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Title:	Plutonium Equivalent Inventory for Belowground Radioactive Waste at the Los Alamos National Laboratory Technical Area 54, Area G Disposal Facility – Fiscal Year 2011
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Plutonium Equivalent Inventory for Belowground Radioactive Waste at the Los Alamos National Laboratory Technical Area 54, Area G Disposal Facility – Fiscal Year 2011

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Acronyms and Abbreviations

DOE	Department of Energy
LANL or Laboratory	Los Alamos National Laboratory
LLW	Low-level (radioactive) waste
MAP	Mixed-activation product
MFP	Mixed-fission product
PE-Ci	Plutonium-equivalent curies
TA-54	Technical Area 54
TRU	Transuranic

1.0 Introduction

The Los Alamos National Laboratory (LANL) generates radioactive waste as a result of various activities. Many aspects of the management of this waste are conducted at Technical Area 54 (TA-54); Area G plays a key role in these management activities as the Laboratory's only disposal facility for low-level radioactive waste (LLW). Furthermore, Area G serves as a staging area for transuranic (TRU) waste that will be shipped to the Waste Isolation Pilot Plant for disposal. A portion of this TRU waste is retrievably stored in pits, trenches, and shafts.

The radioactive waste disposed of or stored at Area G poses potential short- and long-term risks to workers at the disposal facility and to members of the public. These risks are directly proportional to the radionuclide inventories in the waste. The Area G performance assessment and composite analysis (LANL, 2008a) project long-term risks to members of the public; short-term risks to workers and members of the public, such as those posed by accidents, are addressed by the Area G Documented Safety Analysis (LANL, 2011a). The Documented Safety Analysis uses an inventory expressed in terms of plutonium-equivalent curies, referred to as the PE-Ci inventory, to estimate these risks. The Technical Safety Requirements for Technical Area 54, Area G (LANL, 2011b) establishes a belowground radioactive material limit that ensures the cumulative projected inventory authorized for the Area G site is not exceeded. The total belowground radioactive waste inventory limit established for Area G is 110,000 PE-Ci.

The PE-Ci inventory is updated annually; this report presents the inventory prepared for 2011. The approach used to estimate the inventory is described in Section 2. The results of the analysis are presented in Section 3.

2.0 Waste Characterization Methodology

PE-Ci inventory estimates were developed for all radioactive waste disposed of at Area G and for the TRU waste that has been retrievably stored in belowground pits, trenches, and shafts at the facility. The inventory of disposed material was prepared for Revision 4 of the Area G performance assessment and composite analysis (Shuman, 2008). Separate inventory projections were prepared for four time frames: 1959 through 1970; 1971 through September 26, 1988; September 27, 1988 through 2007; and 2008 through 2044. The starting date of 1959 represents the year in which Area G first began receiving waste on a routine basis, while 2044 is the year in which the facility is projected to stop accepting waste. The intermediate dates were selected for reasons discussed in the inventory characterization report (Shuman, 2008).

The inventory projections used in the Area G performance assessment and composite analysis are updated through annual disposal receipt reviews. Pit and shaft inventories are updated to reflect the waste that has been received since the performance assessment and composite analysis inventory projections were developed, and the projections of future waste inventories are revised. The LLW inventories used to estimate the PE-Ci inventory provided in this report take into account the results of the fiscal year 2011 disposal receipt review. A complete discussion of the manner in which this review was conducted may be found in LANL (2012).

The LANL waste databases provide radionuclide-specific inventories for most of the waste disposed of at Area G; however, the activities listed for mixed-fission product (MFP), mixed-activation product (MAP), and material type waste account for all radionuclides in the material. These total activities must be allocated to specific radionuclides in order to estimate the PE-Ci inventory. Allocations were made for these waste types using information presented in the 2008 inventory characterization (Shuman, 2008). The factors used to allocate MFP waste inventories to specific radionuclides are a function of the age of the waste and the fission processes that generate the waste; the factors used to estimate the PE-Ci inventory assume the waste is 2 years old at the time of disposal, that 85 percent of the waste is generated as a result of U-235 fission, and that the remaining 15 percent results from Pu-239 fission. Distributions of allocation factors were used to estimate radionuclide inventories for some material types; the means of these distributions were used to estimate the PE-Ci inventory.

Historically, the retrievably stored TRU waste has included the material placed in Pits 9 and 29, Trenches A through D, and shafts with numbers ranging from 200 through 306. Waste that had been stored in shafts 236 through 243 and in shafts 246 through 253 was retrieved in 2009 for processing and off-site disposal. Radionuclide inventories provided in LANL (2008b) were used to develop the PE-Ci inventory for this waste; the inventories for the shafts from which waste

was retrieved were omitted. Pit and trench inventories were combined for the inventory characterization; shaft inventories of TRU waste were maintained separately.

The radionuclides that are found in the LLW and TRU waste have radioactive half-lives ranging from a few minutes to millions of years. Furthermore, many of the isotopes are members of radioactive decay chains that, over time, may give rise to other radionuclides. An accurate assessment of the PE-Ci inventory requires that the decay characteristics of the radionuclides in the LLW and retrievably stored TRU waste be taken into account. Towards this end, all radionuclides included in the LLW and TRU waste inventories were reviewed in terms of their modes of decay; the results of this review were used to construct decay chains, where appropriate, and to refine some of the radionuclide-specific inventories.

The products of the radionuclide-specific inventories and PE-Ci weighting factors yield radionuclide-specific PE-Ci inventories; summing these inventories over all isotopes yields the PE-Ci inventory for all belowground waste at Area G. The PE-Ci weighting factors used in these calculations are given by the following:

$$WF_i = \frac{DCF_{inh,i}}{DCF_{inh,Pu-239}} \qquad 1$$

where

WF_i	=	PE-Ci weighting factor for radionuclide *i*
$DCF_{inh,i}$	=	inhalation dose conversion factor for radionuclide *i*
$DCF_{inh,Pu-239}$	=	inhalation dose conversion factor for Pu-239

The inhalation dose conversion factors used in the weighting factor calculations were adopted from the Environmental Protection Agency (EPA, 1988).

In addition to the inhalation risk tritium poses, the radionuclide is readily absorbed across the skin of the human body. To account for this additional hazard, the PE-Ci weighting factor for tritium, calculated using Equation 1, was multiplied by 1.5. This adjustment is consistent with information published by the Department of Energy (DOE, 1999).

The actual estimates of the PE-Ci inventory were developed using a model constructed within the GoldSim™ modeling environment; a complete description of this modeling tool may be found elsewhere (e.g., GoldSim 2007a, 2007b, and 2007c). Briefly, GoldSim uses features called elements to input data into the model, to perform calculations using defined inputs, and to physically represent the system being modeled. In terms of the PE-Ci inventory effort, elements known as transport pathways are used to represent the pits, trenches, and shafts in which the

waste has been, or will be, placed. Other elements are used to read in the radionuclide-specific inventory data and to convert these activities to the PE-Ci inventory.

The GoldSim modeling environment was adopted for the PE-Ci inventory analysis because it accounts for changes in radionuclide activities over time due to radioactive decay and ingrowth. As-disposed radionuclide inventories were input into the model and decay relationships between the various isotopes were specified as part of the data input process. Based on that information, the model provided estimates of the radionuclide-specific activities remaining in the pits, trenches, and shafts during the simulation period. The decay and ingrowth calculations are conducted using the Bateman equation, which may be represented as follows:

$$A_n(t) = A_1(0)\left[\prod_{i=1}^{n-1}\lambda_i\right]\sum_{i=1}^{n}\left[\frac{e^{-\lambda_i t}}{\prod_{\substack{j=1\\ j\neq i}}^{n}(\lambda_j - \lambda_i)}\right] \qquad 2$$

where

$A_n(t)$ = activity of decay chain member n at time t
$A_1(0)$ = activity of parent at time 0
λ_i, λ_j = radioactive decay constant of i^{th} and j^{th} members of decay chain

The temporal pattern of waste placement in the pits, trenches, and shafts will influence the decay and ingrowth of the radionuclides in the waste. The LLW was assumed to be disposed of at a linear rate over the period that the disposal units were in use. For example, the pit waste disposed of between 1959 and 1970 was added to the disposal units at a linear rate over that period. In a similar fashion, the retrievably stored TRU waste was assumed to be added to the pits, trenches, and shafts at a linear rate during the periods those units received waste.

3.0 PE-Ci Inventory Projections

This section provides the PE-Ci inventory projections for the radioactive waste that has been disposed of at Area G and the TRU waste that has been placed in belowground retrievable storage. Section 3.1 summarizes the input data and PE-Ci weighting factors that were used in the analysis. Actual inventory projections are provided in Section 3.2.

3.1 Inventory Data and PE-Ci Weighting Factors

Table 3-1 lists the radionuclide-specific inventories in the radioactive waste disposed of at Area G. Inventories are provided for four time periods: 1959 through 1971; 1971 through September 26, 1988; September 27, 1988 through September 30, 2011; and October 1, 2012 through 2044. Separate inventories are provided for the pits and shafts. Radionuclide inventories estimated for the retrievably stored TRU waste are listed in Table 3-2; inventories in the pits and trenches are combined and kept separate from the shaft inventories. All inventories listed in these tables represent as-disposed activities.

Several radionuclides listed in Tables 3-1 and 3-2 are short-lived decay products of longer-lived parents: other isotopes are members of long decay chains. Because specific information about the origin of each radionuclide was lacking, several assumptions were made to ensure the radionuclides and activities in the waste were conservatively represented. The decay characteristics used to arrive at the radionuclide-specific inventories that were used in the PE-Ci inventory analysis are provided in Appendix A. These characteristics were established using several sources of information including Firestone and Ekstrom (2004), Kocher (1985), Shleien et al., (1998), and the Bureau of Radiological Health (BRH, 1970).

In general, all radionuclides that have short half-lives relative to their parents were assumed to be in secular equilibrium and present at the parent radionuclides' activities. In several cases, the listed activities for a parent and its short-lived daughter were inconsistent with this assumption, and the parent's activity was set to the greater of the activities listed for parent and daughter. Separately, activities were not provided for the shorter-lived parents of many radionuclides; the parent's contribution to the PE-Ci inventory was ignored in this situation. The GoldSim model was used to calculate rates of radionuclide decay and ingrowth for isotopes that had long-lived daughters.

The PE-Ci weighting factors used in the inventory analysis are listed in Table 3-3. The factors listed for radionuclides that have short-lived daughters in secular equilibrium include the weighting factors for the parent and the decay product(s). Weighting factors could not be calculated for some of the radionuclides listed in Table 3-3 because inhalation dose conversion factors were unavailable. Inhalation dose conversion factors were also lacking for some of the short-lived daughters that are in secular equilibrium with their parent radionuclides. The radionuclides lacking weighting factors are effectively excluded from the inventory projections.

Table 3-1
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

Radionuclide	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Ac-227	8.6E-01	---	7.0E-02	---	1.9E-05	5.3E-07	3.1E-06	0.0E+00
Ac-228	---	---	---	---	4.9E-03	1.3E-03	4.7E-04	2.8E-05
Ag-105	---	---	---	---	---	6.8E-01	0.0E+00	0.0E+00
Ag-108m	---	---	---	---	6.5E-04	4.4E+00	2.1E-04	2.7E-08
Ag-110m	---	---	1.3E-03	---	2.3E-03	9.9E-01	3.0E-04	0.0E+00
Ag-111	---	---	---	---	1.3E-06	---	2.4E-07	0.0E+00
Al-26	---	---	---	---	2.6E-04	---	5.2E-08	0.0E+00
Am-240	---	---	---	---	1.0E-07	---	0.0E+00	0.0E+00
Am-241	2.4E+03	---	2.4E+01	4.0E-02	1.0E+01	3.2E-01	1.2E+00	3.2E-03
Am-242	---	---	---	---	2.7E-06	---	1.2E-06	0.0E+00
Am-243	---	2.0E-02	---	1.1E-05	1.3E-02	1.0E-09	1.6E-03	0.0E+00
As-72	---	---	---	---	3.5E-06	4.9E-03	3.2E-11	0.0E+00
As-73	---	---	---	---	2.2E-02	2.0E-01	1.3E-03	6.0E-02
As-74	---	---	---	---	3.0E-04	5.6E-01	5.1E-06	9.1E-05
Au-194	---	---	---	---	2.9E-05	---	5.7E-06	0.0E+00
Au-195	---	---	---	---	4.8E-06	---	3.5E-07	0.0E+00
Ba-133	---	---	---	---	7.2E-01	3.1E-03	1.4E-01	1.3E-03
Ba-137m	---	---	---	---	7.3E-05	---	3.0E-09	0.0E+00
Ba-139	---	---	---	1.0E+00	---	---	0.0E+00	0.0E+00
Ba-140	---	---	---	---	1.2E-04	4.8E-08	4.5E-06	0.0E+00
Be-7	2.5E-01	5.6E+01	8.3E+02	9.6E+03	2.1E+01	5.1E+03	3.1E-01	3.2E-03
Be-10	---	---	---	---	4.6E-03	---	3.4E-04	0.0E+00
Bi-207	---	---	---	---	1.5E-02	6.0E-05	2.2E-03	4.7E-06
Bi-210	---	---	---	---	1.0E-06	6.9E-02	7.7E-08	0.0E+00
Bi-211	---	---	---	---	1.5E-03	5.9E-08	7.6E-05	0.0E+00
Bi-212	---	---	---	---	3.1E-04	4.3E-07	5.3E-05	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Bi-214	---	---	---	---	5.5E-03	1.4E-08	7.7E-04	0.0E+00
Bk-247	---	---	---	---	2.8E-07	---	1.7E-08	0.0E+00
Bk-249	1.6E-03	---	---	---	6.2E-10	---	4.7E-11	0.0E+00
Br-76	---	---	---	---	2.0E-09	---	1.2E-10	0.0E+00
Br-77	---	---	---	---	3.1E-07	2.4E-03	5.5E-10	0.0E+00
Br-82	---	---	---	---	1.5E-05	---	8.9E-08	0.0E+00
C-14	---	---	2.3E-01	1.1E+00	3.3E+00	1.6E+01	2.5E-01	0.0E+00
Ca-41	---	---	---	---	2.7E-01	---	2.1E-02	0.0E+00
Ca-45	---	---	---	---	2.2E-02	6.9E+01	8.7E-06	0.0E+00
Cd-109	---	---	---	5.0E-02	1.8E-02	1.0E+01	2.2E-03	3.0E-05
Cd-115	---	---	---	---	8.0E-07	---	1.5E-07	0.0E+00
Ce-137	---	5.0E-01	---	---	5.6E-05	---	4.2E-06	0.0E+00
Ce-139	---	---	---	---	2.0E-01	1.0E-03	1.3E-03	3.0E-03
Ce-141	---	---	---	---	2.2E-04	---	3.1E-05	0.0E+00
Ce-144	4.9E+02	1.3E+03	3.1E+02	3.5E+03	8.4E+00	3.1E+01	2.2E-03	0.0E+00
Cf-249	2.4E-03	---	4.1E-04	---	1.1E-04	---	2.0E-05	0.0E+00
Cf-251	2.7E-03	---	1.6E-03	---	---	---	0.0E+00	0.0E+00
Cf-252	1.5E-02	4.0E+00	8.6E-03	5.5E+01	2.9E-05	9.6E-06	2.1E-06	2.3E-05
Cl-36	---	---	---	---	1.8E-02	2.5E-04	1.3E-03	0.0E+00
Cm-242	1.8E-03	---	---	---	---	---	0.0E+00	0.0E+00
Cm-243	---	---	---	---	4.2E-05	---	3.1E-06	0.0E+00
Cm-244	1.7E-03	2.3E-04	---	1.9E-01	2.8E-03	2.2E-03	5.4E-04	5.9E-03
Cm-245	---	---	---	---	4.6E-05	---	3.5E-06	0.0E+00
Cm-248	---	---	---	---	4.5E-07	---	8.7E-08	0.0E+00
Co-56	---	---	---	5.0E+01	2.9E+00	9.2E+02	2.0E-01	7.2E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Co-57	2.4E-02	5.8E+00	8.0E+01	9.2E+02	5.1E+00	6.3E+03	3.7E-02	4.8E+00
Co-58	---	---	2.3E-03	---	7.1E-01	9.5E+02	5.6E-03	3.7E+00
Co-60	1.2E-02	2.0E+01	1.3E+03	3.3E+03	7.0E+01	3.3E+03	6.9E+00	6.5E+01
Cr-51	---	---	6.6E-02	---	1.9E+00	2.4E+03	2.9E-03	2.7E+00
Cs-134	---	1.2E-01	---	---	1.6E-01	4.9E-02	2.5E-04	0.0E+00
Cs-135	---	---	---	---	1.3E-04	4.5E-06	2.5E-06	0.0E+00
Cs-136	---	---	---	---	---	1.1E-02	0.0E+00	0.0E+00
Cs-137	1.4E+02	3.7E+02	1.2E+03	1.0E+03	8.7E+00	9.1E+01	2.8E-01	2.8E-01
Cu-67	---	---	---	---	1.1E-05	---	1.4E-07	0.0E+00
Dy-159	---	---	---	---	1.3E+00	2.3E+00	9.2E-03	6.5E+00
Eu-149	---	---	---	---	3.6E-01	1.1E+00	2.5E-03	3.3E+00
Eu-152	---	1.2E-01	---	---	4.4E-01	1.1E-02	3.3E-02	1.9E-03
Eu-154	4.5E-03	1.2E-02	2.8E-03	3.2E-02	5.2E-02	9.8E-02	3.9E-03	0.0E+00
Eu-155	6.1E-02	1.6E-01	3.8E-02	4.4E-01	2.9E-03	3.6E-03	1.5E-04	0.0E+00
Eu-156	---	---	---	---	1.1E-05	---	0.0E+00	0.0E+00
Eu-158	---	---	---	---	1.0E-08	---	0.0E+00	0.0E+00
Fe-55	---	---	---	1.0E-05	1.9E+02	7.5E+03	2.7E+01	3.8E+02
Fe-59	---	---	4.0E-03	---	5.6E+00	6.1E+02	6.2E-02	5.4E-07
Ga-68	---	---	---	---	8.8E-02	2.6E-01	3.0E-02	0.0E+00
Gd-146	---	---	---	---	7.4E-06	---	1.9E-07	0.0E+00
Gd-148	---	---	---	---	1.0E-05	2.5E-01	0.0E+00	7.4E-01
Gd-151	---	---	---	---	5.6E-01	9.8E-01	3.8E-03	2.9E+00
Gd-153	---	---	---	---	1.5E+00	1.0E-01	1.2E-02	0.0E+00
Ge-68	---	---	---	---	1.2E+00	6.6E-01	7.8E-02	1.2E-01
H-3	2.7E+00	6.1E+04	7.5E+03	8.0E+05	3.9E+03	1.7E+06	3.2E+02	3.4E+06

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Hf-172	---	---	---	---	6.7E+00	1.4E+01	2.6E-01	4.2E+01
Hf-175	---	---	---	---	8.7E-01	4.8E+00	1.8E-02	1.4E+01
Hf-178m	---	---	---	---	5.9E-05	---	4.8E-06	0.0E+00
Hf-178n	---	---	---	---	2.7E-05	---	6.5E-06	0.0E+00
Hf-181	---	---	---	---	1.9E-05	---	1.4E-06	0.0E+00
Hg-203	---	---	---	1.0E-06	7.5E-05	9.8E-08	5.8E-06	0.0E+00
Ho-163	---	---	---	---	9.1E-01	7.0E-02	6.2E-03	0.0E+00
Ho-166	---	---	---	---	2.0E-05	4.9E-05	1.5E-06	1.5E-04
Ho-166m	---	---	---	---	1.4E-03	---	2.7E-04	0.0E+00
I-125	---	---	1.0E-08	1.0E-05	3.0E-03	---	4.6E-05	0.0E+00
I-129	---	---	---	---	3.1E-05	3.0E-08	2.7E-06	0.0E+00
I-131	---	---	---	---	1.2E-05	---	2.2E-06	0.0E+00
I-133	---	---	---	---	9.0E-06	---	1.7E-06	0.0E+00
In-114m	---	---	---	---	---	1.5E+00	0.0E+00	0.0E+00
In-115m	---	---	---	---	---	2.0E-03	0.0E+00	0.0E+00
Ir-192	---	---	3.0E-03	5.5E-02	3.0E-02	1.2E-05	2.3E-03	0.0E+00
Ir-194	---	---	---	---	---	1.1E-05	0.0E+00	0.0E+00
K-40	---	---	---	---	2.7E-01	4.3E-07	4.2E-02	0.0E+00
Kr-85	1.3E+02	3.4E+02	8.1E+01	9.3E+02	2.3E+00	7.6E+00	8.4E-04	2.4E-02
La-140	---	---	---	---	3.9E-03	4.5E-09	7.5E-04	0.0E+00
Lu-172	---	---	---	---	2.9E+01	9.3E-01	2.4E-01	0.0E+00
Lu-172m	---	---	---	---	8.4E-03	---	9.6E-05	0.0E+00
Lu-173	---	---	---	---	9.7E+00	1.5E+01	1.9E-01	4.5E+01
Lu-174	---	---	---	---	2.5E-01	---	1.5E-03	0.0E+00
Lu-176	---	---	---	---	1.7E-06	---	1.3E-07	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Lu-177	---	---	---	---	1.2E-02	7.9E+02	0.0E+00	0.0E+00
Mn-52	---	---	---	---	4.2E-02	3.5E-02	1.8E-04	8.9E-03
Mn-52m	---	---	---	---	---	2.4E-01	0.0E+00	0.0E+00
Mn-54	3.3E-02	7.4E+00	1.1E+02	1.3E+03	9.7E+00	4.4E+03	2.6E-01	9.4E+00
Mn-56	---	---	---	---	7.1E-02	1.1E+00	5.3E-04	0.0E+00
Mo-93	---	---	---	---	2.0E-05	1.3E-02	1.5E-06	0.0E+00
Mo-99	---	---	---	---	9.6E-06	---	5.0E-10	0.0E+00
Na-22	1.5E-02	3.3E+00	1.7E+02	1.1E+03	9.6E+00	4.2E+03	8.1E-01	1.1E+00
Na-24	---	---	---	---	9.8E-10	1.0E-11	5.9E-11	3.0E-11
Nb-91	---	---	---	---	1.2E-05	9.4E-03	2.2E-06	2.8E-02
Nb-91m	---	---	---	---	1.6E-02	9.8E+00	1.2E-03	0.0E+00
Nb-92	---	---	---	---	3.0E-06	4.0E-03	5.8E-07	0.0E+00
Nb-92m	---	---	---	---	2.6E-05	9.6E-01	2.0E-06	0.0E+00
Nb-93	---	---	---	---	---	---	1.4E-06	6.6E+00
Nb-93m	---	---	---	---	1.0E-03	2.7E+00	2.0E-04	1.5E+00
Nb-94	---	---	8.0E-06	---	4.0E-02	1.3E-04	1.2E-03	0.0E+00
Nb-95	---	---	---	---	3.5E-02	1.7E+01	1.2E-03	0.0E+00
Nd-144	---	---	---	---	1.0E-08	---	0.0E+00	0.0E+00
Nd-147	---	---	---	---	4.7E-05	---	7.0E-06	0.0E+00
Ni-56	---	---	---	---	1.2E-05	3.3E-03	7.1E-07	3.0E-03
Ni-57	---	---	---	---	2.5E-04	7.4E-01	1.7E-05	0.0E+00
Ni-59	---	---	---	---	6.3E-03	2.6E+00	1.3E-04	0.0E+00
Ni-63	---	---	---	4.3E-03	2.0E+00	1.2E+03	1.5E-01	1.2E+02
Ni-65	---	---	---	---	1.8E-06	---	0.0E+00	0.0E+00
Np-235	---	---	---	---	1.0E-12	---	0.0E+00	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Np-237	4.0E-03	1.4E-04	7.0E-07	7.8E-05	5.4E-03	3.1E-08	7.4E-04	0.0E+00
Np-239	---	---	---	---	1.6E-05	---	9.3E-08	0.0E+00
Np-242	---	---	---	---	4.5E-07	1.0E-09	3.4E-08	0.0E+00
Os-194	---	---	---	---	1.3E-07	---	9.8E-09	0.0E+00
P-32	---	---	1.0E-03	---	2.1E+00	1.5E+02	2.3E-04	4.4E+02
P-33	---	---	---	---	2.6E-03	3.4E+01	5.0E-04	1.0E+02
Pa-231	---	---	---	---	4.5E-05	2.7E-03	3.3E-06	0.0E+00
Pa-233	---	---	---	---	1.1E-03	1.6E-08	6.7E-06	0.0E+00
Pa-234	---	---	---	---	6.2E-02	5.0E-07	3.2E-10	1.5E-06
Pa-234m	---	---	---	---	1.3E-02	2.3E-06	5.6E-04	0.0E+00
Pb-203	---	---	---	---	2.1E-08	---	1.6E-09	0.0E+00
Pb-210	---	---	---	---	2.7E-01	2.9E-08	3.3E-03	0.0E+00
Pb-211	---	---	---	---	---	5.0E-08	0.0E+00	0.0E+00
Pb-212	---	---	---	---	1.3E-02	1.8E-08	2.1E-03	0.0E+00
Pb-214	---	---	---	---	6.5E-03	1.4E-08	9.2E-04	0.0E+00
Pm-143	---	---	---	---	6.2E-01	8.2E-01	8.3E-03	2.3E+00
Pm-145	---	---	---	---	1.1E-01	---	7.5E-04	0.0E+00
Pm-147	1.7E-04	4.5E-04	1.6E-04	3.0E-03	5.1E-03	1.8E-02	6.9E-06	5.4E-02
Po-208	---	---	---	---	2.4E-08	1.0E-07	4.7E-09	0.0E+00
Po-209	---	---	---	---	1.0E-07	6.9E-04	2.0E-08	0.0E+00
Po-210	1.9E-03	1.0E-01	1.1E-03	4.8E-02	6.7E-04	1.3E-04	3.6E-06	3.0E-04
Pu-233	---	---	---	---	1.0E-08	---	1.9E-13	0.0E+00
Pu-234	---	---	---	---	2.0E-09	---	0.0E+00	0.0E+00
Pu-236	---	---	---	---	1.0E-09	---	7.5E-11	0.0E+00
Pu-238	4.4E+03	5.6E+00	4.9E+02	2.0E+00	1.8E+01	2.7E-01	1.7E+00	1.5E-02

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Pu-239	2.5E+03	2.1E+01	2.3E+01	1.0E+02	3.8E+01	9.1E-02	5.4E+00	1.1E-02
Pu-240	6.4E+02	3.4E-02	1.5E-01	4.7E+00	9.4E-01	4.7E-03	4.2E-02	0.0E+00
Pu-241	7.3E+03	5.4E-03	1.7E+00	5.2E+01	6.9E+00	7.6E-02	2.4E-01	0.0E+00
Pu-242	2.6E-01	1.2E-04	5.7E-05	1.5E-03	6.8E-03	3.1E-06	1.0E-03	0.0E+00
Pu-244	---	---	---	---	3.5E-06	---	2.6E-07	0.0E+00
Ra-223	---	---	---	---	6.7E-03	4.0E-08	5.3E-04	0.0E+00
Ra-224	---	---	---	---	1.9E-02	3.2E-08	2.2E-03	0.0E+00
Ra-226	---	1.0E-01	2.0E-01	2.5E+00	1.2E-01	7.8E-01	1.1E-02	5.4E-05
Ra-228	---	---	2.1E-01	---	3.6E-02	---	5.0E-03	0.0E+00
Rb-82	---	---	---	---	6.3E-06	1.0E-02	2.2E-07	0.0E+00
Rb-83	---	---	---	---	4.6E-02	1.0E+03	5.5E-03	1.3E+03
Rb-84	---	---	---	---	2.9E-02	4.7E+02	2.2E-03	1.3E+03
Rb-86	---	---	---	---	2.3E-03	3.1E+02	2.1E-04	8.7E+02
Re-183	---	---	---	---	9.7E-02	5.2E-01	2.0E-03	1.5E+00
Re-184	---	---	---	---	1.1E-05	---	8.5E-07	0.0E+00
Re-184m	---	---	---	---	1.2E-02	5.7E+01	0.0E+00	0.0E+00
Re-188	---	---	---	---	2.0E-03	---	0.0E+00	0.0E+00
Rh-97	---	---	---	---	---	2.0E-02	0.0E+00	0.0E+00
Rh-99	---	---	---	---	---	9.6E-02	0.0E+00	0.0E+00
Rh-101	---	---	---	---	4.2E-03	1.9E-01	2.0E-03	0.0E+00
Rh-102	---	---	---	---	1.2E-04	4.4E-01	1.9E-05	0.0E+00
Rh-102m	---	---	---	---	3.5E-05	---	2.7E-06	0.0E+00
Rh-103	---	---	---	---	---	---	0.0E+00	0.0E+00
Rh-106	---	---	---	---	---	---	0.0E+00	0.0E+00
Rn-219	---	---	---	---	6.4E-03	2.3E-08	4.9E-04	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Ru-103	---	---	---	---	3.2E-03	---	2.2E-06	0.0E+00
Ru-106	9.6E+01	2.5E+02	6.0E+01	6.9E+02	1.7E+00	5.7E+00	1.1E-03	0.0E+00
S-35	---	---	6.0E-03	---	8.3E-03	1.8E+01	5.8E-04	5.1E+01
Sb-124	---	---	---	---	2.9E-02	4.9E-08	1.5E-03	1.4E-07
Sb-125	5.4E-01	1.4E+00	3.4E-01	3.9E+00	1.8E-02	6.6E+01	6.3E-04	4.5E-07
Sb-126	---	---	---	---	2.7E-06	2.4E-02	0.0E+00	0.0E+00
Sc-43	---	---	---	---	4.0E-09	---	0.0E+00	0.0E+00
Sc-44	---	---	---	---	3.4E-04	---	5.6E-07	0.0E+00
Sc-46	---	---	---	---	2.2E-01	3.7E+02	1.8E-03	2.2E-02
Sc-48	---	---	---	---	2.6E-03	6.6E-01	1.8E-04	0.0E+00
Se-73	---	---	---	---	4.3E-04	---	0.0E+00	0.0E+00
Se-75	---	---	---	---	7.8E-02	1.8E+02	6.0E-03	1.7E-01
Si-32	---	---	---	---	2.7E-05	---	3.0E-06	0.0E+00
Sm-145	---	---	---	---	7.7E-01	1.4E+00	5.3E-03	3.9E+00
Sm-151	8.2E-04	2.1E-03	5.1E-04	5.9E-03	1.4E-05	4.8E-05	2.9E-10	0.0E+00
Sn-113	---	---	---	---	6.1E-06	9.5E-01	1.1E-06	1.6E-07
Sn-119m	2.5E-03	6.6E-03	1.6E-03	1.8E-02	2.1E-03	1.5E-04	1.5E-04	0.0E+00
Sn-121	---	---	---	---	---	3.7E+00	0.0E+00	0.0E+00
Sn-121m	5.2E-02	1.4E-01	3.3E-02	3.7E-01	8.8E-04	3.0E-03	0.0E+00	0.0E+00
Sn-123	3.5E+00	9.1E+00	2.2E+00	2.5E+01	5.9E-02	2.0E-01	0.0E+00	0.0E+00
Sn-126	1.3E-02	3.3E-02	8.0E-03	9.2E-02	2.2E-04	7.5E-04	0.0E+00	0.0E+00
Sr-82	---	---	---	---	1.1E-02	2.3E+01	3.0E-04	1.1E+01
Sr-85	---	---	---	---	9.8E-02	3.5E+02	6.6E-03	1.9E+01
Sr-89	3.5E-01	9.2E-01	2.9E+04	2.5E+00	1.5E-01	2.1E-02	3.0E-05	0.0E+00
Sr-90	1.5E+02	4.0E+02	1.5E+03	1.1E+03	5.4E+00	9.6E+01	4.2E-01	2.0E-01

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
Ta-179	---	---	---	---	1.3E+01	4.3E+01	8.9E-02	1.2E+02
Ta-182	---	---	---	3.1E+01	1.3E+00	1.5E+02	1.9E-02	9.2E+00
Ta-183	---	---	---	---	5.0E-09	---	0.0E+00	0.0E+00
Tb-157	---	---	---	---	4.5E-08	---	0.0E+00	0.0E+00
Tb-160	---	---	---	---	3.9E-07	---	7.5E-08	0.0E+00
Tc-95	---	---	---	---	1.0E-03	---	1.9E-04	0.0E+00
Tc-95m	---	---	---	---	6.8E-03	9.4E-01	4.1E-04	0.0E+00
Tc-97	---	---	---	---	2.1E-06	---	3.9E-09	0.0E+00
Tc-99	---	---	---	---	3.6E-01	1.2E-05	3.6E-02	0.0E+00
Tc-99m	---	---	1.0E-03	---	1.0E-04	---	1.9E-07	0.0E+00
Te-125m	---	---	---	---	5.4E-08	1.6E+01	4.1E-09	0.0E+00
Te-129m	---	---	---	---	2.1E-08	---	2.0E-09	0.0E+00
Th-227	---	---	---	---	1.5E-02	6.4E-08	2.0E-03	0.0E+00
Th-228	---	---	---	---	2.6E-03	6.9E-04	1.5E-04	2.0E-03
Th-229	---	---	---	---	4.4E-04	5.4E-08	3.2E-05	0.0E+00
Th-230	1.6E+01	5.7E-04	9.5E+00	---	1.3E-03	1.6E-08	1.1E-04	0.0E+00
Th-231	---	---	---	---	1.0E-04	2.7E-02	2.0E-05	8.0E-02
Th-232	1.9E-03	1.7E-05	2.8E-02	1.9E-02	3.6E-01	1.9E-01	2.2E-02	3.9E-02
Th-234	---	---	---	---	1.7E-01	1.9E-02	2.3E-02	5.1E-02
Ti-44	---	---	---	---	8.1E-02	4.2E-01	1.6E-02	1.2E+00
Tl-204	---	---	---	---	7.5E-05	4.0E-06	5.7E-06	1.2E-05
Tl-208	---	---	---	---	3.1E-03	1.5E-08	4.6E-04	0.0E+00
Tm-170	---	---	---	---	5.0E-03	---	1.0E-07	0.0E+00
Tm-171	---	---	---	---	2.0E-01	---	1.8E-02	0.0E+00
U-232	---	---	---	2.1E-01	1.0E-03	2.0E-04	5.8E-05	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-1 (Continued)
Radionuclide-specific Inventories in the Radioactive Waste Disposed of at Area G

	As-Disposed Activity (Ci)							
	Pre-1971 Waste		1971–1988 Waste [a]		1988–2011 Waste [b]		2012–2044 Waste [c]	
Radionuclide	Pits	Shafts	Pits	Shafts	Pits	Shafts	Pits	Shafts
U-233	6.1E+00	1.5E+00	1.9E-02	4.0E+00	8.1E-02	5.8E-04	1.4E-02	0.0E+00
U-234	2.1E+00	2.6E-05	1.6E+00	4.9E-01	8.8E+00	1.3E+00	1.7E+00	1.5E+00
U-235	4.6E-01	1.3E-02	7.8E-01	1.0E+00	1.3E+00	6.8E-02	9.0E-02	9.3E-02
U-236	9.6E-05	1.2E-07	1.9E-04	1.9E-04	6.4E-03	3.8E-06	1.1E-03	0.0E+00
U-237	---	---	---	---	2.4E-05	1.2E-07	5.1E-07	0.0E+00
U-238	1.1E+01	4.4E-05	1.5E+01	1.1E+01	2.5E+01	2.4E+00	2.6E+00	7.7E-01
U-239	---	---	---	---	2.9E-03	---	1.4E-03	0.0E+00
V-48	---	---	1.0E-03	---	1.9E-02	1.0E+03	1.4E-05	2.1E-01
V-49	---	---	---	---	3.6E-01	2.9E+03	3.3E-03	2.9E+00
V-52	---	---	---	---	2.1E-02	---	4.5E-05	0.0E+00
W-181	---	---	---	---	1.8E+01	3.4E+02	1.0E-01	8.9E+01
W-185	---	---	---	---	1.9E+01	1.1E+03	1.3E-01	1.5E+02
Xe-133	---	---	---	---	1.8E-05	---	1.3E-06	0.0E+00
Y-88	---	---	---	3.8E+01	1.3E-01	4.5E+01	1.0E-02	3.7E+00
Y-90	---	---	2.9E-02	---	4.1E-05	6.9E-02	3.9E-06	2.0E-01
Y-91	2.5E-02	6.6E-02	1.6E-02	1.8E-01	4.3E-04	1.5E-03	7.5E-10	0.0E+00
Yb-169	---	---	---	---	1.2E-02	6.3E+00	3.3E-07	0.0E+00
Zn-65	2.5E-02	5.8E+00	8.5E+01	9.7E+02	1.2E+00	6.1E+02	3.5E-02	7.2E+00
Zn-69m	---	---	---	---	9.2E-06	---	0.0E+00	0.0E+00
Zn-72	---	---	---	---	---	1.9E-02	0.0E+00	0.0E+00
Zr-88	---	---	---	---	2.5E-02	2.4E+02	1.2E-03	6.1E-01
Zr-93	---	---	---	---	2.0E-08	---	0.0E+00	0.0E+00
Zr-95	1.7E+01	4.4E+01	1.1E+01	1.2E+02	5.3E-01	4.1E+00	1.8E-02	0.0E+00

[a] *Refers to waste that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to waste that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-2
Radionuclide-specific Inventories in the Area G Retrievably Stored TRU Waste

Radionuclide	As-Disposed Activity (Ci)	
	Pits and Trenches	Shafts
Ac-227	4.3E-01	—
Am-241	1.1E+04	2.3E-02
Bk-249	9.6E-04	—
Ce-144	2.1E-01	1.6E+03
Cf-249	1.0E-03	—
Cm-242	1.0E-03	—
Cm-244	1.0E-03	—
Co-60	—	2.9E+01
Cs-137	5.9E-02	4.6E+02
Eu-154	1.9E-06	1.4E-02
Eu-155	2.6E-05	2.0E-01
H-3	—	3.8E+03
Kr-85	5.4E-02	4.2E+02
Np-237	3.7E-03	—
Pm-147	7.3E-08	5.6E-04
Pu-238	1.1E+05	1.9E+00
Pu-239	2.0E+03	9.8E+01
Pu-240	7.0E+02	4.0E+00
Pu-241	2.1E+04	1.2E+02
Pu-242	3.8E-01	1.7E-03
Pu-244	5.3E-08	—
Ru-106	4.1E-02	3.1E+02
Sb-125	2.3E-04	1.7E+00
Sm-151	2.1E-07	1.6E-03
Sn-119m	1.1E-06	8.1E-03
Sn-121m	2.2E-05	1.7E-01
Sn-123	1.5E-03	1.1E+01
Sn-126	5.4E-06	4.1E-02
Sr-89	1.5E-04	1.1E+00
Sr-90	6.5E-02	5.0E+02

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-2 (Continued)
Radionuclide-specific Inventories in the Area G Retrievably Stored TRU Waste

Radionuclide	As-Disposed Activity (Ci)	
	Pits and Trenches	Shafts
U-233	4.2E+01	—
U-234	2.3E-01	1.7E-03
U-235	3.5E-02	8.4E-03
U-236	8.9E-04	8.1E-06
U-238	2.5E-02	4.1E-05
Y-90	—	3.1E+00
Y-91	1.1E-05	8.2E-02
Zr-95	7.1E-03	5.4E+01

— = Indicates that the radionuclide did not occur in the inventory.

Table 3-3
PE-Ci Weighting Factors

Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor
Ac-227+D	1.6E+01	Cd-113	3.9E-03	Dy-166+D	2.5E-05	I-125	5.6E-05
Ag-105	1.1E-05	Cd-113m	3.6E-03	Eu-149+D	4.4E-06	I-129	4.0E-04
Ag-108m+D	6.6E-04	Cd-115+D	1.0E-05	Eu-150	6.3E-04	I-131+D	7.7E-05
Ag-110m+D	1.9E-04	Ce-137m+D	3.4E-06	Eu-152	5.2E-04	I-133	1.4E-05
Ag-111	1.4E-05	Ce-139	2.1E-05	Eu-154	6.7E-04	In-114m+D	2.1E-04
Al-26	1.9E-04	Ce-141	2.1E-05	Eu-155	9.7E-05	In-115	8.7E-03
Am-240	4.3E-06	Ce-144+D	8.7E-04	Eu-156	3.3E-05	In-115m	3.1E-07
Am-241	1.0E+00	Cf-249	1.3E+00	Eu-158	2.2E-07	Ir-192	6.6E-05
Am-242	1.4E-04	Cf-251	1.4E+00	Fe-52+D	5.5E-06	K-40	2.9E-05
Am-243+D	1.0E+00	Cf-252	3.7E-01	Fe-55	6.3E-06	Kr-81	—
As-73	8.1E-06	Cl-36	5.1E-05	Fe-59	3.5E-05	Kr-85	—
As-74	1.9E-05	Cm-242	4.0E-02	Gd-146+D	9.8E-05	La-137	2.0E-04
Au-195	3.0E-05	Cm-243	7.2E-01	Gd-148	7.7E-01	Lu-173	5.3E-05
Ba-133	1.8E-05	Cm-244	5.8E-01	Gd-150	—	Lu-174	9.2E-05
Ba-139	4.0E-07	Cm-245	1.1E+00	Gd-151	2.1E-05	Lu-176	1.5E-03
Ba-140+D	2.0E-05	Cm-247+D	9.7E-01	Gd-152	5.7E-01	Lu-177	5.7E-06
Be-10	8.3E-04	Cm-248	3.9E+00	Gd-153	5.5E-05	Mn-52	1.3E-05
Be-7	7.5E-07	Co-56	9.2E-05	Ge-68+D	1.2E-04	Mn-54	1.6E-05
Bi-207	4.7E-05	Co-57	2.1E-05	H-3	2.2E-07	Mn-56	8.8E-07
Bi-208	—	Co-58	2.5E-05	Hf-172+D	7.5E-04	Mo-93	6.6E-05
Bk-247	1.3E+00	Co-60	5.1E-04	Hf-175	1.3E-05	Mo-99+D	9.3E-06
Bk-249	3.2E-03	Cr-51	7.8E-07	Hf-178m	—	Na-22	1.8E-05
Br-76	3.7E-06	Cs-134	1.1E-04	Hf-178n	5.7E-03	Na-24	2.8E-06
Br-77	6.4E-07	Cs-135	1.1E-05	Hf-181	3.6E-05	Nb-91	—
Br-82	3.6E-06	Cs-136	1.7E-05	Hf-182+D	7.9E-03	Nb-91m	—
C-14	4.9E-06	Cs-137+D	7.4E-05	Hg-194+D	4.3E-04	Nb-92	—
Ca-41	3.1E-06	Cu-67	2.9E-06	Hg-203	1.7E-05	Nb-92m	—
Ca-45	1.5E-05	Dy-154	—	Ho-163	—	Nb-93m	6.8E-05

[a] *Weighting factors for radionuclides with an appended "+D" include the contributions from decay products that are in secular equilibrium.*

— = Indicates a weighting factor could not be calculated because an inhalation dose conversion factor for the radionuclide is unavailable.

Table 3-3 (Continued)
PE-Ci Weighting Factors

Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor	Radionuclide [a]	PE-Ci Weighting Factor
Cd-109+D	2.7E-04	Dy-159	5.7E-06	Ho-166m	1.8E-03	Nb-94	9.7E-04
Nb-95	1.4E-05	Pu-240	1.0E+00	Sm-145	2.6E-05	Ti-44+D	2.4E-03
Nd-144	—	Pu-241	1.9E-02	Sm-146	1.9E-01	Tl-204	5.6E-06
Nd-147	1.6E-05	Pu-242	9.6E-01	Sm-147	1.7E-01	Tm-170	6.1E-05
Ni-56	9.7E-06	Pu-244+D	9.4E-01	Sm-148	—	Tm-171	2.1E-05
Ni-57	4.4E-06	Ra-226+D	2.0E-02	Sm-151	7.0E-05	U-232	1.5E+00
Ni-59	6.3E-06	Ra-228+D	1.2E-02	Sn-113+D	2.5E-05	U-233	3.2E-01
Ni-63	1.5E-05	Rb-83+D	1.2E-05	Sn-119m	1.5E-05	U-234	3.1E-01
Ni-65	8.0E-07	Rb-84	1.5E-05	Sn-121	1.2E-06	U-235+D	2.9E-01
Np-235	9.7E-06	Rb-86	1.5E-05	Sn-121m+D	2.8E-05	U-236	2.9E-01
Np-237+D	1.3E+00	Re-183	—	Sn-123	7.6E-05	U-237	8.2E-06
Np-242	—	Re-184	1.2E-05	Sn-126+D	2.4E-04	U-238+D	2.8E-01
Os-194+D	1.6E-03	Re-184m+D	4.3E-05	Sr-82+D	1.4E-04	U-239+D	5.9E-06
P-33	5.4E-06	Rh-97+D	1.1E-06	Sr-85	1.2E-05	V-48	2.4E-05
Pa-231	3.0E+00	Rh-99	7.2E-06	Sr-89+D	9.7E-05	V-49	8.0E-07
Pb-203	1.2E-06	Rh-101	9.2E-05	Sr-90+D	3.1E-03	V-52	—
Pb-204	—	Rh-102	2.8E-04	Ta-178	1.9E-07	W-181	3.5E-07
Pb-205	9.1E-06	Rh-102m+D	1.1E-04	Ta-179	1.5E-05	W-185	1.8E-06
Pb-210+D	5.4E-02	Ru-103+D	2.1E-05	Ta-182	1.0E-04	W-188+D	1.4E-05
Pd-107	3.0E-05	Ru-106+D	1.1E-03	Ta-183+D	1.2E-05	Xe-133	—
Pm-143	2.5E-05	S-35	5.8E-06	Tb-157	2.2E-05	Xe-133m	—
Pm-144	1.3E-04	Sb-124	5.9E-05	Tb-158	6.0E-04	Y-91	1.1E-04
Pm-145	7.1E-05	Sb-125+D	3.2E-05	Tb-160	5.82E-05	Yb-169	1.9E-05
Pm-146	3.4E-04	Sb-126	2.7E-05	Tc-95	5.8E-07	Zn-65	4.8E-05
Pm-147	9.1E-05	Sc-43	6.0E-07	Tc-95m+D	9.1E-06	Zn-69m+D	2.0E-06
Po-208	—	Sc-46	6.9E-05	Tc-97	2.3E-06	Zn-72+D	1.6E-05
Po-209	—	Sc-48	9.6E-06	Tc-99	1.9E-05	Zr-88+D	1.2E-04
Pu-233+D	5.1E-09	Se-72+D	9.5E-06	Te-129m+D	5.6E-05	Zr-93	7.5E-04
Pu-234+D	2.8E-03	Se-73	1.1E-06	Th-228+D	8.0E-01	Zr-95+D	7.4E-05
Pu-236	3.4E-01	Se-75	2.0E-05	Th-229+D	5.0E+00		
Pu-238	9.1E-01	Se-79	2.3E-05	Th-230	7.6E-01		
Pu-239	1.0E+00	Si-32+D	2.4E-03	Th-232	3.8E+00		

[a] *Weighting factors for radionuclides with an appended "+D" include the contributions from decay products that are in secular equilibrium.*

— = Indicates a weighting factor could not be calculated because an inhalation dose conversion factor for the radionuclide is unavailable.

3.2 PE-Ci Inventory Estimates

The projected PE-Ci inventory for the belowground radioactive waste at Area G is presented in Figure 3-1, and is also provided in tabular form in Table 3-4; projections are shown for the 1960 to 2146 period. The facility began receiving waste on a routine basis in 1959; the year 2146 represents the end of the 100-year active institutional control period that follows the end of disposal operations in 2044 and a 2-year closure period. The total PE-Ci inventory is shown, as are the contributions made by the various inventories of disposed radioactive waste and retrievably stored TRU waste. As of 2011, the total belowground radioactive waste inventory is approximately 98,900 PE-Ci.

The belowground inventory at Area G increases until about 1987, at which point it starts to decline due to radioactive decay. The retrievably stored TRU waste is the major contributor to the inventory until 2015, when it is assumed the waste will be retrieved and prepared for shipment to the Waste Isolation Pilot Plant. The total inventory decreases to 8,900 PE-Ci as a result, and is dominated by the radioactive waste that was disposed of at Area G prior to 1971.

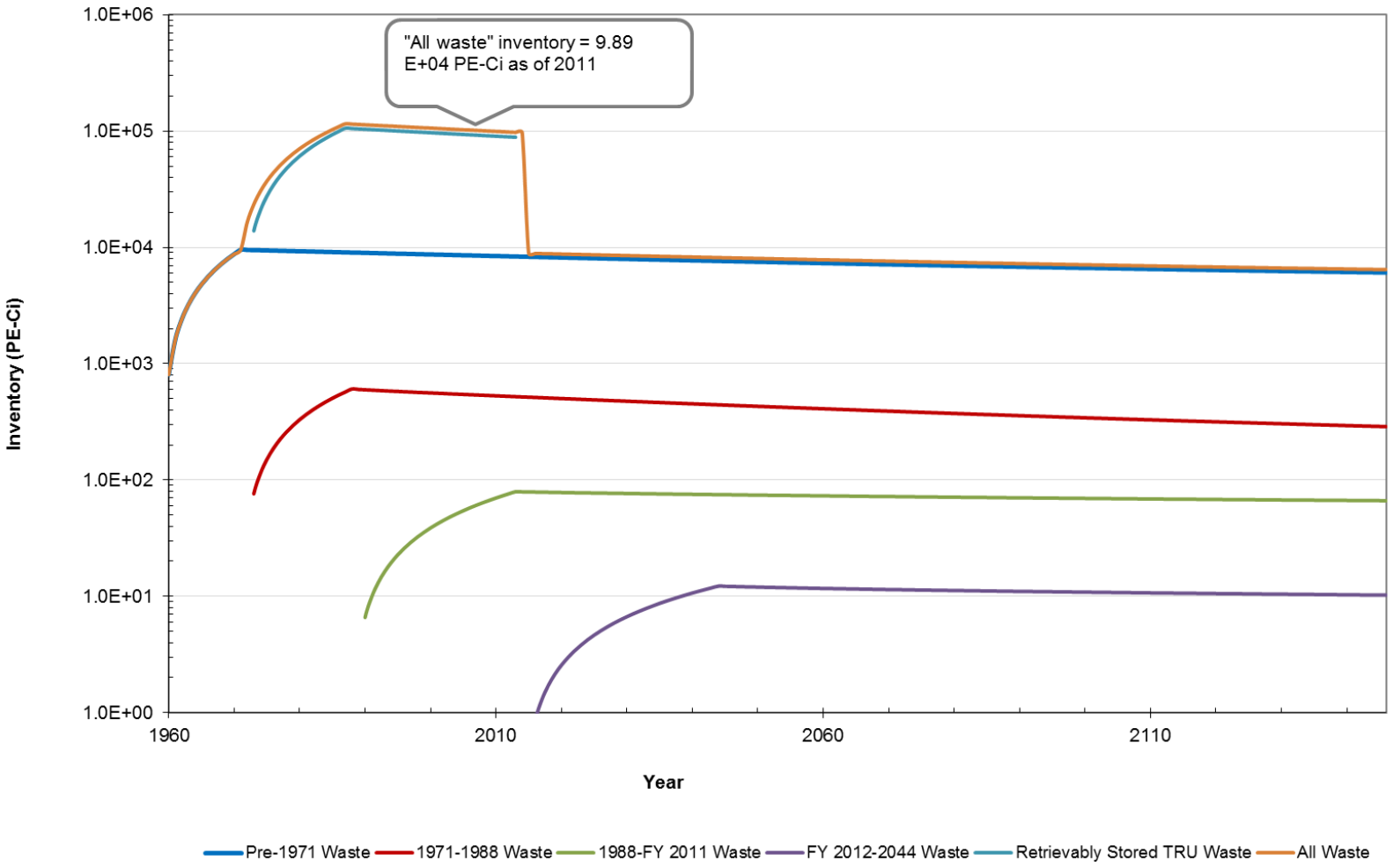

Figure 3-1
Area G Belowground Inventory Projections

Table 3-4
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
1960	8.1E+02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.1E+02
1961	1.6E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.6E+03
1962	2.4E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.4E+03
1963	3.2E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.2E+03
1964	4.0E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E+03
1965	4.8E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.8E+03
1966	5.6E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.6E+03
1967	6.4E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	6.4E+03
1968	7.2E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	7.2E+03
1969	8.0E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.0E+03
1970	8.8E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	8.8E+03
1971	9.5E+03	0.0E+00	0.0E+00	0.0E+00	0.0E+00	9.5E+03
1972	9.5E+03	3.8E+01	0.0E+00	0.0E+00	7.0E+03	1.7E+04
1973	9.5E+03	7.6E+01	0.0E+00	0.0E+00	1.4E+04	2.3E+04
1974	9.5E+03	1.1E+02	0.0E+00	0.0E+00	2.1E+04	3.0E+04
1975	9.4E+03	1.5E+02	0.0E+00	0.0E+00	2.8E+04	3.7E+04
1976	9.4E+03	1.9E+02	0.0E+00	0.0E+00	3.4E+04	4.4E+04
1977	9.4E+03	2.2E+02	0.0E+00	0.0E+00	4.1E+04	5.1E+04
1978	9.3E+03	2.6E+02	0.0E+00	0.0E+00	4.8E+04	5.7E+04
1979	9.3E+03	2.9E+02	0.0E+00	0.0E+00	5.4E+04	6.4E+04
1980	9.3E+03	3.3E+02	0.0E+00	0.0E+00	6.1E+04	7.1E+04
1981	9.2E+03	3.7E+02	0.0E+00	0.0E+00	6.8E+04	7.7E+04
1982	9.2E+03	4.0E+02	0.0E+00	0.0E+00	7.4E+04	8.4E+04
1983	9.2E+03	4.4E+02	0.0E+00	0.0E+00	8.1E+04	9.0E+04
1984	9.2E+03	4.7E+02	0.0E+00	0.0E+00	8.7E+04	9.7E+04
1985	9.1E+03	5.0E+02	0.0E+00	0.0E+00	9.3E+04	1.0E+05

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
1986	9.1E+03	5.4E+02	0.0E+00	0.0E+00	1.0E+05	1.1E+05
1987	9.1E+03	5.7E+02	0.0E+00	0.0E+00	1.1E+05	1.2E+05
1988	9.0E+03	6.1E+02	0.0E+00	0.0E+00	1.1E+05	1.1E+05
1989	9.0E+03	6.0E+02	3.3E+00	0.0E+00	1.0E+05	1.1E+05
1990	9.0E+03	6.0E+02	6.6E+00	0.0E+00	1.0E+05	1.1E+05
1991	9.0E+03	5.9E+02	9.8E+00	0.0E+00	1.0E+05	1.1E+05
1992	8.9E+03	5.9E+02	1.3E+01	0.0E+00	1.0E+05	1.1E+05
1993	8.9E+03	5.8E+02	1.6E+01	0.0E+00	1.0E+05	1.1E+05
1994	8.9E+03	5.8E+02	2.0E+01	0.0E+00	1.0E+05	1.1E+05
1995	8.8E+03	5.8E+02	2.3E+01	0.0E+00	1.0E+05	1.1E+05
1996	8.8E+03	5.7E+02	2.6E+01	0.0E+00	1.0E+05	1.1E+05
1997	8.8E+03	5.7E+02	2.9E+01	0.0E+00	9.9E+04	1.1E+05
1998	8.8E+03	5.7E+02	3.2E+01	0.0E+00	9.8E+04	1.1E+05
1999	8.7E+03	5.6E+02	3.6E+01	0.0E+00	9.8E+04	1.1E+05
2000	8.7E+03	5.6E+02	3.9E+01	0.0E+00	9.7E+04	1.1E+05
2001	8.7E+03	5.6E+02	4.2E+01	0.0E+00	9.6E+04	1.1E+05
2002	8.6E+03	5.5E+02	4.5E+01	0.0E+00	9.6E+04	1.0E+05
2003	8.6E+03	5.5E+02	4.8E+01	0.0E+00	9.5E+04	1.0E+05
2004	8.6E+03	5.5E+02	5.1E+01	0.0E+00	9.4E+04	1.0E+05
2005	8.6E+03	5.4E+02	5.4E+01	0.0E+00	9.4E+04	1.0E+05
2006	8.5E+03	5.4E+02	5.8E+01	0.0E+00	9.3E+04	1.0E+05
2007	8.5E+03	5.4E+02	6.1E+01	0.0E+00	9.2E+04	1.0E+05
2008	8.5E+03	5.4E+02	6.4E+01	0.0E+00	9.2E+04	1.0E+05
2009	8.5E+03	5.3E+02	6.7E+01	0.0E+00	9.1E+04	1.0E+05
2010	8.4E+03	5.3E+02	7.0E+01	0.0E+00	9.1E+04	1.0E+05

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2011	8.4E+03	5.3E+02	7.3E+01	0.0E+00	9.0E+04	9.9E+04
2012	8.4E+03	5.2E+02	7.6E+01	0.0E+00	8.9E+04	9.8E+04
2013	8.4E+03	5.2E+02	7.9E+01	0.0E+00	8.9E+04	9.8E+04
2014	8.3E+03	5.2E+02	7.9E+01	0.0E+00	8.8E+04	9.7E+04
2015	8.3E+03	5.2E+02	7.9E+01	4.3E-01	0.0E+00	8.9E+03
2016	8.3E+03	5.1E+02	7.9E+01	8.6E-01	0.0E+00	8.9E+03
2017	8.3E+03	5.1E+02	7.9E+01	1.3E+00	0.0E+00	8.8E+03
2018	8.2E+03	5.1E+02	7.8E+01	1.7E+00	0.0E+00	8.8E+03
2019	8.2E+03	5.0E+02	7.8E+01	2.1E+00	0.0E+00	8.8E+03
2020	8.2E+03	5.0E+02	7.8E+01	2.6E+00	0.0E+00	8.8E+03
2021	8.2E+03	5.0E+02	7.8E+01	3.0E+00	0.0E+00	8.7E+03
2022	8.1E+03	5.0E+02	7.8E+01	3.4E+00	0.0E+00	8.7E+03
2023	8.1E+03	4.9E+02	7.8E+01	3.8E+00	0.0E+00	8.7E+03
2024	8.1E+03	4.9E+02	7.7E+01	4.2E+00	0.0E+00	8.7E+03
2025	8.1E+03	4.9E+02	7.7E+01	4.6E+00	0.0E+00	8.6E+03
2026	8.0E+03	4.9E+02	7.7E+01	5.0E+00	0.0E+00	8.6E+03
2027	8.0E+03	4.8E+02	7.7E+01	5.5E+00	0.0E+00	8.6E+03
2028	8.0E+03	4.8E+02	7.7E+01	5.9E+00	0.0E+00	8.6E+03
2029	8.0E+03	4.8E+02	7.7E+01	6.3E+00	0.0E+00	8.5E+03
2030	7.9E+03	4.8E+02	7.7E+01	6.7E+00	0.0E+00	8.5E+03
2031	7.9E+03	4.7E+02	7.6E+01	7.1E+00	0.0E+00	8.5E+03
2032	7.9E+03	4.7E+02	7.6E+01	7.5E+00	0.0E+00	8.5E+03
2033	7.9E+03	4.7E+02	7.6E+01	7.9E+00	0.0E+00	8.4E+03
2034	7.9E+03	4.7E+02	7.6E+01	8.3E+00	0.0E+00	8.4E+03
2035	7.8E+03	4.6E+02	7.6E+01	8.7E+00	0.0E+00	8.4E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2036	7.8E+03	4.6E+02	7.6E+01	9.1E+00	0.0E+00	8.4E+03
2037	7.8E+03	4.6E+02	7.6E+01	9.5E+00	0.0E+00	8.3E+03
2038	7.8E+03	4.6E+02	7.6E+01	9.9E+00	0.0E+00	8.3E+03
2039	7.7E+03	4.5E+02	7.5E+01	1.0E+01	0.0E+00	8.3E+03
2040	7.7E+03	4.5E+02	7.5E+01	1.1E+01	0.0E+00	8.3E+03
2041	7.7E+03	4.5E+02	7.5E+01	1.1E+01	0.0E+00	8.2E+03
2042	7.7E+03	4.5E+02	7.5E+01	1.1E+01	0.0E+00	8.2E+03
2043	7.7E+03	4.5E+02	7.5E+01	1.2E+01	0.0E+00	8.2E+03
2044	7.6E+03	4.4E+02	7.5E+01	1.2E+01	0.0E+00	8.2E+03
2045	7.6E+03	4.4E+02	7.5E+01	1.2E+01	0.0E+00	8.2E+03
2046	7.6E+03	4.4E+02	7.5E+01	1.2E+01	0.0E+00	8.1E+03
2047	7.6E+03	4.4E+02	7.4E+01	1.2E+01	0.0E+00	8.1E+03
2048	7.6E+03	4.3E+02	7.4E+01	1.2E+01	0.0E+00	8.1E+03
2049	7.5E+03	4.3E+02	7.4E+01	1.2E+01	0.0E+00	8.1E+03
2050	7.5E+03	4.3E+02	7.4E+01	1.2E+01	0.0E+00	8.0E+03
2051	7.5E+03	4.3E+02	7.4E+01	1.2E+01	0.0E+00	8.0E+03
2052	7.5E+03	4.3E+02	7.4E+01	1.2E+01	0.0E+00	8.0E+03
2053	7.5E+03	4.2E+02	7.4E+01	1.2E+01	0.0E+00	8.0E+03
2054	7.4E+03	4.2E+02	7.4E+01	1.2E+01	0.0E+00	7.9E+03
2055	7.4E+03	4.2E+02	7.4E+01	1.2E+01	0.0E+00	7.9E+03
2056	7.4E+03	4.2E+02	7.3E+01	1.2E+01	0.0E+00	7.9E+03
2057	7.4E+03	4.2E+02	7.3E+01	1.2E+01	0.0E+00	7.9E+03
2058	7.4E+03	4.1E+02	7.3E+01	1.2E+01	0.0E+00	7.9E+03
2059	7.3E+03	4.1E+02	7.3E+01	1.2E+01	0.0E+00	7.8E+03
2060	7.3E+03	4.1E+02	7.3E+01	1.2E+01	0.0E+00	7.8E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2061	7.3E+03	4.1E+02	7.3E+01	1.2E+01	0.0E+00	7.8E+03
2062	7.3E+03	4.1E+02	7.3E+01	1.2E+01	0.0E+00	7.8E+03
2063	7.3E+03	4.0E+02	7.3E+01	1.2E+01	0.0E+00	7.8E+03
2064	7.3E+03	4.0E+02	7.3E+01	1.2E+01	0.0E+00	7.7E+03
2065	7.2E+03	4.0E+02	7.3E+01	1.2E+01	0.0E+00	7.7E+03
2066	7.2E+03	4.0E+02	7.2E+01	1.2E+01	0.0E+00	7.7E+03
2067	7.2E+03	4.0E+02	7.2E+01	1.1E+01	0.0E+00	7.7E+03
2068	7.2E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.7E+03
2069	7.2E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.6E+03
2070	7.1E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.6E+03
2071	7.1E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.6E+03
2072	7.1E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.6E+03
2073	7.1E+03	3.9E+02	7.2E+01	1.1E+01	0.0E+00	7.6E+03
2074	7.1E+03	3.8E+02	7.2E+01	1.1E+01	0.0E+00	7.5E+03
2075	7.1E+03	3.8E+02	7.2E+01	1.1E+01	0.0E+00	7.5E+03
2076	7.0E+03	3.8E+02	7.2E+01	1.1E+01	0.0E+00	7.5E+03
2077	7.0E+03	3.8E+02	7.1E+01	1.1E+01	0.0E+00	7.5E+03
2078	7.0E+03	3.8E+02	7.1E+01	1.1E+01	0.0E+00	7.5E+03
2079	7.0E+03	3.8E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2080	7.0E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2081	7.0E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2082	6.9E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2083	6.9E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2084	6.9E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.4E+03
2085	6.9E+03	3.7E+02	7.1E+01	1.1E+01	0.0E+00	7.3E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2086	6.9E+03	3.6E+02	7.1E+01	1.1E+01	0.0E+00	7.3E+03
2087	6.9E+03	3.6E+02	7.1E+01	1.1E+01	0.0E+00	7.3E+03
2088	6.8E+03	3.6E+02	7.0E+01	1.1E+01	0.0E+00	7.3E+03
2089	6.8E+03	3.6E+02	7.0E+01	1.1E+01	0.0E+00	7.3E+03
2090	6.8E+03	3.6E+02	7.0E+01	1.1E+01	0.0E+00	7.3E+03
2091	6.8E+03	3.6E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2092	6.8E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2093	6.8E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2094	6.8E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2095	6.7E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2096	6.7E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.2E+03
2097	6.7E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.1E+03
2098	6.7E+03	3.5E+02	7.0E+01	1.1E+01	0.0E+00	7.1E+03
2099	6.7E+03	3.4E+02	7.0E+01	1.1E+01	0.0E+00	7.1E+03
2100	6.7E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.1E+03
2101	6.6E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.1E+03
2102	6.6E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.1E+03
2103	6.6E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2104	6.6E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2105	6.6E+03	3.4E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2106	6.6E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2107	6.6E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2108	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	7.0E+03
2109	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	6.9E+03
2110	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	6.9E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2111	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	6.9E+03
2112	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	6.9E+03
2113	6.5E+03	3.3E+02	6.9E+01	1.1E+01	0.0E+00	6.9E+03
2114	6.5E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.9E+03
2115	6.5E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.9E+03
2116	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2117	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2118	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2119	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2120	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2121	6.4E+03	3.2E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2122	6.4E+03	3.1E+02	6.8E+01	1.1E+01	0.0E+00	6.8E+03
2123	6.4E+03	3.1E+02	6.8E+01	1.1E+01	0.0E+00	6.7E+03
2124	6.3E+03	3.1E+02	6.8E+01	1.1E+01	0.0E+00	6.7E+03
2125	6.3E+03	3.1E+02	6.8E+01	1.0E+01	0.0E+00	6.7E+03
2126	6.3E+03	3.1E+02	6.8E+01	1.0E+01	0.0E+00	6.7E+03
2127	6.3E+03	3.1E+02	6.8E+01	1.0E+01	0.0E+00	6.7E+03
2128	6.3E+03	3.1E+02	6.7E+01	1.0E+01	0.0E+00	6.7E+03
2129	6.3E+03	3.1E+02	6.7E+01	1.0E+01	0.0E+00	6.7E+03
2130	6.3E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2131	6.3E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2132	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2133	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2134	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2135	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

Table 3-4 (Continued)
Belowground PE-Ci Inventory Projections for Area G

Year	Projected Inventory (PE-Ci)					
	Pre-1971 Waste	1971–1988 Waste [a]	1988– FY 2011 Waste [b]	FY 2012–2044 Waste [c]	Retrievably Stored TRU Waste	All Waste
2136	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2137	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.6E+03
2138	6.2E+03	3.0E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2139	6.2E+03	2.9E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2140	6.1E+03	2.9E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2141	6.1E+03	2.9E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2142	6.1E+03	2.9E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2143	6.1E+03	2.9E+02	6.7E+01	1.0E+01	0.0E+00	6.5E+03
2144	6.1E+03	2.9E+02	6.6E+01	1.0E+01	0.0E+00	6.5E+03
2145	6.1E+03	2.9E+02	6.6E+01	1.0E+01	0.0E+00	6.5E+03
2146	6.1E+03	2.9E+02	6.6E+01	1.0E+01	0.0E+00	6.4E+03

[a] *Refers to LLW that was disposed of from the start of 1971 through September 26, 1988.*

[b] *Refers to LLW that was disposed of from September 27, 1988 through September 30, 2011.*

[c] *Refers to waste that is projected to require disposal from October 1, 2011 through 2044.*

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Appendix A
Decay Chain Characteristics and Assumptions Used to Conduct the PE-Ci Inventory Analysis

The radionuclides found in the waste at Area G will undergo radioactive decay over time, resulting in the formation of numerous radioactive decay products. This appendix summarizes the manner in which the decay characteristics were used to estimate the final inventories used in the PE-Ci inventory analysis. Each radionuclide encountered in the inventory data is listed in Table A-1, accompanied by a brief note that discusses its relationship to other radionuclides and how the final activities for the isotope and any daughters were assigned.

Table A-1
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Ac-227	Decays to form several short-lived daughters; included all short-lived daughters at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.
Ac-228	Short-lived daughter of Ra-228; included as such at secular equilibrium; set Ra-228 activity to greater of Ac-228 and Ra-228 activities.
Ag-105	No radioactive decay products.
Ag-108m	Decays to form short-lived Ag-108 and stable Pd-108; included Ag-108 at secular equilibrium.
Ag-110m	Decays to form short-lived Ag-110 and stable Cd-110; included Ag-110 at secular equilibrium.
Ag-111	Daughter of much shorter-lived Pd-111; relationship ignored due to the absence of Pd-111 inventory; no radioactive decay products.
Al-26	No radioactive decay products.
Am-240	Decays to form long-lived Pu-240 almost 100 percent of the time, and Np-236 1.9×10^{-4} percent of the time; decay calculations account for ingrowth of Pu-240, ignoring Np-236.
Am-241	Decays to form long-lived Np-237; decay calculations account for ingrowth of daughter.
Am-242	Decays to form short-lived Cm-242 and long-lived Pu-242; decay calculations account for ingrowth of daughters.
Am-243	Decays to form short-lived Np-239 and long-lived Pu-239; included Np-239 at secular equilibrium; decay calculations account for ingrowth of Pu-239.
As-72	Short-lived daughter of Se-72; included as such at secular equilibrium; set Se-72 activity to greater of Se-72 and As-72 activities.
As-73	No radioactive decay products.
As-74	No radioactive decay products.
Au-194	Short-lived daughter of Hg-194; included as such at secular equilibrium; set Hg-194 activity to the Au-194 activity because no activity was listed for Hg-194.
Au-195	Daughter of much shorter-lived Hg-195m; relationship ignored due to the absence of Hg-195m inventory; no radioactive decay products.
Ba-133	Daughter of much shorter-lived Ba-133m; relationship ignored due to the absence of Ba-133m inventory; no radioactive decay products.
Ba-137m	Short-lived daughter of Cs-137; included as such at secular equilibrium; set Cs-137 activity to greater of Ba-137m and Cs-137 activities.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Ba-139	Daughter of much shorter-lived Ce-139; relationship ignored due to the absence of Ce-139 inventory; no radioactive decay products.
Ba-140	Daughter of much shorter-lived Cs-140; relationship ignored due to the absence of Cs-140 inventory; decays to form short-lived La-140; included La-140 at secular equilibrium; set Ba-140 activity to greater of Ba-140 and La-140 activities.
Be-7	No radioactive decay products.
Be-10	No radioactive decay products.
Bi-207	Daughter of much shorter-lived At-211; relationship ignored due to the absence of At-211 inventory; no radioactive decay products.
Bi-210	Short-lived daughter of Pb-210; included as such at secular equilibrium; set Pb-210 activity to greater of Bi-210 and Pb-210 activities.
Bi-211	Short-lived daughter of Ac-227; included as such at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.
Bi-212	Short-lived daughter of Th-228; included as such at secular equilibrium; set Th-228 activity to greater of Th-228 and daughters' activities.
Bi-214	Short-lived daughter of Ra-226; included as such at secular equilibrium; set Ra-226 activity to greater of Ra-226 and daughters' activities.
Bk-247	Decays to form long-lived Am-243; decay calculations account for ingrowth of daughter.
Bk-249	Decays to form long-lived Cf-249; decay calculations account for ingrowth of daughter.
Br-76	Daughter of Kr-76; relationship ignored because of gaseous state of parent; no radioactive decay products.
Br-77	No radioactive decay products.
Br-82	Daughter of much shorter-lived Br-82m; relationship ignored due to the absence of Br-82m inventory; no radioactive decay products.
C-14	No radioactive decay products.
Ca-41	No radioactive decay products.
Ca-45	No radioactive decay products.
Cd-109	Decays to form short-lived Ag-109m; included Ag-109m at secular equilibrium.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Cd-115	Daughter of much shorter-lived Ag-115; relationship ignored due to the absence of Ag-115 inventory; decays to form short-lived In-115m which yields In-115; included In-115m at secular equilibrium; decay calculations account for ingrowth of In-115.
Ce-137	Short-lived daughter of Ce-137m; included as such at secular equilibrium; set Ce-137m activity to the Ce-137 activity because no activity was listed for Ce-137m. Ce-137m decays to form long-lived La-137; decay calculations account for ingrowth of La-137.
Ce-139	No radioactive decay products.
Ce-141	No radioactive decay products.
Ce-144	Decays to form short-lived Pr-144 and Pr-144m; included these daughters at secular equilibrium.
Cf-249	Decays to form long-lived Cm-245; decay calculations account for ingrowth of daughter.
Cf-251	Decays to form long-lived Cm-247; decay calculations account for ingrowth of daughter.
Cf-252	Decays to form long-lived Cm-248; decay calculations account for ingrowth of daughter.
Cl-36	No radioactive decay products.
Cm-242	Decays to form long-lived Pu-238; decay calculations account for ingrowth of daughter.
Cm-243	Decays to form long-lived Pu-239; decay calculations account for ingrowth of daughter.
Cm-244	Decays to form long-lived Pu-240; decay calculations account for ingrowth of daughter.
Cm-245	Decays to form long-lived Pu-241; decay calculations account for ingrowth of daughter.
Cm-248	Decays to form long-lived Pu-244; decay calculations account for ingrowth of daughter.
Co-56	No radioactive decay products.
Co-57	No radioactive decay products.
Co-58	No radioactive decay products.
Co-60	No radioactive decay products.
Cr-51	Daughter of much shorter-lived Mn-51; relationship ignored due to the absence of Mn-51 inventory; no radioactive decay products.
Cs-134	No radioactive decay products.
Cs-135	Daughter of much shorter-lived Xe-135; relationship ignored due to the absence of Xe-135 inventory; no radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Cs-136	No radioactive decay products.
Cs-137	Decays to form short-lived Ba-137m; included Ba-137m at secular equilibrium; set Cs-137 activity to greater of Cs-137 and Ba-137m activities.
Cu-67	No radioactive decay products.
Dy-159	No radioactive decay products.
Dy-166	Decays to form short-lived Ho-166; included Ho-166 at secular equilibrium; set Dy-166 activity to greater of Dy-166 and Ho-166 activities.
Eu-149	No radioactive decay products.
Eu-152	Decays to form long-lived Gd-152 and stable Sm-152; decay calculations account for ingrowth of Gd-152.
Eu-154	No radioactive decay products.
Eu-155	No radioactive decay products.
Eu-156	No radioactive decay products.
Eu-158	No radioactive decay products.
Fe-52	Decays to form short-lived Mn-52m; included Mn-52m at secular equilibrium; set Fe-52 activity to greater of Fe-52 and Mn-52m activities.
Fe-55	No radioactive decay products.
Fe-59	No radioactive decay products.
Ga-68	Short-lived daughter of Ge-68; included as such at secular equilibrium; set Ge-68 activity to greater of Ge-68 and Ga-68 activities.
Gd-146	Decays to form short-lived Eu-146; included Eu-146 at secular equilibrium.
Gd-148	No radioactive decay products.
Gd-151	Decays to form long-lived Sm-147 and stable Eu-151; decay calculations account for ingrowth of Sm-147.
Gd-153	No radioactive decay products.
Ge-68	Decays to form short-lived Ga-68; included Ga-68 at secular equilibrium; set Ge-68 activity to greater of Ge-68 and Ga-68 activities.
H-3	No radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Hf-172	Decays to form short-lived Lu-172m and Lu-172; set Hf-172 activity to greater of Hf-172, Lu-172, and Lu-172m activities; included Lu-172m and Lu-172 at secular equilibrium.
Hf-175	No radioactive decay products.
Hf-178m	No radioactive decay products.
Hf-178n	No radioactive decay products.
Hf-181	No radioactive decay products.
Hg-203	No radioactive decay products.
Ho-163	No radioactive decay products.
Ho-166	Short-lived daughter of Dy-166; included as such at secular equilibrium; set Dy-166 activity to greater of Dy-166 and Ho-166 activities; no radioactive decay products.
Ho-166m	No radioactive decay products.
I-125	Daughter of much shorter-lived Xe-125; relationship ignored due to the absence of Xe-125 inventory; no radioactive decay products.
I-129	Daughter of much shorter-lived Te-129; relationship ignored due to the absence of Te-129 inventory; no radioactive decay products.
I-131	Daughter of much shorter-lived Te-125; relationship ignored due to the absence of Te-125 inventory; decays to form short-lived Xe-131m and stable Xe-131; included Xe-131m at secular equilibrium.
I-133	Daughter of much shorter-lived Te-133 and Te-133m; relationships ignored due to the absence of Te-133 and Te-133m inventories; decays to form short-lived Xe-133 and Xe-133m; decay calculations account for ingrowth of daughters.
In-114m	Decays to form short-lived In-114 and stable Cd-114; included In-114 at secular equilibrium.
In-115m	Short-lived daughter of Cd-115; included as such in secular equilibrium; set Cd-115 activity to greater of Cd-115 and In-115m activities.
Ir-192	Daughter of much shorter-lived Ir-192m; relationship ignored due to the absence of Ir-192m inventory; no radioactive decay products.
Ir-194	Short-lived daughter of Os-194; included as such at secular equilibrium; set Os-194 activity to greater of Os-194 and Ir-194 activities; no radioactive decay products.
K-40	No radioactive decay products.
Kr-85	No radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
La-140	Short-lived daughter of Ba-140; included as such at secular equilibrium; set Ba-140 activity to greater of Ba-140 and La-140 activities; no radioactive decay products.
Lu-172	Short-lived daughter of Hf-172; included as such at secular equilibrium; set Hf-172 activity to greater of Hf-172, Lu-172, and Lu-172m activities; no radioactive decay products.
Lu-172m	Short-lived daughter of Hf-172; included as such at secular equilibrium; set Hf-172 activity to greater of Hf-172, Lu-172, and Lu-172m activities; no radioactive decay products.
Lu-173	No radioactive decay products.
Lu-174	No radioactive decay products.
Lu-176	No radioactive decay products.
Lu-177	No radioactive decay products.
Mn-52	No radioactive decay products.
Mn-52m	Included as short-lived daughter of Fe-52, in secular equilibrium; set Fe-52 activity to greater of Fe-52 and Mn-52m activities.
Mn-54	No radioactive decay products.
Mn-56	No radioactive decay products.
Mo-93	Decays to form long-lived Nb-93m; decay calculations account for ingrowth of daughter.
Mo-99	Daughter of much shorter-lived Nb-99; relationship ignored due to the absence of Nb-99 inventory; decays to form long-lived Tc-99 and short-lived Tc-99m; included Tc-99m at secular equilibrium; set Mo-99 activity to greater of Mo-99 and Tc-99m activities; decay calculations account for ingrowth of Tc-99.
Na-22	No radioactive decay products.
Na-24	No radioactive decay products.
Nb-91	No radioactive decay products.
Nb-91m	Decays to form long-lived Nb-91 and stable Zr-91; decay calculations account for ingrowth of Nb-91.
Nb-92	No radioactive decay products.
Nb-92m	No radioactive decay products.
Nb-93	Radionuclide was ignored because it is a stable isotope.
Nb-93m	No radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Nb-94	No radioactive decay products.
Nb-95	No radioactive decay products.
Nd-144	No radioactive decay products.
Nd-147	Decays to form longer-lived Pm-147; decay calculations account for ingrowth of Pm-147.
Ni-56	Decays to form longer-lived Co-56; decay calculations account for ingrowth of Co-56.
Ni-57	Decays to form longer-lived Co-57; decay calculations account for ingrowth of Co-57.
Ni-59	No radioactive decay products.
Ni-63	No radioactive decay products.
Ni-65	No radioactive decay products.
Np-235	Decays to form long-lived U-235; decay calculations account for ingrowth of daughter.
Np-237	Decays to form short-lived Pa-233 and long-lived U-233; included Pa-233 at secular equilibrium; set Np-237 activity to greater of Np-237 and Pa-233 activities; decay calculations account for ingrowth of U-233.
Np-239	Short-lived daughter of Am-243 and U-239; included as such at secular equilibrium.
Np-242	Decays to form long-lived Pu-242; decay calculations account for ingrowth of daughter.
Os-194	Decays to form short-lived Ir-194; included Ir-194 at secular equilibrium; set Os-194 activity to greater of Os-194 and Ir-194 activities.
P-32	Short-lived daughter of Si-32; included as such at secular equilibrium; set Si-32 activity to greater of Si-32 and P-32 activities.
P-33	No radioactive decay products.
Pa-231	Decays to form long-lived Ac-227; decay calculations account for ingrowth of daughter.
Pa-233	Short-lived daughter of Np-237; included as such at secular equilibrium; set Np-237 activity to greater of Np-237 and Pa-233 activities.
Pa-234	Short-lived daughter of U-238; included as such at secular equilibrium; set U-238 activity to greater of U-238 and daughters' activities.
Pa-234m	Short-lived daughter of U-238; included as such at secular equilibrium; set U-238 activity to greater of U-238 and daughters' activities.
Pb-203	Daughter of much shorter-lived Bi-203; relationship ignored due to the absence of Bi-203 inventory; no radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Pb-210	Decays to form short-lived Bi-210 and Po-210; included daughters at secular equilibrium; set Pb-210 activity to greater of Pb-210 and daughter activities.
Pb-211	Short-lived daughter of Ac-227; included as such at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.
Pb-212	Short-lived daughter of Th-228; included as such at secular equilibrium; set Th-228 activity to greater of Th-228 and daughters' activities.
Pb-214	Short-lived daughter of Ra-226; included as such at secular equilibrium; set Ra-226 activity to greater of Ra-226 and daughters' activities.
Pm-143	No radioactive decay products.
Pm-145	No radioactive decay products.
Pm-147	Decays to form long-lived Sm-147; decay calculations account for ingrowth of daughter.
Po-208	Decays to form long-lived Pb-204 and Bi-208; decay calculations account for ingrowth of daughters.
Po-209	Decays to form long-lived Pb-205 and stable Bi-209; decay calculations account for ingrowth of daughter.
Po-210	Short-lived daughter of Pb-210; included as such at secular equilibrium; set Pb-210 activity to greater of Pb-210 and Po-210 activities.
Pu-233	Decays to form short-lived Np-233 and U-229 and long-lived U-233; included short-lived daughters at secular equilibrium; decay calculations account for ingrowth of U-233.
Pu-234	Decays to form short-lived Np-234 and U-230; Np-234 decays to form long-lived U-234 while U-230 decays to form several short-lived daughters leading to Pb-210; included short-lived daughters at secular equilibrium; decay calculations account for ingrowth of U-233.
Pu-236	Decays to form long-lived U-232; decay calculations account for ingrowth of daughter.
Pu-238	Decays to form long-lived U-234; decay calculations account for ingrowth of daughter.
Pu-239	Decays to form long-lived U-235; decay calculations account for ingrowth of daughter.
Pu-240	Decays to form long-lived U-236; decay calculations account for ingrowth of daughter.
Pu-241	Decays to form long-lived Am-241; decay calculations account for ingrowth of daughter.
Pu-242	Decays to form long-lived U-238; decay calculations account for ingrowth of daughter.
Pu-244	Decays to form short-lived U-240, Np-240, and Np-240m and long-lived Pu-240; included short-lived daughters at secular equilibrium; decay calculations account for ingrowth of Pu-240.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Ra-223	Short-lived daughter of Ac-227; included as such at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.
Ra-224	Short-lived daughter of Th-228; included as such at secular equilibrium; set Th-228 activity to greater of Th-228 and daughters' activities.
Ra-226	Decays to form several short-lived daughters and long-lived Pb-210; included all short-lived daughters at secular equilibrium; set Ra-226 activity to greater of Ra-226 and daughters' activities; decay calculations account for ingrowth of Pb-210.
Ra-228	Decays to form short-lived Ac-228 and long-lived Th-228; included Ac-228 at secular equilibrium; set Ra-228 activity to greater of Ra-228 and Ac-228 activities; decay calculations account for ingrowth of Th-228.
Rb-82	Short-lived daughter of Sr-82; included as such at secular equilibrium; set Sr-82 activity to greater of Sr-82 and Rb-82 activities.
Rb-83	Daughter of much shorter-lived Sr-83; relationship ignored due to the absence of Sr-83 inventory; decays to form short-lived Kr-83m and stable Kr-83; included Kr-83m at secular equilibrium.
Rb-84	No radioactive decay products.
Rb-86	No radioactive decay products.
Re-183	Daughter of much shorter-lived Os-183; relationship ignored due to the absence of Os-183 inventory; no radioactive decay products.
Re-184	No radioactive decay products.
Re-184m	Decays to form short-lived Re-184; include Re-184 at secular equilibrium.
Re-188	Short-lived daughter of W-188; included as such at secular equilibrium; set W-188 activity to greater of W-188 and Re-188 activities.
Rh-97	Decays to form short-lived Ru-97; included Ru-97 at secular equilibrium.
Rh-99	No radioactive decay products.
Rh-101	No radioactive decay products.
Rh-102	No radioactive decay products.
Rh-102m	Decays to form short-lived Rh-102 and stable Ru-102; included Rh-102 at secular equilibrium.
Rh-106	Short-lived daughter of Ru-106; included as such at secular equilibrium; set Ru-106 activity to greater of Ru-106 and Rh-106 activities.
Rn-219	Short-lived daughter of Ac-227; included as such at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Ru-103	Decays to form short-lived Rh-103m and stable Ru-103; included Rh-103m at secular equilibrium.
Ru-106	Decays to form short-lived Rh-106 and Rh-106m; included daughters at secular equilibrium.
S-35	No radioactive decay products.
Sb-124	No radioactive decay products.
Sb-125	Daughter of much shorter-lived Sn-125; relationship ignored due to the absence of Sn-125 inventory; decays to form short-lived Te-125m and stable Te-125; included Te-125m at secular equilibrium; set Sb-125 activity to greater of Sb-125 and Te-125m activities.
Sb-126	No radioactive decay products.
Sc-43	No radioactive decay products.
Sc-44	Short-lived daughter of Ti-44; included as such at secular equilibrium; set Ti-44 activity to greater of Ti-44 and Sc-44 activities; no radioactive decay products.
Sc-46	No radioactive decay products.
Sc-48	No radioactive decay products.
Se-72	Decays to form short-lived As-72; included As-72 at secular equilibrium; set Se-72 activity to greater of Se-72 and As-72 activities.
Se-73	Decays to form As-73; decay calculations account for ingrowth of daughter.
Se-75	No radioactive decay products.
Si-32	Decays to form short-lived P-32; included P-32 at secular equilibrium; set Si-32 activity to greater of Si-32 and P-32 activities.
Sm-145	Decays to form long-lived Pm-145; decay calculations account for ingrowth of daughter.
Sm-151	No radioactive decay products.
Sn-113	Decays to form short-lived In-113m; included In-113m at secular equilibrium.
Sn-119m	No radioactive decay products.
Sn-121	No radioactive decay products.
Sn-121m	Decays to form short-lived Sn-121 and stable Sb-121; included Sn-121 at secular equilibrium.
Sn-123	No radioactive decay products.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Sn-126	Decays to form short-lived Sb-126m which yields Sb-126 and stable Te-126; included Sb-126 and Sb-126m at secular equilibrium.
Sr-82	Daughter of much shorter-lived Y-82; relationship ignored due to the absence of Y-82 inventory; decays to form short-lived Rb-82; included Rb-82 at secular equilibrium; set Sr-82 activity to greater of Sr-82 and Rb-82 activities.
Sr-85	Daughter of much shorter-lived Y-85; relationship ignored due to the absence of Y-85 inventory; no radioactive decay products.
Sr-89	Daughter of much shorter-lived Rb-89; relationship ignored due to the absence of Rb-89 inventory; decays to form short-lived Yb-89m and stable Yb-89; included Y-89m at secular equilibrium.
Sr-90	Decays to form short-lived Y-90; included Y-90 at secular equilibrium; set Sr-90 activity to greater of Sr-90 and Y-90 activities.
Ta-179	No radioactive decay products.
Ta-182	No radioactive decay products.
Ta-183	Decays to form short-lived W-183m and stable W-183; included W-183m at secular equilibrium.
Tb-157	Daughter of much shorter-lived Dy-157; relationship ignored due to the absence of Dy-157 inventory; no radioactive decay products.
Tb-160	No radioactive decay products.
Tc-95	No radioactive decay products.
Tc-95m	Decays to form short-lived Tc-95; included Tc-95 at secular equilibrium.
Tc-97	Daughter of much shorter-lived Tc-97m; relationship ignored due to the absence of Tc-97m inventory; no radioactive decay products.
Tc-99	No radioactive decay products.
Tc-99m	Short-lived daughter of Mo-99; included as such at secular equilibrium; set Mo-99 activity to greater of Mo-99 and Tc-99m activities; decays to form long-lived Tc-99; decay calculations account for ingrowth of Tc-99.
Te-125m	Short-lived daughter of Sb-125; included as such at secular equilibrium; set Sb-125 activity to greater of Sb-125 and Te-125m activities; no radioactive decay products.
Te-129m	Decays to form short-lived Te-129 and long-lived I-129; included Te-129 at secular equilibrium; decay calculations account for ingrowth of I-129.
Th-227	Short-lived daughter of Ac-227; included as such at secular equilibrium; set Ac-227 activity to greater of Ac-227 and daughters' activities.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
Th-228	Decays to form several short-lived daughters; included all short-lived daughters at secular equilibrium; set Th-228 activity to greater of Th-228 and daughters' activities.
Th-229	Decays to form several short-lived daughters; included all short-lived daughters at secular equilibrium; set Th-229 activity to greater of Th-229 and daughters' activities.
Th-230	Decays to form long-lived Ra-226; decay calculations account for ingrowth of daughter.
Th-231	Short-lived daughter of U-235; included as such at secular equilibrium; set U-235 activity to greater of U-235 and daughters' activities.
Th-232	Decays to form long-lived Ra-228; decay calculations account for ingrowth of daughter.
Th-234	Short-lived daughter of U-238; included as such at secular equilibrium; set U-238 activity to greater of U-238 and daughters' activities.
Ti-44	Decays to form short-lived Sc-44; included Sc-44 at secular equilibrium; set Ti-44 activity to greater of Ti-44 and Sc-44 activities.
Tl-204	No radioactive decay products.
Tl-208	Short-lived daughter of Th-228; included as such at secular equilibrium; set Th-228 activity to greater of Th-228 and daughters' activities.
Tm-170	No radioactive decay products.
Tm-171	Daughter of much shorter-lived Er-171; relationship ignored due to the absence of Er-171 inventory; no radioactive decay products.
U-232	Decays to form long-lived Th-228; decay calculations account for ingrowth of daughter.
U-233	Decays to form long-lived Th-229; decay calculations account for ingrowth of daughter.
U-234	Decays to form long-lived Th-230; decay calculations account for ingrowth of daughter.
U-235	Decays to form short-lived Th-231 and long-lived Pa-231; included Th-231 at secular equilibrium; decay calculations account for ingrowth of Pa-231.
U-236	Decays to form long-lived Th-232; decay calculations account for ingrowth of daughter.
U-237	Decays to form long-lived Np-237; decay calculations account for ingrowth of daughter.
U-238	Decays to form short-lived Th-234, Pa-234, and Pa-234m and long-lived U-234; included short-lived daughters at secular equilibrium; set U-238 activity to greater of U-238 and daughters' activities; no radioactive decay products; decay calculations account for ingrowth of U-234.
U-239	Decays to form short-lived Np-239 and long-lived Pu-239; included Np-239 at secular equilibrium; set U-239 activity to greater of U-239 and Np-239 activities; decay calculations account for ingrowth of Pu-239.

Table A-1 (Continued)
Decay Chain Characteristics and Assumptions Used to Define Radionuclide-Specific Inventories for the PE-Ci Inventory Analysis

Radionuclide	Decay Chain Characteristics and Assumptions
V-48	No radioactive decay products.
V-49	No radioactive decay products.
V-52	No radioactive decay products.
W-181	Daughter of much shorter-lived Re-181; relationship ignored due to the absence of Re-181 inventory; no radioactive decay products.
W-185	No radioactive decay products.
Xe-133	Daughter of much shorter-lived I-133; relationship ignored due to the absence of I-133 inventory; no radioactive decay products.
Y-88	Short-lived daughter of Zr-88; included as such in secular equilibrium; set Zr-88 activity to greater of Zr-88 and Y-88 activities; no radioactive decay products.
Y-90	Short-lived daughter of Sr-90; included as such in secular equilibrium; set Sr-90 activity to greater of Sr-90 and Y-90 activities; no radioactive decay products.
Y-91	Daughter of much shorter-lived Sr-91/Kr-91; relationship ignored due to the absence of Sr-91/Kr-91 inventory; no radioactive decay products.
Yb-169	Daughter of much shorter-lived Lu-169; relationship ignored due to the absence of Lu-169 inventory; no radioactive decay products.
Zn-65	Daughter of much shorter-lived Ga-65; relationship ignored due to the absence of Ga-65 inventory; no radioactive decay products.
Zn-69m	Decays to form short-lived Zn-69 which yields stable Ga-69; included Zn-69 at secular equilibrium.
Zn-72	Decays to form short-lived Ga-72; included Ga-72 at secular equilibrium.
Zr-88	Decays to form short-lived Y-88; included Zn-69 at secular equilibrium; set Zr-88 activity to greater of Zr-88 and Y-88 activities
Zr-93	Decays to form long-lived Nb-93m; decay calculations account for ingrowth of daughter.
Zr-95	Decays to form short-lived Nb-95 and Nb-95m; included daughters at secular equilibrium.