-03	2.70E-05	2.70E-05	1.31E-04
Pu-240	5.89E+02	1.01E-02	2.67E-03	2.78E-02	2.70E-02	5.58E-04	5.58E-04	2.71E-03
Pu-241	3.67E+04	6.29E-01	3.23E-04	3.38E-03	3.46E-02	7.18E-04		3.48E-03
Pu-242	1.22E+00	2.09E-05	6.45E-05	6.73E-04	6.41E-04	1.33E-05	1.33E-05	6.44E-05
Am-241	6.72E+03	1.15E-01	1.82E-03	1.91E-02	2.39E-02	4.94E-04	4.94E-04	2.40E-03
Am-242m	7.81E+00	1.34E-04	7.38E-05	7.71E-04	7.39E-04	1.53E-05	1.53E-05	7.42E-05
Am-243	2.12E+03	3.63E-02	1.50E-09	1.57E-08	1.82E-03	3.76E-05	3.76E-05	1.82E-04
Cm-244	1.33E+04	2.28E-01	4.91E-04	5.13E-03	1.63E-02	3.37E-04		
Cm-245	1.25E+00	2.14E-05	6.47E-07	6.76E-06	7.49E-06	1.55E-07	1.55E-07	7.52E-07
Cm-246	2.90E+01	4.97E-04	1.40E-13	1.46E-12	2.48E-05	5.15E-07	5.15E-07	2.50E-06
Cm-247	1.42E-04	2.43E-09	1.70E-19	1.78E-18	1.21E-10	2.51E-12	2.51E-12	1.22E-11
Total	5.84E+06	1.00E+02	9.57E+00	1.00E+02	1.00E+02	2.07E+00	2.44E-03	1.00E+01

Attachment 9

F- and H-Area High Level Supernate Waste Stream Exclusion Criteria

Attachment 9

F- and H-Area High Level Supernate Waste Stream Exclusion Criteria

Isotope	Mean Ci/Ci Cs-137	Mean Distribution (%)	<1% of Dist?(a)	Not Expected	Distribution: RADs Remaining after Exclusion Criteria	Distribution: Mean Distribution (%)	Distribution: Re-normalized Distribution (%)
H-3	3.28E-03	1.59E-01	yes(b)		H-3	1.59E-01	1.59E-01
C-14	1.96E-06	9.44E-05			**C-14**	9.44E-05	9.44E-05
Ni-59	2.07E-05	9.98E-04	yes				
Co-60	2.08E-02	1.01E+00	no		Co-60	1.01E+00	1.01E+00
Ni-63	6.89E-08	3.33E-06	yes				
Sr-90	4.74E-02	2.29E+00	no		Sr-90	2.29E+00	2.29E+00
Y-90	4.74E-02	2.29E+00	no		Y-90	2.29E+00	2.29E+00
Tc-99	1.99E-04	9.60E-03			**Tc-99**	9.60E-03	9.60E-03
I-129	2.06E-07	9.93E-06			**I-129**	9.93E-06	9.94E-06
Cs-137	1.00E+00	4.83E+01	no		Cs-137	4.83E+01	4.83E+01
Ba-137m	9.46E-01	4.57E+01	no		Ba-137m	4.57E+01	4.57E+01
Pm-147	2.15E-03	1.04E-01	yes(b)		Pm-147	1.04E-01	1.04E-01
Eu-154	4.98E-04	2.41E-02	yes				
U-233	1.03E-07	4.97E-06			U-233	4.97E-06	4.98E-06
U-234	9.76E-08	4.71E-06			**U-234**	4.71E-06	4.71E-06
U-235	2.94E-08	1.42E-06			U-235	1.42E-06	1.42E-06
U-238	4.22E-08	2.04E-06			**U-238**	2.04E-06	2.04E-06
Np-237	4.78E-08	2.31E-06			Np-237	2.31E-06	2.31E-06
Np-239	3.76E-05	1.82E-03	yes				
Pu-238	1.29E-03	6.23E-02			Pu-238	6.23E-02	6.24E-02
Pu-239	2.70E-05	1.30E-03			Pu-239	1.30E-03	1.30E-03
Pu-240	5.58E-04	2.70E-02			Pu-240	2.70E-02	2.70E-02
Pu-241	7.18E-04	3.46E-02			Pu-241	3.46E-02	3.47E-02
Pu-242	1.33E-05	6.41E-04			Pu-242	6.41E-04	6.41E-04
Am-241	4.94E-04	2.39E-02			Am-241	2.39E-02	2.39E-02
Am-242m	1.53E-05	7.39E-04			Am-242m	7.39E-04	7.39E-04
Am-243	3.76E-05	1.82E-03			Am-243	1.82E-03	1.82E-03
Cm-244	3.37E-04	1.63E-02	yes				
Cm-245	1.55E-07	7.49E-06			Cm-245	7.49E-06	7.49E-06
Cm-246	5.15E-07	2.48E-05			Cm-246	2.48E-05	2.49E-05
Cm-247	2.51E-12	1.21E-10			Cm-247	1.21E-10	1.21E-10
Total	2.07E+00	1.00E+02			Total	1.00E+02	1.00E+02

Bold = PA radionuclides

(a) for those radionuclides included because they were expected to be present at

(b) retained in distribution since they are close to 1% of total activity

all fissile and transuranic isotopes retained in distribution

Attachment 10

F- and H-Area High Level Supernate Waste Stream Activity Distribution

Attachment 10

F- and H-Area High Level Supernate Waste Stream
Activity Distribution

95% SUPERNATE 5% SLUDGE		
Radionuclide	**Normalized Distribution (%)**	**Scaling Factors Ci/Ci Cs-137**
FHW-00001		
H-3	1.59E-01	3.28E-03
C-14	9.44E-05	1.96E-06
Co-60	1.01E+00	2.08E-02
Sr-90	2.29E+00	4.74E-02
Y-90	2.29E+00	4.74E-02
Tc-99	9.60E-03	1.99E-04
I-129	9.94E-06	2.06E-07
Cs-137	4.83E+01	1.00E+00
Ba-137m	4.57E+01	9.46E-01
Pm-147	1.04E-01	2.15E-03
U-233	4.98E-06	1.03E-07
U-234	4.71E-06	9.76E-08
U-235	1.42E-06	2.94E-08
U-238	2.04E-06	4.22E-08
Np-237	2.31E-06	4.78E-08
Pu-238	6.24E-02	1.29E-03
Pu-239	1.30E-03	2.70E-05
Pu-240	2.70E-02	5.58E-04
Pu-241	3.47E-02	7.18E-04
Pu-242	6.41E-04	1.33E-05
Am-241	2.39E-02	4.94E-04
Am-242m	7.39E-04	1.53E-05
Am-243	1.82E-03	3.76E-05
Cm-245	7.49E-06	1.55E-07
Cm-246	2.49E-05	5.15E-07
Cm-247	1.21E-10	2.51E-12
Total	1.00E+02	2.07E+00

Attachment 11

Comparison of F- and H-Area Supernate Waste Against WAC 3.17, Revision 7, Requirements

Comparison of F- and H-Area Supernate Waste Against WAC 3.17, Rev. 7, *Requirements*

Comparison Against WAC 3.17, Rev. 7, *Requirements* - *Waste Stream FHW-00001*

Comparison to Package Guidelines (Section 3.5.1)

Isotope	Isotope Average Ci/gal 95 Ci% Supernate/5 Ci% Sludge[1]	LAWV limit ci/ft3	LAWV limit Ci for B-25	Amt isotope in B-25 to reach LAWV Limit (gal) = LAWV limit in B-25/supernate activity	Total Curies in B-25	TRU Curies	for 5000 lb nCi/g	min waste wt to not be TRU
H-3	1.59E-02	1.10E+01	9.90E+02	6.22E+04				
C-14	9.48E-06	2.50E-05	2.25E-03	2.37E+02				
Tc-99	9.64E-04	5.60E-05	5.04E-03	5.23E+00				
I-129	9.98E-07	1.10E-08	9.90E-07	**9.92E-01**	9.96E+00	1.17E-02	5.168241	258.412
U-234	4.73E-07	1.10E-03	9.90E-02	2.09E+05				
U-238	2.05E-07	1.20E-03	1.08E-01	5.28E+05				

Sum of Fractions Calculation (Section 3.5.2)

Total Activity, blended 95 Ci% Supernate/5 Ci% Sludge[a] **1.00E+01** *Ci/gal*

Isotope	Isotope Average Ci/gal 95 Ci% Supernate/5 Ci% Sludge[1]	Ci/ft3 supernate	Ci/ft3 waste	LAWV limit ci/ft3	Fraction
H-3	1.59E-02	1.19E-01	1.47E-04	1.10E+01	1.33E-05
C-14	9.48E-06	7.09E-05	8.74E-08	2.50E-05	3.50E-03
Tc-99	9.64E-04	7.21E-03	8.89E-06	5.60E-05	1.59E-01
I-129	9.98E-07	7.46E-06	9.20E-09	1.10E-08	8.36E-01
U-234	4.73E-07	3.54E-06	4.36E-09	1.10E-03	3.97E-06
U-238	2.05E-07	1.53E-06	1.89E-09	1.20E-03	1.57E-06
	ft3 supernate/ft3 waste	1.23E-03		Total	**9.99E-01**
	ft3 supernate/B-25	1.11E-01			
	Gal supernate/B-25	8.30E-01	max amount of supernate in a B-25 to meet Sum of Fractions Limit		
	Equivalent Curies	8.33E+00	TRU curies	9.81E-03	min lb wt to not be TRU
			nCi/g at max wt	4.32E+00	216.1320481

TRU Curies/Total Curies = 1.18E-03

Total TRU[a] = 1.18E-02 *Ci/gal*

Np-237	2.32E-07	Ci/gal
Pu-238	6.26E-03	Ci/gal
Pu-239	1.31E-04	Ci/gal
Pu-240	2.71E-03	Ci/gal
Pu-242	6.44E-05	Ci/gal
Am-241	2.40E-03	Ci/gal
Am-242m	7.42E-05	Ci/gal
Am-243	1.82E-04	Ci/gal
Cm-245	7.52E-07	Ci/gal
Cm-246	2.50E-06	Ci/gal
Cm-247	1.22E-11	Ci/gal

Nuclear Criticality Safety Criteria (Section 3.5.3)

	Isotope Average Ci/gal 95 Ci% Supernate/5 Ci% Sludge[1]	Specific Activity Ci/g	Ci	Mass (g)	Equiv Factor	FGE
U-233	5.00E-07	9.648E-03	3.56E-04	3.69E-02	1.4	5.17E-02
U-235	1.42E-07	2.160E-06	1.01E-04	4.70E+01	1.0	4.70E+01
Pu-239	1.31E-04	6.132E-02	9.32E-02	1.52E+00	1.6	2.43E+00
Pu-241	3.48E-03	1.034E+02	2.48E+00	2.40E-02	3.5	8.39E-02
Am-242m	7.42E-05	9.717E+00	5.29E-02	5.44E-03	54.0	2.94E-01
Cm-245	7.52E-07	1.716E-01	5.36E-04	3.12E-03	24.0	7.50E-02
Cm-247	1.22E-11	9.396E-05	8.69E-09	9.25E-05	1.6	1.48E-04
	Gal Supernate	712.7			Total	**4.99E+01**
	Equiv Curies	7.16E+03				

[a]From Attachment 6

Attachment 12

Comparison of Burial Ground Parameters for 100% Supernate and 95/5 Ci% Supernate/Sludge Mixture

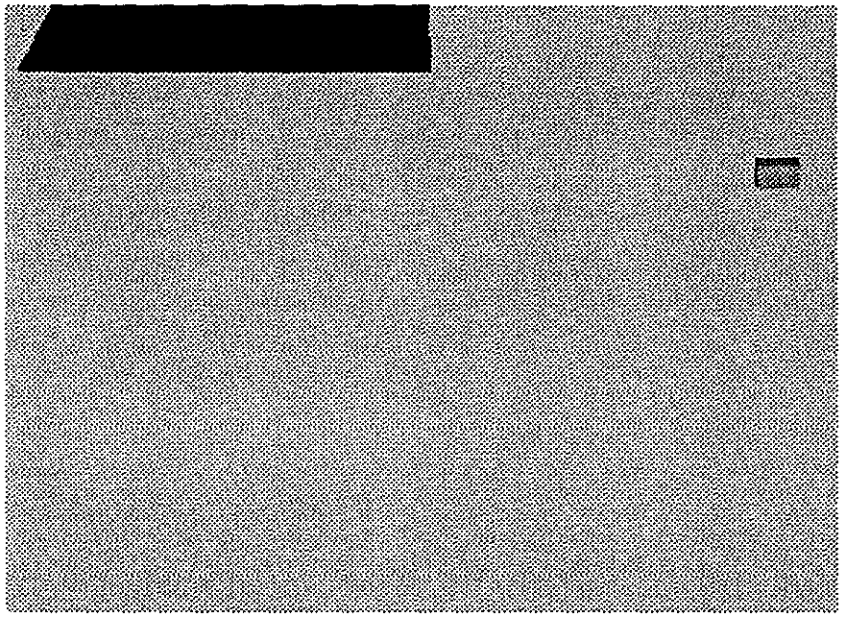
SRS-DTC 3.10 - Summary Output

Case Title: Att 12 (Pg 1 of 3) Case 1: Assume 100% Supernate Run By: [redacted] 3/11/03

File Name: C:\SRSDTC\CASE1.MS1

Run Date: 3/11/2003 11:13:19 AM Total Run Time:5 seconds Reviewed By: _____

Case Model



Source Data

Geometry:	Rectangle	B Up
Length:	6.00	ft
Width:	4.00	ft
Height:	4.00	ft
Mass:	2.419E+05	gm
Volume:	9.600E+01	ft^3
Material/Den:	Composite	0.09

Shield Data

Shield #:	1	
Geometry:	Rectangular	
Length:	6.00	ft
Width:	4.00	ft
Thickness:	0.01	ft
Material/Den:	Iron	7.87

Integration Parameters: Length: 10 Width: 10 Height: 10

Source Activity - Std. Grouping - Lower Energy Cutoff = 0.000E+00

Nuclide	Curies	Bq	Nuclide	Curies	Bq
Am-241	3.760E-04	1.391E+07	I-129	2.060E-07	7.622E+03
Am-242m	1.520E-05	5.624E+05	Ni-59	1.940E-05	7.178E+05
Am-243	3.090E-10	1.143E+01	Np-237	6.010E-08	2.224E+03
Ba-137m	9.460E-01	3.500E+10	Pu-238	1.030E-07	3.811E+03
C-14	1.960E-06	7.252E+04	Pu-239	6.030E-08	2.231E+03
Cm-244	1.010E-04	3.737E+06	Pu-240	5.490E-04	2.031E+07
Cm-245	1.330E-07	4.921E+03	Pu-241	6.670E-05	2.468E+06
Cm-246	2.880E-14	1.066E-03	Pu-242	1.330E-05	4.921E+05
Cm-247	3.500E-20	1.295E-09	Sr-90	8.790E-04	3.252E+07
Co-60	2.070E-02	7.659E+08	Tc-99	1.860E-04	6.882E+06
Cs-137	1.000E+00	3.700E+10	U-233	7.690E-10	2.845E+01
H-3	3.290E-03	1.217E+08	U-234	5.980E-08	2.213E+03

Case Results

	Detector Coordinates in ft			Exposure Rates in Air mR/hr		Dose Equivalent Rate mRem/hr	
Detector #	X	Y	Z	w/o BuildUp	with BuildUp	w/o BuildUp	with BuildUp
1	8.01	2.00	0.00	3.345E+01	5.551E+01	3.085E+01	5.119E+01

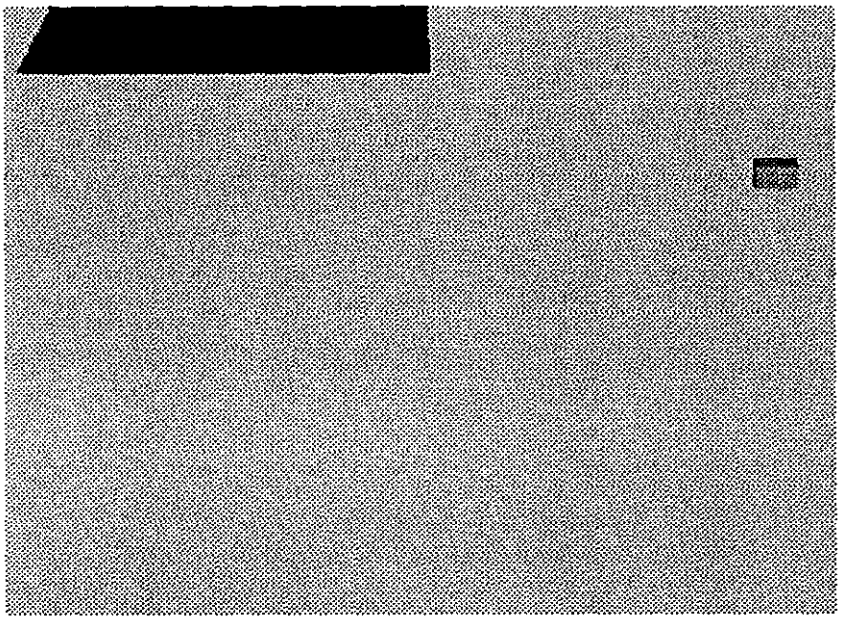
SRS-DTC 3.10 - Summary Output

Case Title: Att 12 (Pg 2 of 3) Case 2: 95/5 Ci% Supernate/Sludge Run By: [redacted] 3/11/03

File Name: C:\SRSDTC\CASE2.MS1

Run Date: 3/11/2003 11:22:05 AM Total Run Time:5 seconds Reviewed By: _____

Case Model



Source Data

Geometry:	Rectangle	B Up
Length:	6.00	ft
Width:	4.00	ft
Height:	4.00	ft
Mass:	2.419E+05	gm
Volume:	9.600E+01	ft^3
Material/Den:	Composite	0.09

Shield Data

Shield #:	1	
Geometry:	Rectangular	
Length:	6.00	ft
Width:	4.00	ft
Thickness:	0.01	ft
Material/Den:	Iron	7.87

Integration Parameters: Length: 10 Width: 10 Height: 10

Source Activity - Std. Grouping - Lower Energy Cutoff = 0.000E+00

Nuclide	Curies	Bq	Nuclide	Curies	Bq
Am-241	4.940E-04	1.828E+07	H-3	3.280E-03	1.214E+08
Am-242m	1.530E-05	5.661E+05	I-129	2.060E-07	7.622E+03
Am-243	3.760E-05	1.391E+06	Ni-59	2.070E-05	7.659E+05
Ba-137m	9.460E-01	3.500E+10	Ni-63	6.890E-08	2.549E+03
C-14	1.960E-06	7.252E+04	Np-237	4.780E-08	1.769E+03
Cm-244	3.370E-04	1.247E+07	Np-239	3.760E-08	1.391E+03
Cm-245	1.550E-07	5.735E+03	Pm-147	2.150E-03	7.955E+07
Cm-246	5.150E-07	1.906E+04	Pu-238	1.290E-03	4.773E+07
Cm-247	2.150E-12	7.955E-02	Pu-239	2.700E-05	9.990E+05
Co-60	2.080E-02	7.696E+08	Pu-240	5.580E-04	2.065E+07
Cs-137	1.000E+00	3.700E+10	Pu-241	7.180E-04	2.657E+07
Eu-154	4.980E-04	1.843E+07	Pu-242	1.330E-05	4.921E+05

Case Results

	Detector Coordinates in ft			Exposure Rates in Air mR/hr		Dose Equivalent Rate mRem/hr	
Detector #	X	Y	Z	w/o BuildUp	with BuildUp	w/o BuildUp	with BuildUp
1	8.01	2.00	0.00	3.351E+01	5.559E+01	3.090E+01	5.126E+01

Attachment 12

Comparison of Burial Ground Parameters for 100% Supernate and 95/5 Ci% Supernate/Sludge Mixture

Both Cases:
500 Lb B-25
Job Control Waste

Case 1
Basis: 1 Ci Cs-137
51.19mrem/hr
(See Pg 1 of 3 DTC Run)

Basis: 1 mrem/hr
1.954E-02 Ci Cs-137
2.171E-04 Ci Cs-137/ft3

Case 2
Basis: 1 Ci Cs-137
51.26 mrem/hr
(See Pg 2 of 3 DTC Run)

Basis: 1 mrem/hr
1.951E-02 Ci Cs-137
2.168E-04 Ci Cs-137/ft3

	100% Supernate					95 Ci% Supernate / 5 Ci% Sludge Mixture				
Isotope	**Ci%**	**Ci/Ci Cs-137**	**Ci/ft3**	**ΣFr'ns**	**nCi/g TRU**	**Ci%**	**Ci/Ci Cs-137**	**Ci/ft3**	**ΣFr'ns**	**nCi/g TRU**
H-3	1.67E-01	3.29E-03	7.15E-07			1.59E-01	3.28E-03	7.12E-07		
C-14	9.92E-05	1.96E-06	4.25E-10	1.70E-05		9.44E-05	1.96E-06	4.24E-10	1.70E-05	
Ni-59	9.82E-04	1.94E-05	4.21E-09			9.98E-04	2.07E-05	4.48E-09		
Co-60	1.05E+00	2.07E-02	4.49E-06			1.01E+00	2.08E-02	4.52E-06		
Ni-63						3.33E-06	6.89E-08	1.49E-11		
Sr-90	4.45E-02	8.79E-04	1.91E-07			2.29E+00	4.74E-02	1.03E-05		
Y-90	4.45E-02	8.79E-04	1.91E-07			2.29E+00	4.74E-02	1.03E-05		
Tc-99	9.40E-03	1.86E-04	4.03E-08	7.19E-04		9.60E-03	1.99E-04	4.31E-08	7.69E-04	
I-129	1.04E-05	2.06E-07	4.47E-11	4.07E-03		9.93E-06	2.06E-07	4.46E-11	4.05E-03	
Cs-137	5.07E+01	1.00E+00	2.17E-04			4.83E+01	1.00E+00	2.17E-04		
Ba-137m	4.79E+01	9.46E-01	2.05E-04			4.57E+01	9.46E-01	2.05E-04		
Pm-147						1.04E-01	2.15E-03	4.66E-07		
Eu-154						2.41E-02	4.98E-04	1.08E-07		
U-233	3.90E-08	7.69E-10	1.67E-13			4.97E-06	1.03E-07	2.23E-11		
U-234	3.03E-06	5.98E-08	1.30E-11	1.18E-08		4.71E-06	9.76E-08	2.12E-11	1.92E-08	
U-235	1.44E-06	2.85E-08	6.18E-12			1.42E-06	2.94E-08	6.36E-12		
U-238	6.52E-08	1.29E-09	2.79E-13	2.33E-10		2.04E-06	4.22E-08	9.14E-12	7.62E-09	
Np-237	1.49E-07	2.94E-09	6.39E-13		2.53E-07	2.31E-06	4.78E-08	1.04E-11		4.11E-06
Np-239						1.82E-03	3.76E-05	8.16E-09		
Pu-238	5.20E-06	1.03E-07	2.23E-11		8.84E-06	6.23E-02	1.29E-03	2.80E-07		1.11E-01
Pu-239	3.05E-06	6.03E-08	1.31E-11		5.19E-06	1.30E-03	2.70E-05	5.85E-09		2.32E-03
Pu-240	2.78E-02	5.49E-04	1.19E-07		4.73E-02	2.70E-02	5.58E-04	1.21E-07		4.80E-02
Pu-241	3.38E-03	6.67E-05	1.45E-08			3.46E-02	7.18E-04	1.56E-07		
Pu-242	6.73E-04	1.33E-05	2.88E-09		1.14E-03	6.41E-04	1.33E-05	2.88E-09		1.14E-03
Am-241	1.91E-02	3.76E-04	8.16E-08		3.24E-02	2.39E-02	4.94E-04	1.07E-07		4.25E-02
Am-242m	7.71E-04	1.52E-05	3.30E-09		1.31E-03	7.39E-04	1.53E-05	3.32E-09		1.32E-03
Am-243	1.57E-08	3.09E-10	6.71E-14		2.66E-08	1.82E-03	3.76E-05	8.16E-09		3.23E-03
Cm-244	5.13E-03	1.01E-04	2.20E-08			1.63E-02	3.37E-04	7.31E-08		
Cm-245	6.76E-06	1.33E-07	2.89E-11		1.15E-05	7.49E-06	1.55E-07	3.36E-11		1.33E-05
Cm-246	1.46E-12	2.88E-14				2.48E-05	5.15E-07	1.12E-10		
Cm-247	1.78E-18	3.50E-20	7.61E-24		3.02E-18	1.21E-10	2.51E-12	5.45E-16		2.16E-10
Total	1.00E+02	1.97E+00		**4.80E-03**	**8.21E-02**	1.00E+02	2.07E+00	4.04E-02	**4.84E-03**	**2.09E-01**

Attachment 13

Waste Characterization Form for FHW-00001

OSR 29-82# (Rev 1-14-2003)

Ref. 1S Manual, Appendix A-17 Instructions

EAV Low Level Waste Stream Characterization

1. Waste Stream ID	2. Generating Facility	3. Waste Organization	4. Building Name	5. Effective Date
FHW00001	FTF, HTF	F-Area Tank Farm/H-Area Tank Farm	241-F, 241-H, 241-197H	4/1/2003

6. WITS Stream Description	7. Reason for Submittal	8. WSCF No.	9. Rev
Sludge contam'd waste from Tks 9-15, 21-23, 30, 32, 35, 36, 40, 42, 43, and 51	New Waste Stream		

10. Activity Generating Waste	11. Physical Form	12. TSD Facility/Location
FTF and HTF Operations	Combustible	EAV - Law Vault - 1

13. Valid Calculation Method for Waste	14. STC Constant	15. STC Min Value	16. DTC Waste Form
☐ Dose-to-Curie ☐ Smear to Curie ☐ Char by Pack ☒ Curies or RAD Weight	N/A	N/A	N/A

17. Assigned Container Types	18. DTC Containers	19. Waste Description	Vol %
B-12 (14)	All B-25s	Contaminated Equipment	60
B-25 (Yellow)-Light (6)	All B-12s	Job Control Waste	36
B-25 (Yellow) 625# (733)	All 55-gal Drums	Soil	4
55-gal Drum (A,7A) (15)	Skid Pan		
Skid Pan (183)			

20. WITS ID	21. Tech Baseline	22. Container Document No.	23. Deviation Document No.	24. CERCLA	25. Waste < 2 nCi/g
FHW00001LLW	WSRC-TR-94-00290, Rev. 4	N/A	N/A	☐ Yes ☒ No	☐ Yes ☒ No

26. Source(s)	27. PCB Category				
☐ Yes ☒ No	☐ PCB Leachable	☐ PCB Bulk	☐ PCB Remediation	☒ N/A	☐ PCB Laboratory	☐ PCB Article	☐ PCB Decontamination

28. Comments

29. Meas Tech	30. Waste Incidental to Reprocessing (WIR) — Evaluation Document No.
☐ Sample and Analysis ☒ Process Knowledge	☒ NA

31. Currently Assigned Isotopes

Isotope	Ci %	Basis for Exclusion (PA isotopes only)	Isotope	Ci %	Basis for Exclusion*
H-3	1.59E-01		Am-243	1.82E-03	
C-14	9.44E-05		Cm-245	7.49E-06	
Co-60	1.01E+00		Cm-246	2.49E-05	
Sr-90	2.29E+00		Cm-247	1.21E-10	
Y-90	2.29E+00				
Tc-99	9.60E-03				
I-129	9.94E-06				
Cs-137	4.83E+01				
Ba-137m	4.57E+01				
Pm-147	1.04E-01				
U-233	4.98E-06				
U-234	4.71E-06				
U-235	1.42E-06				
U-238	2.04E-06				
Np-237	2.31E-06				
Pu-238	6.24E-02				
Pu-239	1.30E-03				
Pu-240	2.70E-02				
Pu-241	3.47E-02				
Pu-242	6.41E-04				
Am-241	2.39E-02				
Am-242m	7.39E-04				

Total 100.00 ~~104.9791~~ %

32. GCO Name	33. GCO Address	34. GCO Phone
W. R. Stewart	704-56H	8-0604

35. GCO Signature**	Date	Environmental Compliance Authority Signature	Date
	3/13/03	Wm A Bleeker	3/13/03

Solid Waste Generator Service Approval	Date	WITS Data Input Signature	Date

**Generator Certification Statement: "I certify that to the best of my knowledge, the data submitted provides a true and accurate description of the waste."