

## **Determination of SDF Inventories through 9/30/2013**


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## ACRONYMS

FY	Fiscal Year
SDF	Saltstone Disposal Facility

## EXECUTIVE SUMMARY

The current disposed inventories in the Saltstone Disposal Facility (SDF) through 9/30/2013 are determined here. This work uses the methodology described in the *Revised Methodology for Determination of Inventories in SDF Vaults 1 and 4 through 9/30/2011* and builds upon the inventory established through 9/30/2012 [SRR-CWDA-2012-00002, SRR-CWDA-2013-00010]. Recent processing only includes disposal actions into Saltstone Disposal Unit (SDU 2) Cells A and B. The inventories for Vaults 1 and 4 have been updated to reflect decay from 9/30/2012 to 9/30/2013.

### 1.1 Methodology

The Tank 50 concentrations used in this analysis are based on Tank 50 samples, taken once a quarter, and transfer volumes throughout fiscal year 2013. This analysis uses the methodology described in SRR-CWDA-2012-00002 for inventory calculation. Each sample analysis was used to determine the inventory of material transferred in the quarter of the sample date.

All inventories as of 9/30/2012 were decayed using ORIGEN2 to account for both decay and ingrowth of radionuclides within the disposal units.

The Table 1.1-1 provides a general crosswalk of the source information that was used to develop the inventories within this report. The source information provided here was used to update the inventories by adding decayed inventory values to the values published in the previous inventory report through 9/30/2012. [SRR-CWDA-2013-00010]

**Table 1.1-1: Crosswalk for Inputs**

Source for Concentration Data	Source for Fill Volume Data	Period for Reported Concentration
SRNL-STI-2012-00786	X-CLC-Z-00054	2012, 4 <sup>th</sup> Quarter
SRNL-STI-2013-00271	X-CLC-Z-00058	2013, 1 <sup>st</sup> Quarter
SRNL-STI-2013-00390	X-CLC-Z-00061	2013, 2 <sup>nd</sup> Quarter
SRNL-STI-2013-00651	X-CLC-Z-00066	2013, 3 <sup>rd</sup> Quarter

### 1.2 Current Inventories

The activity from material disposed of as of 9/30/2013 is provided for each of the disposal units. The entire inventory disposed during FY 2013 was received in SDU 2 Cells A and B. There was no material added to Vaults 1 and 4 and, therefore, the changes to the Vault 1 and 4 inventories since 9/30/2012 were only due to decay. The current total SDF inventory as of 9/30/2013 is approximately 390 kCi.

**Table 1.2-3: Vault 1 Inventory**

<b>Radionuclide</b>	<b>Activity (Ci)</b>	<b>Radionuclide</b>	<b>Activity (Ci)</b>
H-3	1.7E+01	Eu-155	4.8E-04
C-14	1.3E+00	Pt-193	1.7E+00
Na-22	4.6E+00	Ra-226	4.6E-07
Al-26	2.6E-01	Ra-228	7.7E-06
Cl-36	2.0E-07	Ac-227	1.5E-06
K-40	1.9E-07	Th-229	2.1E-04
Co-60	7.3E-04	Th-230	4.9E-05
Ni-59	2.3E-03	Th-232	7.7E-06
Ni-63	1.2E-01	Pa-231	2.9E-06
Se-79	3.4E-01	U-232	6.9E-04
Sr-90	1.2E-02	U-233	7.8E-02
Y-90	1.2E-02	U-234	1.0E-01
Zr-93	6.9E-01	U-235	2.5E-03
Nb-93m	7.2E-01	U-236	6.5E-03
Nb-94	2.0E-03	U-238	1.1E-02
Tc-99	5.5E+01	Np-237	3.9E-03
Ru-106	6.0E-06	Pu-238	1.0E-02
Rh-106	6.0E-06	Pu-239	1.7E-02
Pd-107	8.4E-03	Pu-240	1.7E-02
Sn-126	1.2E+00	Pu-241	2.5E-02
Sb-125	6.0E-02	Pu-242	1.6E-03
Sb-126	2.2E-10	Pu-244	1.0E-05
Sb-126m	0.0E+00	Am-241	1.8E-03
Te-125m	1.5E-02	Am-242m	6.9E-05
I-129	2.0E-01	Am-243	1.4E-03
Cs-134	3.5E-03	Cm-242	5.7E-05
Cs-135	9.8E-02	Cm-243	5.1E-04
Cs-137	6.9E+00	Cm-244	3.5E-03
Ba-137m	6.5E+00	Cm-245	2.8E-04
Ce-144	3.1E-04	Cm-247	1.6E-13
Pr-144	3.0E-04	Cm-248	1.7E-13
Pm-147	8.8E-03	Bk-249	2.3E-23
Sm-151	4.8E-03	Cf-249	8.9E-13
Eu-152	1.9E-03	Cf-251	3.1E-14
Eu-154	7.2E-04	Cf-252	1.2E-16
		Total	9.7E+01

Table 1.2-1: SDU 2 Cell A Inventory

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	2.4E+00	Eu-155	4.9E-03
C-14	2.0E+00	Pt-193	1.4E+00
Na-22	2.7E+00	Ra-226	1.1E-04
Al-26	7.5E-04	Ra-228	1.1E-05
Cl-36	1.4E-04	Ac-227	3.9E-04
K-40	1.4E-04	Th-229	1.9E-03
Co-60	1.3E-03	Th-230	2.5E-01
Ni-59	8.6E-04	Th-232	1.1E-05
Ni-63	4.2E-02	Pa-231	2.7E-02
Se-79	1.1E-01	U-232	1.2E-02
Sr-90	1.4E+01	U-233	7.9E-01
Y-90	1.4E+01	U-234	5.1E-01
Zr-93	2.3E-01	U-235	1.1E-03
Nb-93m	2.4E-01	U-236	5.3E-03
Nb-94	1.5E-03	U-238	1.8E-02
Tc-99	9.5E+01	Np-237	1.5E-01
Ru-106	7.9E-03	Pu-238	4.7E+00
Rh-106	7.9E-03	Pu-239	4.7E-01
Pd-107	5.0E-03	Pu-240	4.7E-01
Sn-126	6.2E-01	Pu-241	1.6E+00
Sb-125	2.3E-01	Pu-242	3.1E-01
Sb-126	2.3E-04	Pu-244	1.5E-03
Sb-126m	0.0E+00	Am-241	2.7E-02
Te-125m	5.6E-02	Am-242m	6.8E-03
I-129	6.1E-02	Am-243	4.0E-03
Cs-134	2.7E-01	Cm-242	3.8E-03
Cs-135	6.5E-02	Cm-243	4.8E-04
Cs-137	5.2E+03	Cm-244	7.1E-02
Ba-137m	4.9E+03	Cm-245	1.6E-04
Ce-144	6.5E-04	Cm-247	9.5E-14
Pr-144	6.4E-04	Cm-248	9.9E-14
Pm-147	1.7E-01	Bk-249	1.2E-23
Sm-151	1.4E-01	Cf-249	5.5E-13
Eu-152	2.7E-04	Cf-251	1.9E-14
Eu-154	8.2E-03	Cf-252	6.8E-17
		Total	1.0E+04

Table 1.2-2: SDU 2 Cell B Inventory

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	1.9E+00	Eu-155	5.0E-03
C-14	2.0E+00	Pt-193	1.4E+00
Na-22	2.9E+00	Ra-226	4.3E-04
Al-26	7.4E-04	Ra-228	1.6E-05
Cl-36	1.8E-04	Ac-227	6.6E-07
K-40	1.7E-04	Th-229	3.3E-03
Co-60	1.5E-03	Th-230	9.8E-01
Ni-59	6.0E-04	Th-232	1.5E-05
Ni-63	2.9E-02	Pa-231	1.3E-06
Se-79	1.1E-01	U-232	1.1E-02
Sr-90	1.7E+01	U-233	1.1E+00
Y-90	1.7E+01	U-234	7.0E-01
Zr-93	3.2E-01	U-235	1.1E-03
Nb-93m	3.5E-01	U-236	7.3E-03
Nb-94	1.2E-03	U-238	2.3E-02
Tc-99	1.2E+02	Np-237	7.9E-02
Ru-106	4.6E-03	Pu-238	4.6E+00
Rh-106	4.6E-03	Pu-239	5.2E-01
Pd-107	5.1E-03	Pu-240	5.2E-01
Sn-126	5.6E-01	Pu-241	1.6E+00
Sb-125	7.7E-01	Pu-242	4.3E-01
Sb-126	6.2E-09	Pu-244	2.0E-03
Sb-126m	0.0E+00	Am-241	4.1E-02
Te-125m	1.9E-01	Am-242m	6.4E-03
I-129	6.0E-02	Am-243	3.9E-03
Cs-134	2.1E-01	Cm-242	3.6E-03
Cs-135	7.5E-02	Cm-243	5.0E-04
Cs-137	6.5E+03	Cm-244	1.4E-01
Ba-137m	6.2E+03	Cm-245	1.7E-04
Ce-144	3.4E-03	Cm-247	6.7E-13
Pr-144	3.3E-03	Cm-248	2.4E-13
Pm-147	1.2E-01	Bk-249	3.5E-22
Sm-151	1.3E-01	Cf-249	5.7E-13
Eu-152	2.8E-04	Cf-251	1.3E-13
Eu-154	1.6E-02	Cf-252	6.3E-16
		Total	1.3E+04



Table 1.2-4: Vault 4 Inventory

Radionuclide	Activity (Ci)	Radionuclide	Activity (Ci)
H-3	3.1E+01	Eu-155	1.2E+00
C-14	6.6E+00	Pt-193	8.9E+00
Na-22	1.6E+01	Ra-226	3.1E-05
Al-26	9.1E-01	Ra-228	2.1E-04
Cl-36	2.9E-02	Ac-227	2.0E-05
K-40	2.9E-02	Th-229	3.8E-02
Co-60	1.0E-01	Th-230	2.7E-03
Ni-59	8.0E-02	Th-232	2.1E-04
Ni-63	3.1E+00	Pa-231	3.8E-05
Se-79	9.7E+00	U-232	1.2E-01
Sr-90	2.6E+03	U-233	8.7E+00
Y-90	2.6E+03	U-234	5.7E+00
Zr-93	6.7E+00	U-235	3.4E-02
Nb-93m	7.6E+00	U-236	8.1E-02
Nb-94	8.9E-02	U-238	7.9E-02
Tc-99	6.4E+02	Np-237	5.6E-01
Ru-106	5.0E-02	Pu-238	3.2E+02
Rh-106	5.0E-02	Pu-239	5.8E+01
Pd-107	3.5E-02	Pu-240	7.2E+01
Sn-126	2.1E+00	Pu-241	1.1E+02
Sb-125	7.4E+01	Pu-242	4.1E+00
Sb-126	4.0E-10	Pu-244	1.6E-02
Sb-126m	0.0E+00	Am-241	1.9E+01
Te-125m	1.8E+01	Am-242m	1.9E-02
I-129	2.8E-01	Am-243	5.0E-01
Cs-134	5.8E+00	Cm-242	1.6E-02
Cs-135	1.7E+00	Cm-243	3.1E-03
Cs-137	1.9E+05	Cm-244	3.7E+01
Ba-137m	1.8E+05	Cm-245	1.1E-03
Ce-144	2.2E-02	Cm-247	6.8E-13
Pr-144	2.2E-02	Cm-248	7.0E-13
Pm-147	1.2E+01	Bk-249	3.6E-22
Sm-151	2.1E+01	Cf-249	3.8E-12
Eu-152	9.1E-02	Cf-251	1.3E-13
Eu-154	4.3E+00	Cf-252	6.3E-16
		Total	3.7E+05

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