SRR-CWDA-2014-00124
Revision 0

Determination of the SDF Inventory through 9/30/2014

February 3, 2015

Prepared by: Savannah River Remediation LLC
Waste Disposal Authority
Aiken, SC 29808

Prepared for U.S. Department of Energy Under Contract No. DE-AC09-09SR22505

APPROVALS

Author:

D. B. Dixon
Waste Disposal Authority
Savannah River Remediation LLC

2-3-2015
Date

Technical Review (per ENG51):

S.P. Hommel
Waste Disposal Authority
Savannah River Remediation LLC

2/3/15
Date

Management Review:

S. A. Thomas
Waste Disposal Authority
Savannah River Remediation LLC

2/3/2015
Date

EXECUTIVE SUMMARY

This document provides the annual assessment of radionuclide inventory that has been received and disposed of (hereinafter referred to as: disposed inventory) at the Saltstone Disposal Facility (SDF). In addition, this document provides the actual inventory of radionuclides in the SDF accounting for decay of the radionuclides and the ingrowth of daughter products (hereinafter referred to as: current inventory). The inventories provided include all material sent to SDF through the end of Fiscal Year (FY) 2014 (i.e., September 30, 2014). The current inventory in the SDF is significantly less than the disposed inventory due to the fact that the majority of the curies disposed of in SDF are associated with Cs-137 and Sr-90, radionuclides with approximate 30-year half-lives, and their short-lived daughter products, Ba-137m and Y-90, respectively.

In FY2014 alone, 1,167 kilogallons (kgal) of low-level salt waste was transferred from Tank 50 to the Saltstone Processing Facility (SPF). A total of 2,114 kgal of saltstone containing 19.6 kilocuries (kCi) was emplaced in the SDF. Saltstone was emplaced in Saltstone Disposal Unit (SDU) Cells 2A and 2B, as well as in SDU Cell 5B. Cesium-137 and its daughter product Ba-137m made up 99% of the curies disposed of in FY2014. Table ES-1 summarizes these activities. During FY2014 alone, 9 kCi decayed from the SDF inventory, resulting in a net gain of only 10.6 kCi to the SDF current inventory at the end of FY2014.

Table ES-1: FY2014 Saltstone Processing Summary

	SDU 2A	SDU 2B	SDU5B	Total
FY2014 Volume of Salt Waste Disposed (kgal)	264	223	680	1,167
FY2014 Volume of Saltstone Emplaced (kgal)	529	395	1,190	2,114
FY 2014 Curies Disposed (kCi)	3.23	3.33	13.0	19.6

Since initiation of operations in June 1990, the SDF has received and disposed of a combined total of 623 kCi in SDU 1 (Vault 1), SDU 2A, SDU 2B, SDU 4 (Vault 4) and SDU 5B. The current inventory in the SDF as of September 30, 2014 is 408 kCi. The difference between the disposed inventory and current inventory is due to ongoing radioactive decay, principally of Cs-137 and Ba-137m which make up 97% of the SDF current inventory. Figure ES-1 shows the disposed inventory and the current inventory in each of the SDUs as of the end of FY2014. SDUs 1 and 4 have remaining disposal space but a decision has been made to discontinue future saltstone emplacement operations to these units. In FY2014, SDUs 2A and 2B were filled to their operational capacity; no further disposal to these units is anticipated. In FY2015, SDUs 3A, 3B, 5A and the remaining space in SDU 5B are available to emplace saltstone.

In March 2007, the SDF began emplacing saltstone produced with decontaminated salt solution (DSS) associated with Interim Salt Processing (ISP). Interim Salt Processing includes salt treatment utilizing the Deliquification, Dissolution and Adjustment (DDA) process and Actinide Removal Process (ARP) / Modular Caustic Side Solvent Extraction Unit (MCU) processes. The

U.S. Department of Energy (DOE) has agreed to limit the SDF disposed inventory associated with Interim Salt Processing to no more than 600 kCi, regardless of the current inventory associated with ISP. Through September 30, 2014, 456 kCi associated with ISP have been disposed of in the SDF leaving a margin of 144 kCi for future disposal associated with Interim Salt Processing. As shown in Table ES-2, the current inventory in the SDF as of September 30, 2014 associated with Interim Salt Processing is 407 kCi. At the end of FY2014 there was a difference of less than one kCi between the current inventory in the SDF since initiation of operations in 1990 (408 kCi), including ISP operations, and the current inventory in SDF associated with ISP alone (407 kCi).

Figure ES-1: SDF Disposed/Current Inventory per SDU through FY2014

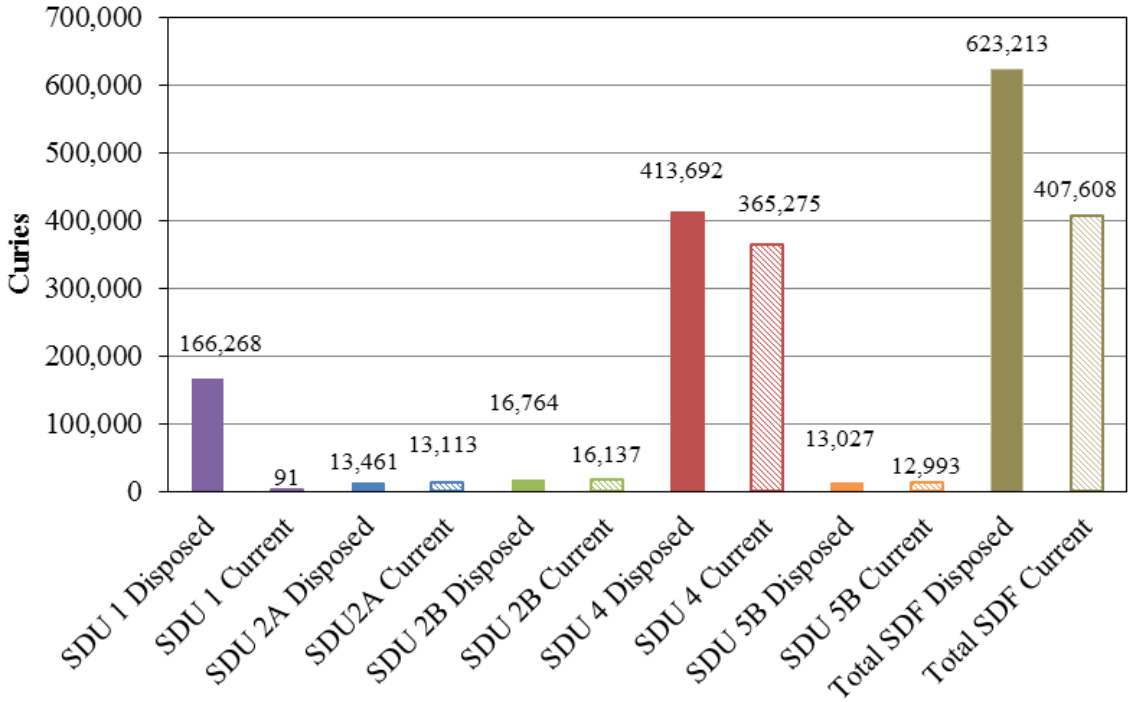


Table ES-2: SDF Inventory Summary 1990 through FY2014

	All Salt Processing[1] 1990-FY2014 kCi		**Interim Salt Processing 2007-FY2014 kCi**	
	Disposed	Current	Disposed	Current
SDF Total	623	408	456	407
SDU 1	166	0.0906	0	0
SDU 2A	13.5	13.1	13.5	13.1
SDU 2B	16.8	16.1	16.8	16.1
SDU 4	414	365	413	365
SDU 5B	13.0	13.0	13.0	13.0

[1] Includes Interim Salt Processing

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ARP	Actinide Removal Process
DDA	Deliquification, Dissolution, and Adjustment
DOE	U.S. Department of Energy
DOE-SR	U.S. Department of Energy – Savannah River Office
DSS	Decontaminated Salt Solution
ETF	Effluent Treatment Facility
FY	Fiscal Year
HLW	High Level Waste
kCi	kilocuries
kgal	kilogallons
ISP	Interim Salt Processing
ITP	In-Tank Precipitation
MCU	Modified Caustic Side Solvent Extraction Unit
SCDHEC	South Carolina Department of Health and Environmental Control
SDF	Saltstone Disposal Facility
SDU	Salt Disposal Unit
SPF	Saltstone Production Facility
SRS	Savannah River Site

1.0 METHODOLOGY

The Saltstone Disposal Facility (SDF) inventory presented in this document was determined using the Saltstone Disposal Facility Waste Inventory Disposed Estimator (SDF-WIDE) model. The SDF-WIDE model uses GoldSim software to perform inventory calculations and to track the volume and curies disposed of (with and without decay and ingrowth) within each SDU. The *Saltstone Disposal Facility Waste Inventory Disposed Estimator Model Report* provides a detailed description of the approach and methodology used in the SDF-WIDE model. [SRR-CWDA-2015-00003]

The inputs for the SDF-WIDE model are the Tank 50 sample concentrations and the Tank 50 transfer volumes from Tank 50 to the Saltstone Production Facility (SPF). Table 1-1 below, provides a crosswalk of the source information that was used to develop the inventory (i.e., disposed of and current) attributed to FY2014 processing. All historical SDF inputs used to develop the inventory (i.e., disposed of and current) since the beginning of SDF processing (i.e., 1990) can be found in the SDF-WIDE model report, SRR-CWDA-2015-00003.

Table 1-1: Crosswalk for FY2014 Inputs

Source for Tank 50 Concentration Data	Source for Tank 50 Transfer Volume and Saltstone Volume Data	Period for Reported Concentration
SRNL-STI-2014-00074	X-CLC-Z-00067	10/1/2013 – 12/31/2013
SRNL-STI-2014-00203	X-CLC-Z-00068	1/1/2014 – 3/31/2014
SRNL-STI-2014-00308	X-CLC-Z-00069	4/1/2014 – 6/30/2014
SRNL-STI-2014-00492	X-CLC-Z-00070	7/1/2014 – 9/30/2014

2.0 SDF INVENTORY

2.1 SDF Processing History

The SDF was originally permitted to receive treated salt solution from the In-Tank Precipitation (ITP) process. The permits were subsequently modified to provide for the treatment of residues from the Effluent Treatment Facility (ETF). The ITP process was designed to remove targeted radioisotopes from salt solution originating from High Level Waste (HLW) tanks prior to disposal at the SDF. The SPF began receiving radioactive waste for treatment in June 1990 with transfers from Tank 50; the resultant saltstone grout was emplaced in SDU 1. Operations continued through August 1998 with emplacement in SDU 1 and SDU 4 until the facility was put up in "lay up" mode because of difficulties with the ITP process. [WSRC-RP-2008-00390]

In early 2002 efforts began to restart saltstone production. In 2007, U.S. Department of Energy (DOE) received concurrence from the South Carolina Department of Health and Environmental Control (SCDHEC) to treat and dispose of low activity salt waste. This treatment included processing lower activity salt waste by Deliquification, Dissolution, and Adjustment (DDA) and processing slightly higher activity waste using an Actinide Removal Process (ARP) and a Modular Caustic Side Solvent Extraction Unit (MCU). The treated salt solution resulting from these processes is referred to as decontaminated salt solution (DSS). The two treatment methods, DDA and ARP/MCU, are collectively referred to as Interim Salt Processing (ISP). [WSRC-RP-2008-00390, DOE-WD-2005-001]

In March 2007, the first DDA material was transferred into Tank 50 and subsequently processed at the SPF and disposed of in SDU 4. [SPD-07-153] In April 2008, Tank 50 began receiving DSS from ARP/MCU, in addition to receipts of DDA material. Tank 50 continued to receive material from both DDA and ARP/MCU until September 2009 when the last DDA transfer into Tank 50 was completed. [LWO-PIT-2007-00083, SRR-LWP-2010-00007] Treatment of salt waste through ARP/MCU continued and is still on-going. In May 2011, DOE formally declared that the DDA processing was complete. [OCC-11-0070] In July 2011, DOE issued a letter to SCDHEC stating that, among other things, DOE would limit the disposal at SDF of salt waste resulting from the ISP treatment methods to a volume of waste that contains no more than 600 kCi. [EQMD-11-027] In other words, the disposed inventory for SDF resulting from ISP treatment of salt waste will be no more than 600 kCi, regardless of the current inventory in SDF.

This document provides the current inventory of the SDF through FY2014. The current inventory takes into account decay and ingrowth of daughter products. This document also provides the overall disposed inventory at the SDF through FY2014 and the disposed inventory specifically associated with ISP during the period from March 2007 through FY2014.

2.2 Current Inventory

The current inventory at the SDF is the inventory for all waste disposed from June 1990 through FY2014 taking into account radioactive decay and ingrowth. There was no material added to SDUs 1 and 4 in FY2014, therefore, the changes to those inventories since September 30, 2013 were only due to decay. SDU 1 last received waste in September 1996 and SDU 4 last received waste in November 2011. There are no plans to receive any additional waste in these units. [SRR-LWP-2009-00001] The SDF inputs for FY2014 processing are provided in Table 1-1.

The SDF inputs from facility startup through FY2013 are provided in *Saltstone Disposal Facility Waste Inventory Disposed Estimator Model Report*, SRR-CWDA-2015-00003.

Figure 2-1 shows the current inventory at the SDF from 1990 through FY2014. The current inventory (which includes decay) for the SDF through FY2014 is 408 kCi. The current inventory for each SDU on September 30, 2014 is presented in Figure 2-2.

The current inventory through FY2014 for each radionuclide within each SDU is provided in Tables 2-1 through 2-5. As shown in these tables, the largest contributors to the current inventory in SDUs 2A, 2B, 4, and 5B are Cs-137 and Ba-137m. Cs-137 and Ba-137m make up 99% of the current inventory in SDU 2A, SDU 2B, and SDU 5B and make up 97% of the current inventory in SDU 4. Tc-99 and H-3 are the largest contributors to the current inventory in SDU 1, with 54% of the inventory being Tc-99 and 18% of the inventory being H-3.

Figure 2-1: SDF Current Inventory through FY2014

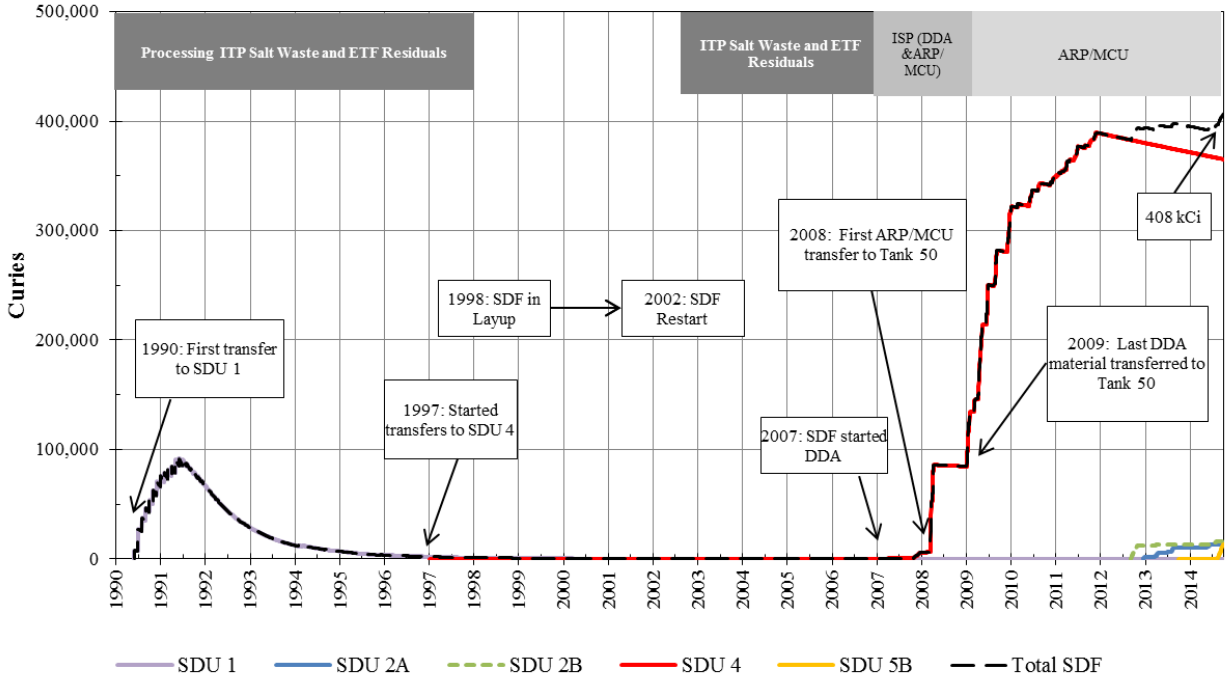


Figure 2-2: Current Inventory of SDUs on September 30, 2014

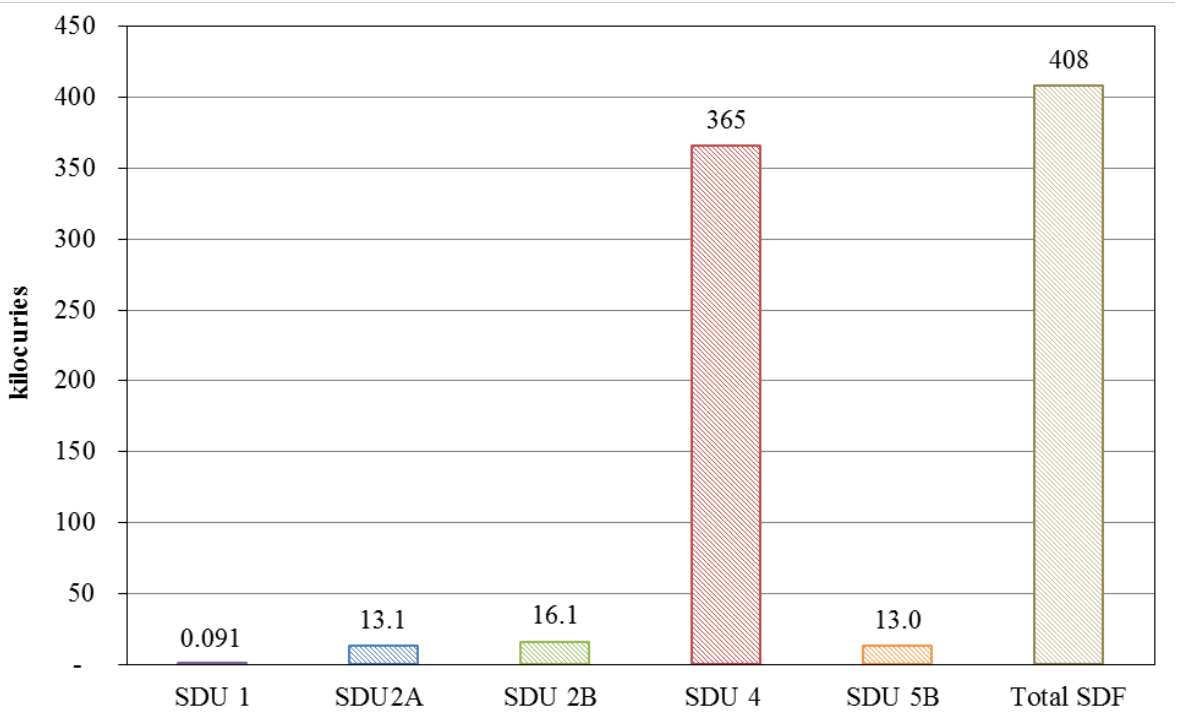


Table 2-1: SDU 1 Current Inventory on September 30, 2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	1.61E+01	Eu-155	5.90E-04
C-14	1.32E+00	Pt-193	1.71E+00
Na-22	3.37E+00	Ra-226	4.34E-07
Al-26	2.64E-01	Ra-228	7.68E-06
Cl-36	1.93E-07	Ac-227	1.53E-06
K-40	1.93E-07	Th-229	3.85E-04
Co-60	6.54E-04	Th-230	4.47E-05
Ni-59	2.30E-03	Th-232	7.68E-06
Ni-63	1.22E-01	Pa-231	2.91E-06
Se-79	3.44E-01	U-232	6.75E-04
Y-90	1.19E-02	U-233	7.79E-02
Sr-90	1.19E-02	U-234	9.98E-02
Zr-93	7.68E-01	U-235	2.53E-03
Nb-93m	7.57E-01	U-236	6.54E-03
Nb-94	2.03E-03	U-238	1.07E-02
Tc-99	4.93E+01	Np-237	3.94E-03
Ru-106	3.47E-06	Pu-238	7.36E-03
Rh-106	3.47E-06	Pu-239	1.43E-02
Pd-107	8.38E-03	Pu-240	1.35E-02
Sn-126	1.22E+00	Pu-241	2.37E-02
Sb-125	4.93E-02	Pu-242	1.57E-03
Sb-126	1.71E-01	Pu-244	1.01E-05
Sb-126m	1.22E+00	Am-241	1.86E-03
Te-125m	1.21E-02	Am-242m	6.92E-05
I-129	2.01E-01	Am-243	1.42E-03
Cs-134	2.33E-03	Cm-242	5.83E-06
Cs-135	9.75E-02	Cm-243	4.99E-04
Cs-137	6.80E+00	Cm-244	3.39E-03
Ba-137m	6.42E+00	Cm-245	2.73E-04
Pr-144	1.06E-04	Cm-247	1.61E-13
Ce-144	1.07E-04	Cm-248	1.68E-13
Pm-147	6.39E-03	Bk-249	1.59E-23
Sm-151	5.67E-03	Cf-249	8.91E-13
Eu-152	1.81E-03	Cf-251	3.12E-14
Eu-154	6.78E-04	Cf-252	1.06E-16
		Total	**9.06E+01**

Table 2-2: SDU 2 Cell A Current Inventory on September 30, 2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	2.78E+00	Eu-155	5.44E-03
C-14	2.41E+00	Pt-193	1.63E+00
Na-22	2.31E+00	Ra-226	5.25E-07
Al-26	8.98E-04	Ra-228	1.26E-05
Cl-36	1.86E-04	Ac-227	6.07E-07
K-40	1.86E-04	Th-229	2.44E-03
Co-60	1.40E-03	Th-230	7.75E-04
Ni-59	9.17E-04	Th-232	1.26E-05
Ni-63	4.54E-02	Pa-231	1.15E-06
Se-79	1.34E-01	U-232	1.42E-02
Y-90	1.81E+01	U-233	9.52E-01
Sr-90	1.81E+01	U-234	6.16E-01
Zr-93	2.65E-01	U-235	9.94E-04
Nb-93m	2.82E-01	U-236	6.37E-03
Nb-94	1.90E-03	U-238	2.24E-02
Tc-99	1.14E+02	Np-237	1.60E-01
Ru-106	6.22E-03	Pu-238	5.86E+00
Rh-106	6.22E-03	Pu-239	5.28E-01
Pd-107	6.04E-03	Pu-240	5.28E-01
Sn-126	7.62E-01	Pu-241	1.94E+00
Sb-125	2.03E-01	Pu-242	3.76E-01
Sb-126	1.07E-01	Pu-244	1.75E-03
Sb-126m	7.62E-01	Am-241	5.11E-02
Te-125m	5.18E-02	Am-242m	1.01E-02
I-129	7.32E-02	Am-243	4.20E-03
Cs-134	3.12E-01	Cm-242	9.27E-05
Cs-135	4.01E-02	Cm-243	5.81E-04
Cs-137	6.66E+03	Cm-244	2.21E-01
Ba-137m	6.29E+03	Cm-245	1.45E-02
Pr-144	6.28E-05	Cm-247	1.67E-02
Ce-144	6.34E-05	Cm-248	1.21E-13
Pm-147	1.70E-01	Bk-249	9.67E-24
Sm-151	1.71E-01	Cf-249	1.79E-02
Eu-152	3.05E-04	Cf-251	1.34E-02
Eu-154	1.07E-02	Cf-252	7.24E-17
		Total	**1.31E+04**

Table 2-3: SDU 2 Cell B Current Inventory on September 30, 2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	2.36E+00	Eu-155	5.45E-03
C-14	2.44E+00	Pt-193	1.63E+00
Na-22	2.32E+00	Ra-226	4.41E-07
Al-26	8.55E-04	Ra-228	1.92E-05
Cl-36	2.32E-04	Ac-227	7.77E-07
K-40	2.32E-04	Th-229	5.68E-03
Co-60	1.56E-03	Th-230	3.81E-04
Ni-59	7.32E-04	Th-232	1.92E-05
Ni-63	3.62E-02	Pa-231	1.47E-06
Se-79	1.23E-01	U-232	1.38E-02
Y-90	2.22E+01	U-233	1.32E+00
Sr-90	2.22E+01	U-234	8.54E-01
Zr-93	3.83E-01	U-235	1.27E-03
Nb-93m	4.31E-01	U-236	8.85E-03
Nb-94	2.09E-03	U-238	2.65E-02
Tc-99	1.37E+02	Np-237	9.61E-02
Ru-106	4.54E-03	Pu-238	5.57E+00
Rh-106	4.54E-03	Pu-239	5.19E-01
Pd-107	6.06E-03	Pu-240	5.19E-01
Sn-126	6.83E-01	Pu-241	1.83E+00
Sb-125	6.42E-01	Pu-242	5.21E-01
Sb-126	9.56E-02	Pu-244	2.42E-03
Sb-126m	6.83E-01	Am-241	6.58E-02
Te-125m	1.60E-01	Am-242m	6.44E-03
I-129	6.83E-02	Am-243	4.88E-03
Cs-134	2.47E-01	Cm-242	7.15E-05
Cs-135	4.03E-02	Cm-243	5.77E-04
Cs-137	8.20E+03	Cm-244	2.51E-01
Ba-137m	7.74E+03	Cm-245	2.22E-02
Pr-144	6.35E-05	Cm-247	1.41E-02
Ce-144	6.41E-05	Cm-248	1.21E-13
Pm-147	1.32E-01	Bk-249	9.76E-24
Sm-151	1.49E-01	Cf-249	1.48E-02
Eu-152	3.07E-04	Cf-251	1.09E-02
Eu-154	1.91E-02	Cf-252	7.28E-17
		Total	**1.61E+04**

Table 2-4: SDU 4 Current Inventory on September 30, 2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	2.93E+01	Eu-155	1.05E+00
C-14	6.51E+00	Pt-193	8.82E+00
Na-22	1.01E+01	Ra-226	2.76E-05
Al-26	9.08E-01	Ra-228	2.08E-04
Cl-36	2.94E-02	Ac-227	2.04E-05
K-40	2.94E-02	Th-229	3.63E+00
Co-60	8.68E-02	Th-230	2.88E-03
Ni-59	7.89E-02	Th-232	2.08E-04
Ni-63	3.20E+00	Pa-231	3.87E-05
Se-79	9.75E+00	U-232	1.21E-01
Y-90	2.56E+03	U-233	8.85E+00
Sr-90	2.56E+03	U-234	5.77E+00
Zr-93	7.94E+00	U-235	3.38E-02
Nb-93m	5.73E+02	U-236	8.12E-02
Nb-94	8.93E-02	U-238	7.92E-02
Tc-99	6.34E+02	Np-237	5.76E-01
Ru-106	2.57E-02	Pu-238	3.20E+02
Rh-106	2.57E-02	Pu-239	5.86E+01
Pd-107	3.52E-02	Pu-240	7.28E+01
Sn-126	2.22E+00	Pu-241	1.04E+02
Sb-125	5.93E+01	Pu-242	4.12E+00
Sb-126	3.11E-01	Pu-244	1.68E-02
Sb-126m	2.22E+00	Am-241	2.01E+01
Te-125m	1.45E+01	Am-242m	1.93E-02
I-129	2.77E-01	Am-243	5.18E-01
Cs-134	4.06E+00	Cm-242	4.17E-04
Cs-135	1.78E+00	Cm-243	8.84E-03
Cs-137	1.83E+05	Cm-244	3.65E+01
Ba-137m	1.72E+05	Cm-245	7.79E-01
Pr-144	6.02E-03	Cm-247	1.06E-01
Ce-144	6.08E-03	Cm-248	7.04E-13
Pm-147	8.29E+00	Bk-249	1.66E-22
Sm-151	2.02E+01	Cf-249	2.79E-01
Eu-152	8.63E-02	Cf-251	9.33E-02
Eu-154	4.04E+00	Cf-252	5.08E-16
		Total	**3.65E+05**

Table 2-5: SDU 5 Cell B Current Inventory on September 30, 2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	1.86E+00	Eu-155	3.20E-03
C-14	1.76E+00	Pt-193	7.73E-01
Na-22	1.09E+00	Ra-226	6.15E-08
Al-26	3.92E-04	Ra-228	4.85E-06
Cl-36	6.72E-05	Ac-227	2.55E-07
K-40	6.72E-05	Th-229	1.75E-05
Co-60	5.56E-04	Th-230	3.72E-05
Ni-59	2.37E-04	Th-232	4.85E-06
Ni-63	1.19E-02	Pa-231	4.83E-07
Se-79	3.82E-02	U-232	7.78E-03
Y-90	6.71E+00	U-233	4.28E-01
Sr-90	6.71E+00	U-234	2.76E-01
Zr-93	1.07E-01	U-235	4.19E-04
Nb-93m	1.09E-01	U-236	2.86E-03
Nb-94	4.37E-03	U-238	9.78E-03
Tc-99	4.41E+01	Np-237	3.12E-02
Ru-106	7.64E-03	Pu-238	8.84E-01
Rh-106	7.64E-03	Pu-239	4.54E-02
Pd-107	2.81E-03	Pu-240	4.54E-02
Sn-126	3.28E-01	Pu-241	3.03E-01
Sb-125	2.77E-02	Pu-242	1.69E-01
Sb-126	4.59E-02	Pu-244	7.86E-04
Sb-126m	3.28E-01	Am-241	7.46E-03
Te-125m	2.25E-02	Am-242m	1.98E-04
I-129	2.87E-02	Am-243	7.47E-03
Cs-134	3.98E-01	Cm-242	1.46E-04
Cs-135	1.87E-02	Cm-243	2.78E-04
Cs-137	6.66E+03	Cm-244	5.62E-02
Ba-137m	6.29E+03	Cm-245	6.14E-03
Pr-144	3.05E-05	Cm-247	7.74E-03
Ce-144	3.08E-05	Cm-248	5.63E-14
Pm-147	1.16E-01	Bk-249	4.66E-24
Sm-151	6.01E-02	Cf-249	8.02E-03
Eu-152	1.43E-04	Cf-251	7.22E-03
Eu-154	2.26E-03	Cf-252	3.41E-17
		Total	**1.30E+04**

2.3 Disposed Inventory

The disposed inventory at the SDF from startup in 1990 through FY2014 is presented in Figures 2-3 and 2-4. The disposed inventory does not take into account decay or ingrowth and represents the number of curies transferred into SDF. The total SDF disposed inventory through FY2014 is 623 kCi. The majority of this inventory is emplaced in SDU 4.

Figure 2-3: SDF Disposed Inventory through FY2014

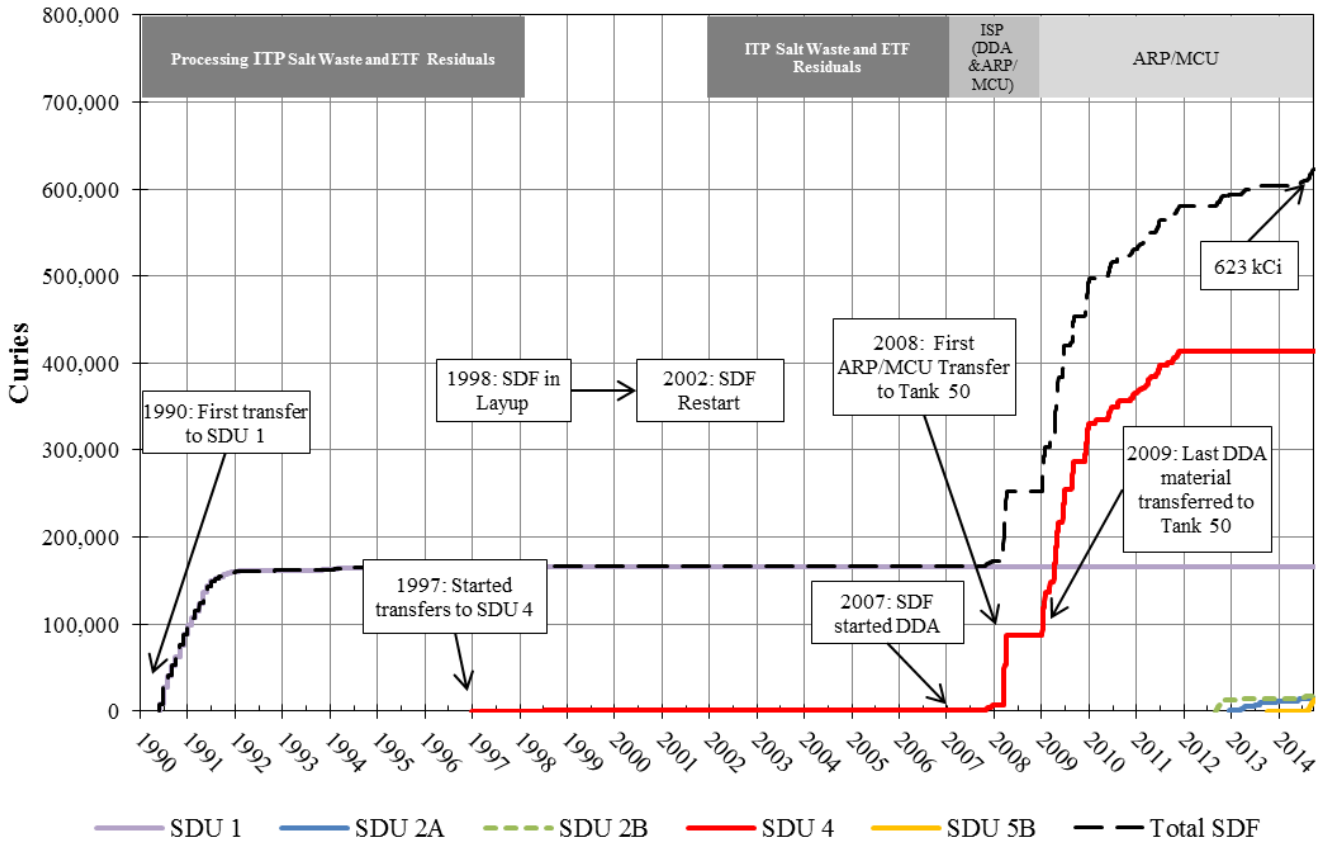
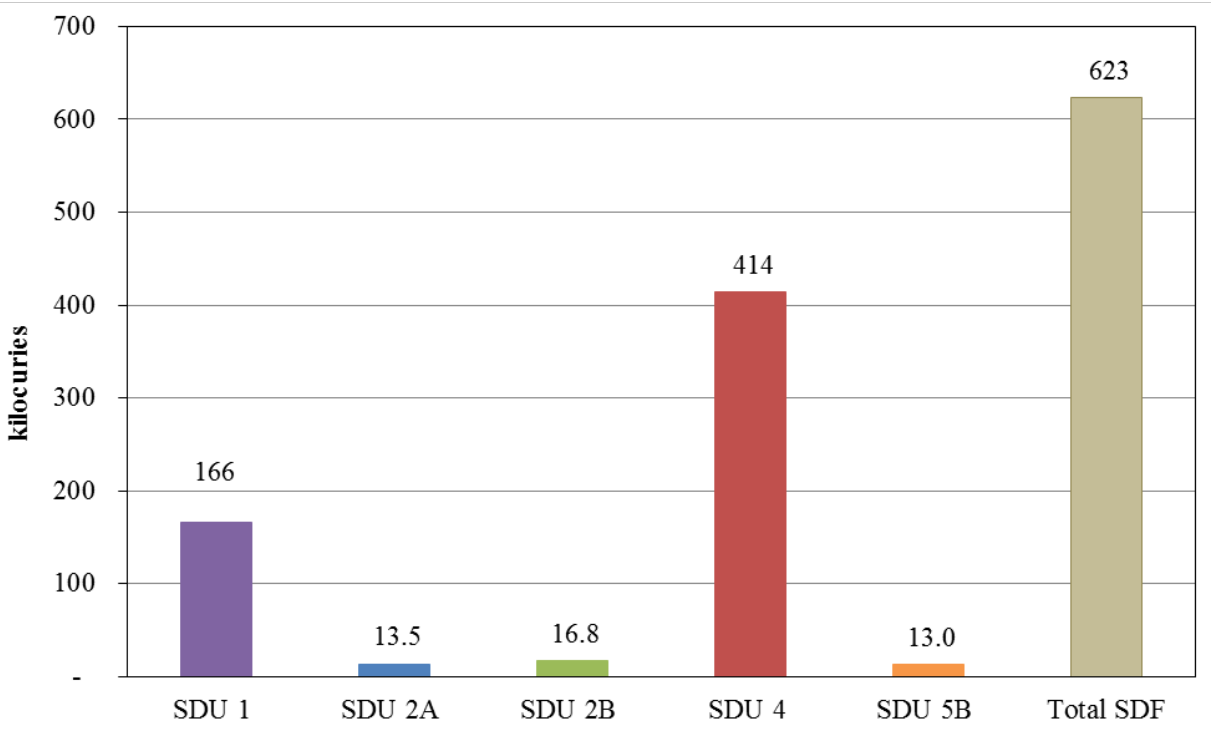


Figure 2-4: Disposed Inventory of SDUs through FY2014



2.3.1 FY2014 Saltstone Processing

In FY2014 alone, 1,167 kgal of low-level salt waste was transferred from Tank 50 to the SPF. A total of 2,114 kgal of saltstone containing 19.6 kilocuries (kCi) was disposed of in the SDF. Saltstone was emplaced in SDU Cells 2A and 2B, as well as in SDU Cell 5B. Input for these transfers is shown in Table 1-1. The entire SDF inventory underwent a total of 9 kCi of decay during FY2014, resulting in a net gain of only 10.6 kCi to the SDF current inventory at the end of FY2014.

Table 2-6 presents a summary of the processing done in FY2014. Tables 2-7 through 2-9 present the disposed inventory for each radionuclide within SDUs 2A, 2B, and 5B associated with FY2014 processing alone. As seen in Tables 2-7 through 2-8 and Figure 2-5, Cs-137 and its daughter product Ba-137m make up 99% of the curies disposed in FY2014.

Table 2-6: FY2014 Saltstone Processing Summary

	SDU 2A	SDU 2B	SDU5B	Total in SDF during FY2014
FY2014 Volume of Salt Waste Disposed (kgal)	264	223	680	1,167
FY2014 Volume of Saltstone Emplaced (kgal)	529	395	1,190	2,114
FY2014 Curies Disposed (kCi)	3.23	3.33	13.0	19.6

Table 2-7: SDU 2 Cell A Disposed Inventory in FY2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	5.25E-01	Eu-155	1.28E-03
C-14	4.55E-01	Pt-193	2.99E-01
Na-22	4.67E-01	Ra-226	2.31E-08
Al-26	1.45E-04	Ra-228	1.80E-06
Cl-36	4.20E-05	Ac-227	1.04E-07
K-40	4.20E-05	Th-229	2.31E-05
Co-60	2.82E-04	Th-230	1.02E-05
Ni-59	9.98E-05	Th-232	1.80E-06
Ni-63	4.99E-03	Pa-231	1.98E-07
Se-79	2.75E-02	U-232	2.40E-03
Y-90	4.20E+00	U-233	1.59E-01
Sr-90	4.20E+00	U-234	1.03E-01
Zr-93	4.33E-02	U-235	1.73E-04
Nb-93m	4.33E-02	U-236	1.06E-03
Nb-94	3.65E-04	U-238	3.95E-03
Tc-99	1.93E+01	Np-237	1.16E-02
Ru-106	2.65E-03	Pu-238	9.22E-01
Rh-106	2.65E-03	Pu-239	6.51E-02
Pd-107	1.09E-03	Pu-240	6.51E-02
Sn-126	1.43E-01	Pu-241	2.99E-01
Sb-125	1.27E-02	Pu-242	6.28E-02
Sb-126	2.01E-02	Pu-244	2.91E-04
Sb-126m	1.43E-01	Am-241	2.15E-02
Te-125m	1.27E-02	Am-242m	5.44E-05
I-129	1.23E-02	Am-243	3.40E-04
Cs-134	1.24E-01	Cm-242	4.46E-05
Cs-135	7.23E-03	Cm-243	1.08E-04
Cs-137	1.64E+03	Cm-244	1.55E-01
Ba-137m	1.55E+03	Cm-245	9.35E-04
Pr-144	1.69E-05	Cm-247	1.16E-03
Ce-144	1.69E-05	Cm-248	2.18E-14
Pm-147	4.36E-02	Bk-249	2.44E-24
Sm-151	3.23E-02	Cf-249	1.18E-03
Eu-152	5.62E-05	Cf-251	1.07E-03
Eu-154	3.18E-03	Cf-252	1.46E-17
		Total	**3.23E+03**

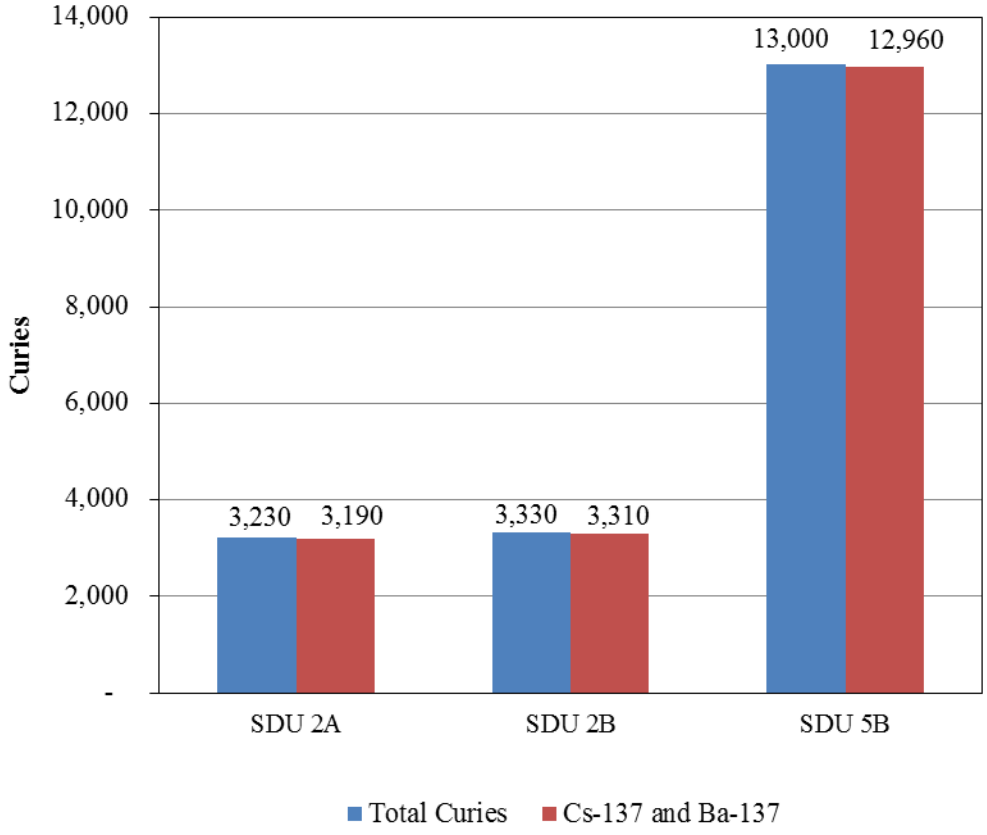
Table 2-8: SDU 2 Cell B Disposed Inventory in FY2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	5.10E-01	Eu-155	9.94E-04
C-14	4.52E-01	Pt-193	2.53E-01
Na-22	3.77E-01	Ra-226	1.96E-08
Al-26	1.24E-04	Ra-228	1.55E-06
Cl-36	3.07E-05	Ac-227	8.52E-08
K-40	3.07E-05	Th-229	7.69E-06
Co-60	2.13E-04	Th-230	6.31E-06
Ni-59	6.88E-05	Th-232	1.55E-06
Ni-63	3.44E-03	Pa-231	1.62E-07
Se-79	2.00E-02	U-232	2.06E-03
Y-90	3.07E+00	U-233	1.37E-01
Sr-90	3.07E+00	U-234	8.82E-02
Zr-93	3.43E-02	U-235	1.41E-04
Nb-93m	3.46E-02	U-236	9.11E-04
Nb-94	2.99E-04	U-238	3.27E-03
Tc-99	1.58E+01	Np-237	9.96E-03
Ru-106	2.27E-03	Pu-238	5.78E-01
Rh-106	2.27E-03	Pu-239	3.84E-02
Pd-107	9.19E-04	Pu-240	3.84E-02
Sn-126	1.15E-01	Pu-241	1.91E-01
Sb-125	9.99E-03	Pu-242	5.39E-02
Sb-126	1.61E-02	Pu-244	2.50E-04
Sb-126m	1.15E-01	Am-241	1.26E-02
Te-125m	1.00E-02	Am-242m	5.64E-05
I-129	1.00E-02	Am-243	1.17E-03
Cs-134	1.15E-01	Cm-242	4.62E-05
Cs-135	6.11E-03	Cm-243	9.11E-05
Cs-137	1.70E+03	Cm-244	9.66E-02
Ba-137m	1.61E+03	Cm-245	1.30E-03
Pr-144	1.23E-05	Cm-247	1.61E-03
Ce-144	1.23E-05	Cm-248	1.84E-14
Pm-147	3.79E-02	Bk-249	1.81E-24
Sm-151	2.38E-02	Cf-249	1.66E-03
Eu-152	4.71E-05	Cf-251	1.51E-03
Eu-154	1.80E-03	Cf-252	1.18E-17
		Total	**3.33E+03**

Table 2-9: SDU 5 Cell B Disposed Inventory in FY2014

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	1.86E+00	Eu-155	3.23E-03
C-14	1.75E+00	Pt-193	7.72E-01
Na-22	1.11E+00	Ra-226	6.00E-08
Al-26	3.91E-04	Ra-228	4.84E-06
Cl-36	6.70E-05	Ac-227	2.54E-07
K-40	6.70E-05	Th-229	1.42E-05
Co-60	5.60E-04	Th-230	3.67E-05
Ni-59	2.36E-04	Th-232	4.84E-06
Ni-63	1.18E-02	Pa-231	4.81E-07
Se-79	3.81E-02	U-232	7.76E-03
Y-90	6.70E+00	U-233	4.27E-01
Sr-90	6.70E+00	U-234	2.75E-01
Zr-93	1.07E-01	U-235	4.17E-04
Nb-93m	1.09E-01	U-236	2.86E-03
Nb-94	9.10E-04	U-238	9.76E-03
Tc-99	4.40E+01	Np-237	3.11E-02
Ru-106	8.02E-03	Pu-238	8.79E-01
Rh-106	8.02E-03	Pu-239	4.50E-02
Pd-107	2.81E-03	Pu-240	4.50E-02
Sn-126	3.27E-01	Pu-241	3.03E-01
Sb-125	2.81E-02	Pu-242	1.69E-01
Sb-126	4.58E-02	Pu-244	7.84E-04
Sb-126m	3.27E-01	Am-241	7.35E-03
Te-125m	2.81E-02	Am-242m	1.98E-04
I-129	2.86E-02	Am-243	7.47E-03
Cs-134	4.07E-01	Cm-242	1.62E-04
Cs-135	1.86E-02	Cm-243	2.78E-04
Cs-137	6.66E+03	Cm-244	5.62E-02
Ba-137m	6.30E+03	Cm-245	6.14E-03
Pr-144	3.28E-05	Cm-247	7.73E-03
Ce-144	3.28E-05	Cm-248	5.61E-14
Pm-147	1.18E-01	Bk-249	4.92E-24
Sm-151	5.99E-02	Cf-249	8.01E-03
Eu-152	1.43E-04	Cf-251	7.22E-03
Eu-154	2.25E-03	Cf-252	3.47E-17
		Total	**1.30E+04**

Figure 2-5: Cs-137 and Ba-137 in Disposed Inventory during FY2014



2.3.2 Inventory Disposed During Interim Salt Processing

In March 2007, the SDF began emplacing saltstone containing DSS associated with ISP. As previously discussed, DOE has agreed to limit the disposed inventory associated with ISP to no more than 600 kCi. [EQMD-11-027]

Figure 2-6 shows the SDF inventory disposed of during the ISP period. SDU 1 is not included because processing to SDU 1 ended in 1996, prior to the start of DDA. As shown in the figure, the total curies disposed from March 2007 through FY2014 is 456 kCi. This leaves a margin of 144 kCi for future disposal associated with ISP. [EQMD-11-027]

Note that although SDU 4 is the dominant disposal unit with respect to the total number of curies disposed since 2007 (see Figure 2-3), the other SDUs (SDU 2A, SDU 2B, and SDU 5B) have each received a significant volume of DSS. SDUs 2A and 2B are considered completely filled. Figure 2-7 depicts the total number of gallons of salt waste disposed at the SDF from March 2007 through FY2014.

Figure 2-6: SDF Disposed Curies through FY2014 – Beginning with Start of Interim Salt Processing (DDA & ARP/MCU)

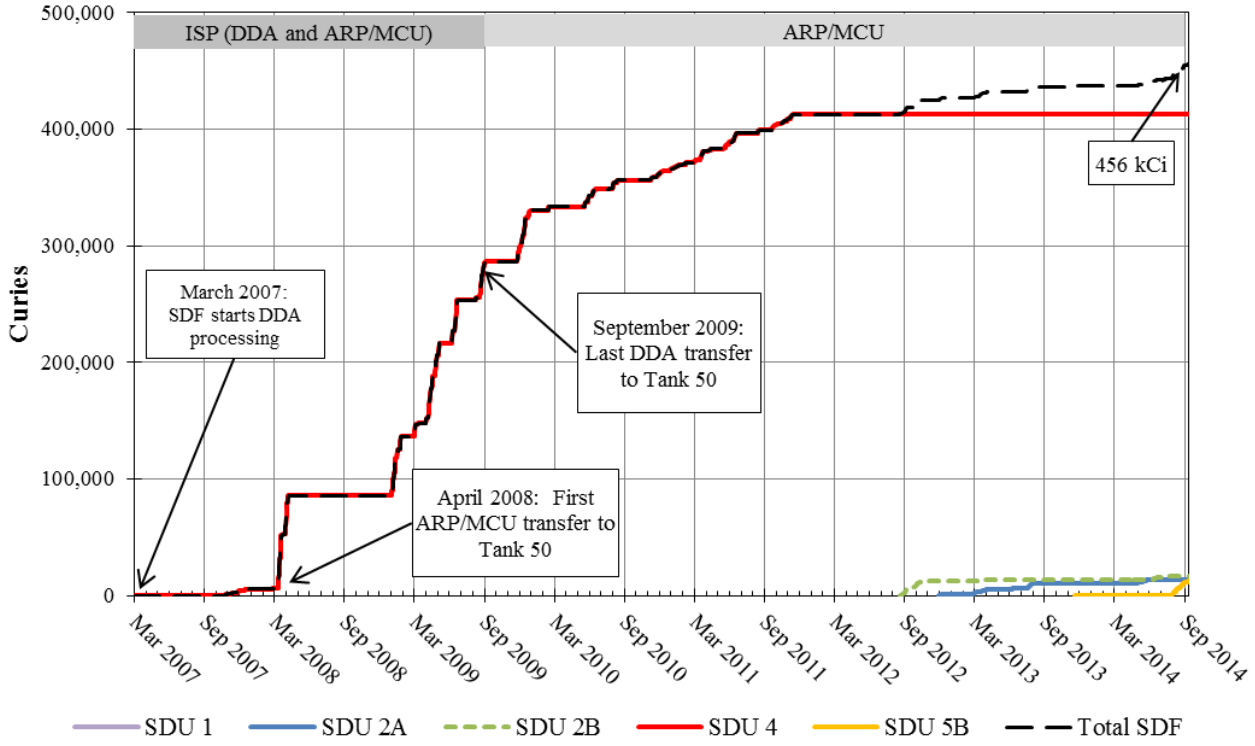
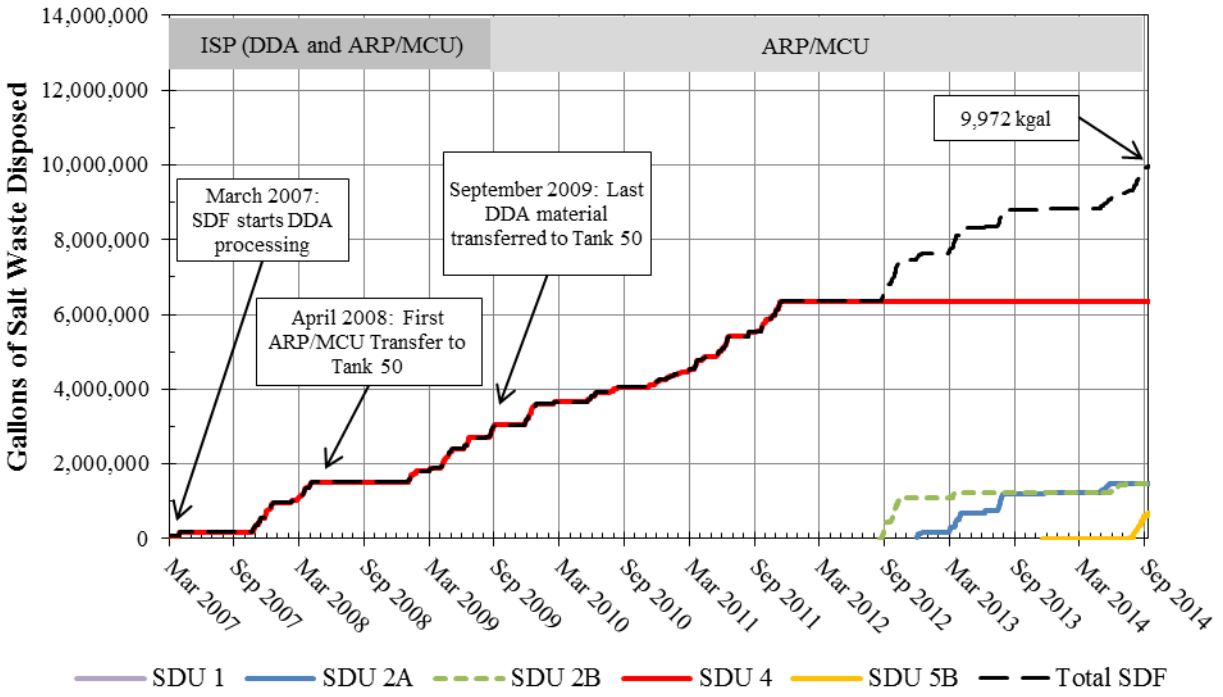


Figure 2-7: Salt Waste Disposed through FY2014 – Beginning with Start of Interim Salt Processing (DDA & ARP/MCU)



2.4 Comparison of Current and Disposed Inventory

Figures 2-1 and 2-3 present the SDF current inventory and disposed inventory, respectively, from 1990 through FY2014. Figures 2-1 and 2-3 have been broken down into each SDU and show a comparison between the current inventory and the disposed inventory. Figures 2-8 through 2-11 present both the current inventory and the disposed inventory for SDU 1, SDU 2A, SDU 2B, SDU 4, and SDU 5B from SDF start up in 1990 through FY2014.

Figures 2-8 through 2-11 show that the largest delta between the current inventory and disposed inventory is for SDUs 1 and 4 which have stopped receiving any saltstone from SPF. Figure 2-12 presents the current and disposed inventory for each SDU along with the gallons of Tank 50 material disposed in each SDU. As seen in Figure 2-12, the inventory in SDU 4 makes up the majority of both the disposed and current inventories.

Figure 2-8: SDU 1 Disposed and Current Inventory through FY2014

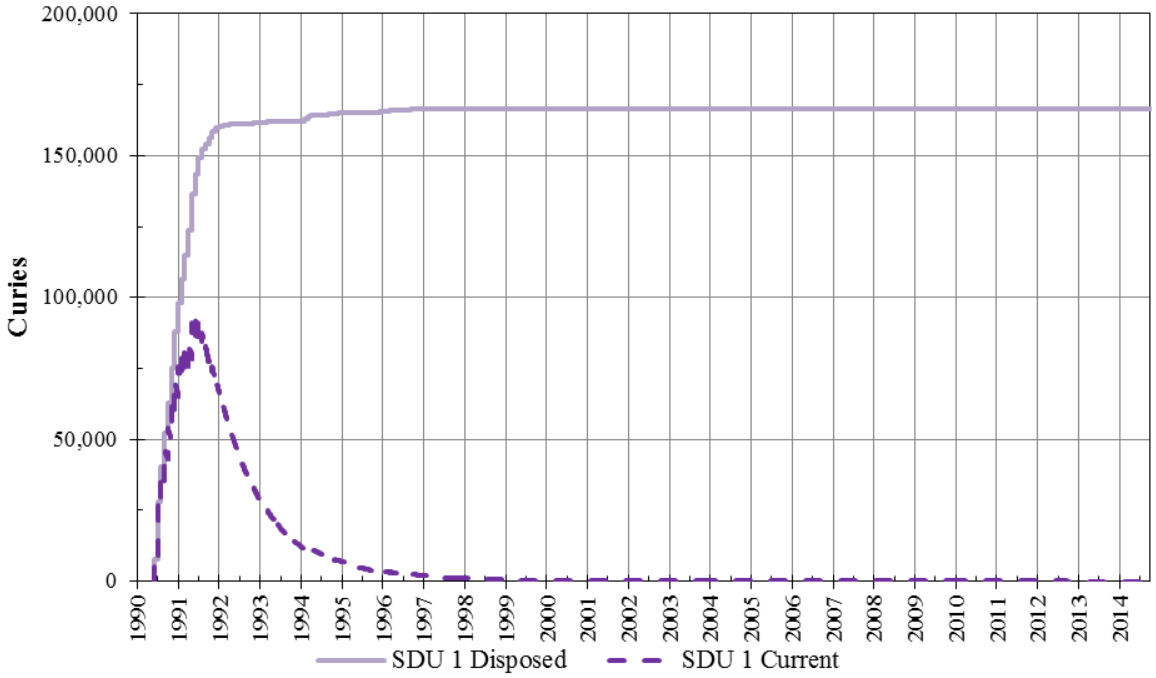


Figure 2-9: SDU 2 Disposed and Current Inventory through FY2014

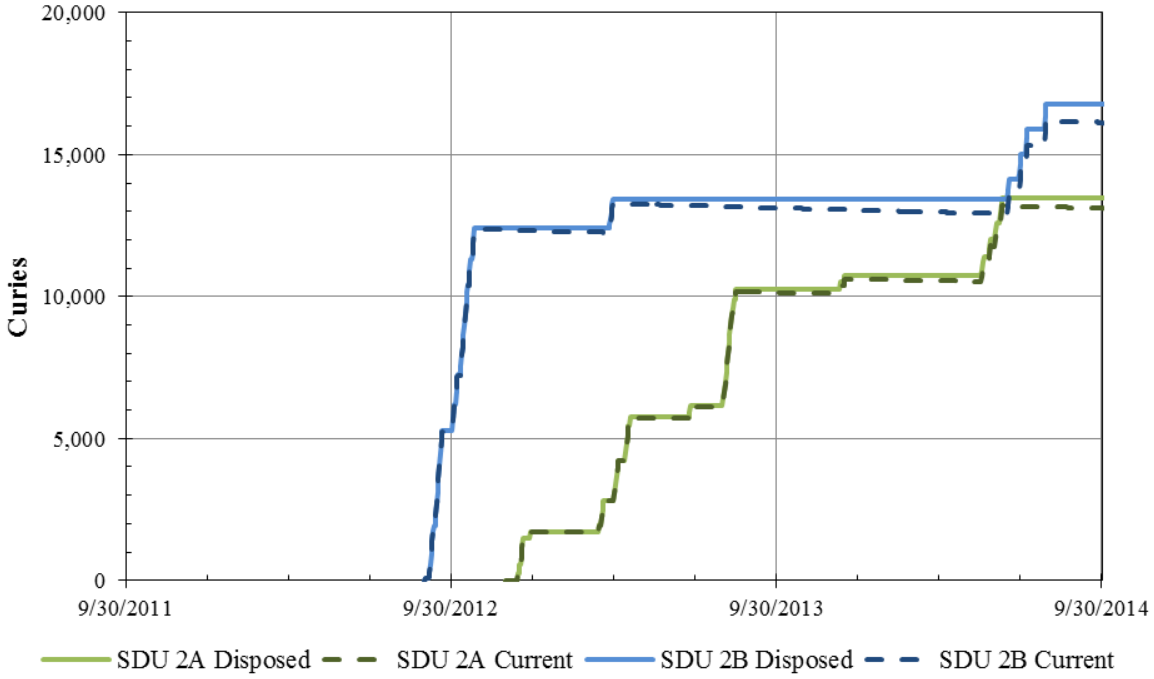


Figure 2-10: SDU 4 Disposed and Current Inventory through FY2014

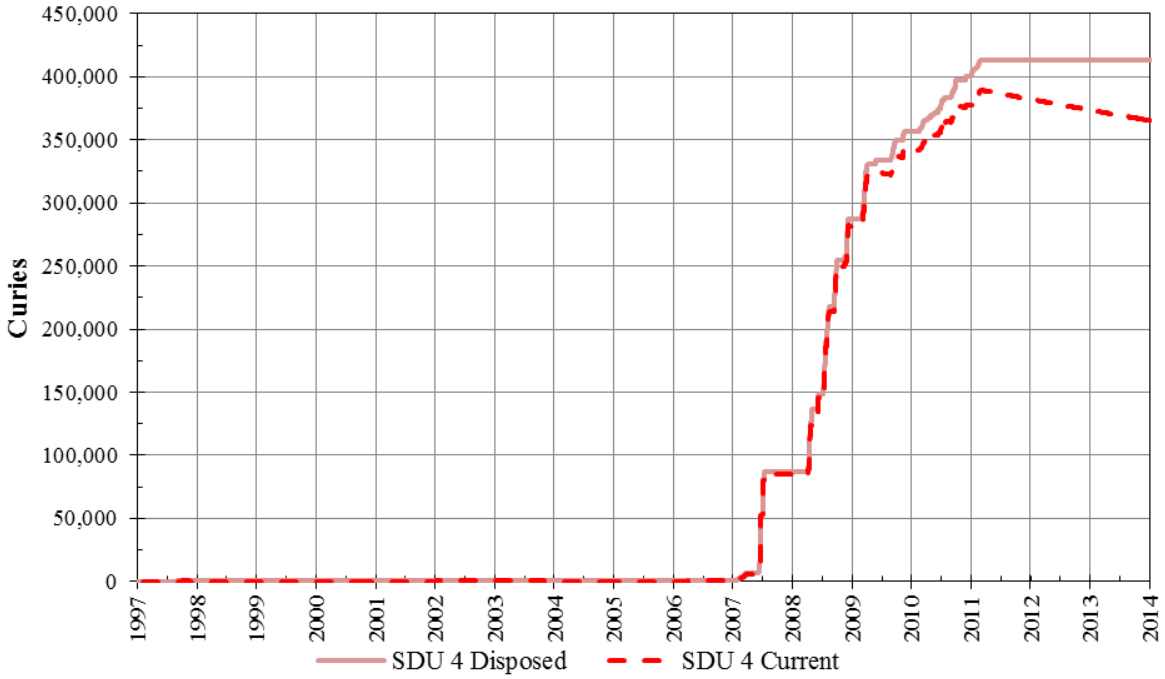


Figure 2-11: SDU 5 Disposed and Current Inventory through FY2014

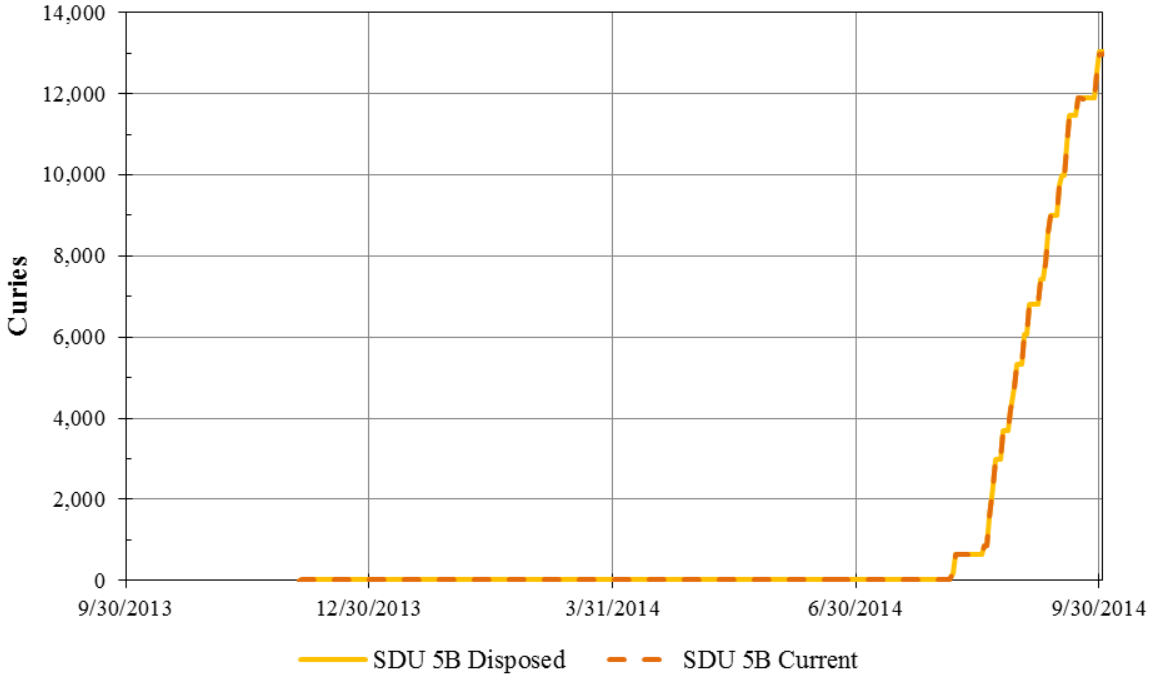
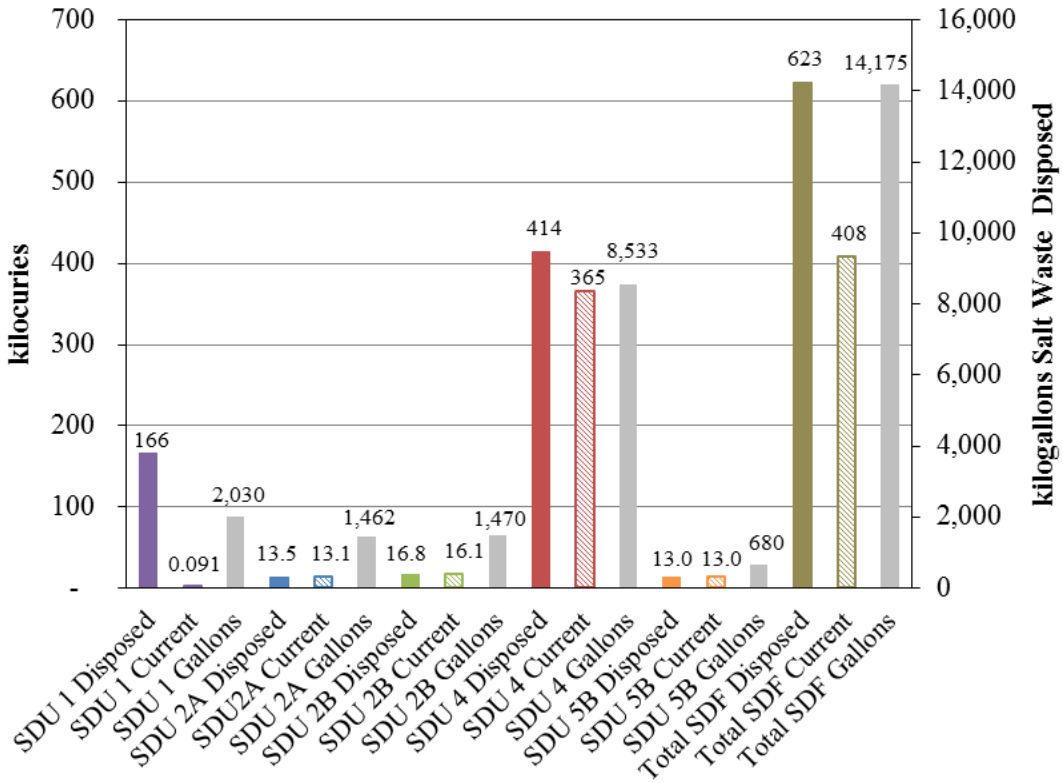


Figure 2-12: SDF Disposed/Current Inventory and kilogallons of Salt Waste Disposed through FY2014



3.0 REFERENCES

DOE-WD-2005-001, *Basis for Section 3116 Determination for Salt Waste Disposal at the Savannah River Site,* Savannah River Site, Aiken, SC, Rev. 0, January 2006.

EQMD-11-027, Ltr, from Moody, D.C. to King, R.W., *Modified Z-Area Saltstone Disposal Permit # 025500-1603, January 23, 2007,* Savannah River Site, Aiken, SC, Rev. 0, July 14, 2011.

LWO-PIT-2007-00083, Chew, D.P., *Evaporator Performance, Tank Space Management, and Liquid Waste Transfers: Fiscal Year 2007 Summary,* Savannah River Site, Aiken, SC, Rev. 1, March 2008.

OCC-11-0070, Ltr, from Knowles, L.M. to King Anderson, R., *Natural Resources Defense Council, et al v. South Carolina Department of Health and Environmental Control, et al., Docket No. 07-ALJ-07-121-CC*, Savannah River Site, Aiken, SC, Rev. 0, May 2011.

SPD-07-153, Ltr. from Allison, J.M. to Pedde, R.A., *Batch 1 Processing at the Saltstone Facility*, Savannah River Site, Aiken, SC, Rev. 0, February 2007.

SRNL-STI-2014-00074, Bannochie, C.J., *Results for the Fourth Quarter 2013 Tank 50 WAC Slurry Sample: Chemical and Radionuclide Contaminants*, Savannah River Site, Aiken, SC, Rev. 0, April 2014.

SRNL-STI-2014-00203, Bannochie, C.J., *Results for the First Quarter 2014 Tank 50 WAC Slurry Sample: Chemical and Radionuclide Contaminants*, Savannah River Site, Aiken, SC, Rev. 0, May 2014.

SRNL-STI-2014-00308, Bannochie, C.J., *Results for the Second Quarter 2014 Tank 50 WAC Slurry Sample: Chemical and Radionuclide Contaminants*, Savannah River Site, Aiken, SC, Rev. 0, September 2014.

SRNL-STI-2014-00492, Crawford, C.L., *Results for the Third Quarter 2014 Tank 50 WAC Slurry Sample: Chemical and Radionuclide Contaminants*, Savannah River Site, Aiken, SC, Rev. 0, December 2014.

SRR-CWDA-2015-00003, Hommel, S.P., *Saltstone Disposal Facility Waste Inventory Disposed Estimator Model Report*, Savannah River Site, Aiken, SC, Rev. 0, January 2015.

SRR-LWP-2009-00001, Chew, D.P., *Liquid Waste System Plan,* Savannah River Site, Aiken, SC, Rev. 19, May 2014.

SRR-LWP-2010-00007, Chew, D.P., *Evaporator Performance, Tank Space Management, and Liquid Waste Transfers: Fiscal Year 2009 Summary,* Savannah River Site, Aiken, SC, Rev. 0, March 2010.

WSRC-RP-2008-00390, *FY 2007 Annual Review - Saltstone Disposal Facility (Z-Area) Performance Assessment (Covering the Performance Period FY 2007),* Savannah River Site, Aiken, SC, Rev. 0, March 11, 2008.

X-CLC-Z-00067, Dixon, K.D., *Saltstone Facility Basis Information for Consent Order of Dismissal Section III.7 Website Data – Fourth Quarter 2013*, Savannah River Site, Aiken, SC, Rev. 0, February 2014.

X-CLC-Z-00068, Utlak, S.A., *Saltstone Facility Basis Information for Consent Order of Dismissal Section III.7 Website Data – First Quarter 2014*, Savannah River Site, Aiken, SC, Rev. 0, May 2014.

X-CLC-Z-00069, Utlak, S.A., *Saltstone Facility Basis Information for Consent Order of Dismissal Section III.7 Website Data – Second Quarter 2014*, Savannah River Site, Aiken, SC, Rev. 0, August 2014.

X-CLC-Z-00070, Utlak, S.A., *Saltstone Facility Basis Information for Consent Order of Dismissal Section III.7 Website Data – Third Quarter 2014*, Savannah River Site, Aiken, SC, Rev. 0, November 2014.