OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT CALCULATION COVER SHEET

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Page: 1 Of: 21

2. Calculation Title
Radionuclide Inventories for DOE SNF Waste Stream and Uranium/Thorium Carbide Fuels

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1. PURPOSE

The objective of this calculation is to generate radionuclide inventories for the Department of Energy (DOE) spent nuclear fuel (SNF) waste stream destined for disposal at the potential repository at Yucca Mountain. The scope of this calculation is limited to the calculation of two radionuclide inventories; one for all uranium/thorium carbide fuels in the waste stream and one for the entire waste stream. These inventories will provide input in future screening calculations to be performed by Performance Assessment to determine important radionuclides. This calculation is performed according to the AP-3.12Q/Rev. 00/ICN 0 procedure, *Calculations*.

2. METHOD

The ORIGEN-S module of SCALE 4.3 (Civilian Radioactive Waste Management System [CRWMS] Management and Operating Contractor [M&O] 1997) is used to calculate the radionuclide inventories as a function of time for all the DOE SNF and the uranium/thorium carbide fuels destined for disposal at the potential repository. The ORIGEN-S module performs a decay calculation using input radionuclide activities and specified decay times.

3. ASSUMPTIONS

There are no assumptions made in this calculation.

4. USE OF COMPUTER SOFTWARE AND MODELS

4.1 SOFTWARE APPROVED FOR QUALITY ASSURANCE (QA) WORK

4.1.1 SCALE

- Software name: SCALE
- Software version/revision number: Version 4.3
- Computer Software Configuration Item (CSCI): 30011 V4.3 (CRWMS M&O 1997)
- Computer type: Hewlett Packard (HP) 9000 Series workstation "Bloom" (CRWMS M&O Tag number 700887).

This software was previously obtained from the Software Configuration Management in accordance with the appropriate procedures. The ORIGEN-S module of the SCALE code system is used to calculate decay of the radionuclide inventories for the DOE SNF and uranium/thorium carbide fuels. This software is appropriate for this application and has been used within the range of its validation.

4.2 SOFTWARE ROUTINES

4.2.1 Excel

The commercially available Excel spreadsheet program (version/revision: Microsoft Excel 97) is

used to add the radionuclide inventories for the DOE SNF and the uranium/thorium carbide fuels before the values are entered into ORIGEN-S. It is also used to organize the radionuclide inventory information taken from the ORIGEN-S output file. These calculations are discussed in sufficient detail in Section 5 to allow for independent repetition of the computations. No additional calculations were performed.

4.3 MODELS

No models are used in this calculation.

5. CALCULATION

As stated in Section 1, the purpose of this calculation is to generate radionuclide inventories for the entire DOE SNF waste stream and the uranium/thorium carbide fuels in that waste stream. The inputs required for this calculation are the radionuclide inventories for all DOE SNF. These inventories are decayed to the desired time by the ORIGEN-S code. This inventory information is taken from National Spent Nuclear Fuel Program (INEEL 1999).

INEEL 1999 is a compact disk (CD) that contains the Excel spreadsheet **dbefeb99.xls**. This spreadsheet provides DOE SNF radionuclide inventories for the calendar year 2010 in the worksheet '**DBE2010**.' Each fuel type has one record, or line of information, that lists the radionuclide inventories in curies for that fuel. For the entire DOE SNF waste stream, these inventories are simply added together to obtain the total for each radionuclide. The uranium/thorium carbide fuels are then selected from the waste stream, shown as '**THC2-UC2**,' '**THCO-UCO**,' and '**THC-UC**' under the heading '**compound**.' There are seven records in INEEL 1999 that are uranium/thorium carbide fuels from three sites: Fort St. Vrain, General Atomic High Temperature Gas Cooled Reactor (GA HTGR) and Peach Bottom I. These seven records are used to determine the total inventory in curies for the uranium/thorium carbide fuels. The inventories entered into ORIGEN-S are shown in Table 1.

Table 1. DOE SNF and Uranium/Thorium Carbide Inventories at 2010

Nuclide	ORIGEN-S Identifier	U/Th Carbide Initial Inventory (Ci)	Initial Inventory for all DOE SNF (Ci)
Ac227	892270	4.811E-01	3.666E+01
Am241	952410	2.172E+03	1.450E+06
Am242m	952421	5.719E-01	1.613E+03
Am243	952430	1.441E+01	2.027E+03
C14	60140	1.121E+02	1.031E+03
Cd113m	481131	8.764E+00	3.934E+03
Cl36	170360	1.446E+00	4.100E+00
Cm242	962420	4.453E+01	5.180E+02
Cm243	962430	3.094E+00	8.335E+02
Cm244	962440	7.308E+02	9.624E+04
Cm245	962450	1.975E-01	2.002E+01
Cm246	962460	4.379E-02	3.721E+00
Cm247	962470	1.413E-07	5.912E-06
Co60	270600	9.581E+01	2.100E+05
Cs134	551340	3.008E+03	4.106E+05
Cs135	551350	1.021E+01	3.913E+02
Cs137	551370	1.735E+06	4.602E+07
Eu154	631540	1.447E+03	2.486E+05
Eu155	631550	1.009E+02	6.619E+04
Fe55	260550	7.954E-02	1.048E+05
H3	10030	3.579E+03	9.198E+04
I129	531290	1.096E+00	2.108E+01
Kr85	360850	1.092E+05	1.913E+06
Nb93m	410931	8.832E+00	1.427E+03
Nb94	410940	1.046E-01	4.055E+01
Ni59	280590	8.817E+00	4.239E+02
Ni63	280630	2.459E+02	1.244E+05
Np237	932370	8.898E+00	1.671E+02
Pa231	912310	9.687E+00	6.863E+01
Pb210	822100	1.359E-03	4.768E-03
Pd107	461070	4.735E-01	3.660E+01
Pm147	611470	3.109E+01	4.275E+06
Pu238	942380	5.146E+04	5.886E+05
Pu239	942390	1.413E+02	6.533E+05
Pu240	942400	2.149E+02	5.260E+05
Pu241	942410	4.847E+03	1.684E+07
Pu242	942420	3.397E-01	2.784E+02
Ra226	882260	1.540E-03	8.289E-03
Ra228	882280	3.309E+00	8.514E+00
Ru106	441060	1.198E+00	8.039E+04

Table 1. DOE SNF and Uranium/Thorium Carbide Inventories at 2010 (Continued)

Nuclide	ORIGEN-S Identifier	U/Th Carbide Initial Inventory (Ci)	Initial Inventory for all DOE SNF (Ci)
Sb125	511250	5.726E+02	4.962E+04
Se79	340790	1.583E+01	3.481E+02
Sm147	621470	3.015E+00	3.018E+00
Sm151	621510	2.754E+04	9.128E+05
Sn126	501260	7.950E+00	4.616E+02
Sr90	380900	1.644E+06	3.596E+07
Tc99	430990	4.000E+02	9.388E+03
Th229	902290	8.759E+00	2.541E+01
Th230	902300	5.878E-01	9.751E-01
Th232	902320	2.729E+00	7.363E+00
U232	922320	1.431E+03	1.444E+04
U233	922330	3.682E+03	9.241E+03
U234	922340	3.157E+02	1.604E+03
U235	922350	1.492E+00	8.177E+01
U236	922360	1.198E+01	2.607E+02
U238	922380	3.150E-02	7.772E+02
Zr93	400930	5.458E+02	1.753E+03

As previously stated, the initial inventories from INEEL 1999 are for the year 2010. ORIGEN-S is used to decay these inventories to the following years: 2010, 2133, 2233, 2333, 2433, 2533, 3033, 4033, 7033, 12033, 12033, 22033, 32033, 102033, 302033, and 1002033. The ORIGEN-S input files are provided in Attachments I and II.

6. RESULTS

This document may be affected by technical product input information that requires confirmation. Any changes to the document that may occur as a result of completing the confirmation activities will be reflected in subsequent revisions. The status of the input information quality may be confirmed by review of the Document Input Reference System (DIRS) database.

The status of the inputs for this calculation is shown in Attachment III. The inventory in curies for the entire DOE SNF waste stream is provided in Tables 2 through 4. The inventory in curies for all uranium/thorium carbide fuels is shown in Tables 5 through 7.

Table 2. Total DOE SNF Radionuclide Inventory for the Years 2010 to 2433

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Ac225	1.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Ac227	3.68E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Ac228	8.50E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Am241	1.45E+06	1.66E+06	1.42E+06	1.21E+06	1.03E+06
Am242	1.61E+03	8.77E+02	5.37E+02	3.28E+02	2.01E+02
Am242m	1.61E+03	8.81E+02	5.39E+02	3.30E+02	2.02E+02
Am243	2.03E+03	2.00E+03	1.98E+03	1.97E+03	1.95E+03
At217	1.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Ba137m	4.34E+07	2.53E+06	2.51E+05	2.49E+04	2.47E+03
Bi210	4.74E-03	7.56E-02	2.07E-01	4.01E-01	6.56E-01
Bi211	1.88E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Bi212	4.41E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Bi213	1.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Bi214	8.31E-03	1.08E-01	2.59E-01	4.73E-01	7.48E-01
C 14	1.03E+03	1.02E+03	1.00E+03	9.91E+02	9.79E+02
Cd113m	3.91E+03	9.31E+00	6.82E-02	5.00E-04	3.66E-06
Cl 36	4.10E+00	4.10E+00	4.10E+00	4.10E+00	4.10E+00
Cm242	6.29E+02	7.26E+02	4.44E+02	2.71E+02	1.66E+02
Cm243	8.32E+02	4.18E+01	3.68E+00	3.23E-01	2.84E-02
Cm244	9.59E+04	8.66E+02	1.88E+01	4.08E-01	8.87E-03
Cm245	2.00E+01	1.98E+01	1.97E+01	1.95E+01	1.93E+01
Cm246	3.72E+00	3.65E+00	3.60E+00	3.55E+00	3.50E+00
Cm247	5.91E-06	5.91E-06	5.91E-06	5.91E-06	5.91E-06
Co 60	2.07E+05	1.97E-02	3.82E-08	7.41E-14	1.43E-19
Cs134	3.97E+05	4.52E-13	1.13E-27	0.00E+00	0.00E+00
Cs135	3.91E+02	3.91E+02	3.91E+02	3.91E+02	3.91E+02
Cs137	4.59E+07	2.68E+06	2.66E+05	2.64E+04	2.62E+03
Eu154	2.47E+05	1.22E+01	3.81E-03	1.19E-06	3.73E-10
Eu155	6.52E+04	8.11E-04	3.00E-10	1.11E-16	4.09E-23
Fe 55	1.02E+05	2.86E-09	2.68E-20	2.51E-31	0.00E+00
Fr221	1.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Fr223	5.07E-01	9.39E-01	9.48E-01	9.48E-01	9.49E-01
H 3	9.15E+04	9.13E+01	3.30E-01	1.19E-03	4.32E-06
I129	2.11E+01	2.11E+01	2.11E+01	2.11E+01	2.11E+01
Kr 85	1.90E+06	6.72E+02	1.04E+00	1.62E-03	2.53E-06
Nb 93m	1.43E+03	1.75E+03	1.75E+03	1.75E+03	1.75E+03

Table 2. Total DOE SNF Radionuclide Inventory for the Years 2010 to 2433 (Continued)

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Nb 94	4.06E+01	4.04E+01	4.02E+01	4.01E+01	4.00E+01
Ni 59	4.24E+02	4.23E+02	4.23E+02	4.23E+02	4.22E+02
Ni 63	1.24E+05	5.31E+04	2.65E+04	1.33E+04	6.64E+03
Np237	1.67E+02	2.37E+02	2.86E+02	3.29E+02	3.65E+02
Np238	7.26E+00	3.97E+00	2.43E+00	1.48E+00	9.08E-01
Np239	2.03E+03	2.00E+03	1.98E+03	1.97E+03	1.95E+03
Pa231	6.86E+01	6.87E+01	6.87E+01	6.87E+01	6.88E+01
Pa233	1.02E+02	2.37E+02	2.86E+02	3.29E+02	3.65E+02
Pa234	6.57E-01	1.01E+00	1.01E+00	1.01E+00	1.01E+00
Pa234m	5.05E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Pb209	1.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Pb210	4.77E-03	7.56E-02	2.07E-01	4.01E-01	6.56E-01
Pb211	1.88E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Pb212	4.41E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Pb214	8.31E-03	1.08E-01	2.59E-01	4.73E-01	7.48E-01
Pd107	3.66E+01	3.66E+01	3.66E+01	3.66E+01	3.66E+01
Pm147	4.16E+06	3.28E-08	1.10E-19	3.65E-31	0.00E+00
Po210	6.49E-04	7.56E-02	2.07E-01	4.01E-01	6.56E-01
Po211	5.17E-02	1.87E-01	1.89E-01	1.89E-01	1.89E-01
Po212	2.82E+02	2.81E+03	1.04E+03	3.89E+02	1.47E+02
Po213	1.52E+01	1.22E+02	2.00E+02	2.77E+02	3.54E+02
Po214	8.31E-03	1.07E-01	2.59E-01	4.73E-01	7.48E-01
Po215	1.88E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Po216	4.41E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Po218	8.31E-03	1.08E-01	2.59E-01	4.73E-01	7.48E-01
Pu238	5.88E+05	2.23E+05	1.02E+05	4.63E+04	2.11E+04
Pu239	6.53E+05	6.51E+05	6.49E+05	6.47E+05	6.45E+05
Pu240	5.26E+05	5.19E+05	5.14E+05	5.09E+05	5.03E+05
Pu241	1.68E+07	4.42E+04	3.72E+02	2.23E+01	1.94E+01
Pu242	2.78E+02	2.78E+02	2.78E+02	2.78E+02	2.78E+02
Pu243	5.91E-06	5.91E-06	5.91E-06	5.91E-06	5.91E-06
Ra223	1.88E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Ra224	4.41E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Ra225	2.09E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Ra226	8.33E-03	1.08E-01	2.59E-01	4.73E-01	7.48E-01
Ra228	8.50E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Rh106	7.51E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn219	1.88E+01	6.80E+01	6.87E+01	6.87E+01	6.87E+01
Rn220	4.41E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Rn222	8.31E-03	1.08E-01	2.59E-01	4.73E-01	7.48E-01
Ru106	7.51E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb125	4.84E+04	1.35E-09	1.27E-20	1.14E-31	0.00E+00
Sb126	5.62E+01	6.46E+01	6.45E+01	6.45E+01	6.44E+01
Sb126m	4.62E+02	4.61E+02	4.61E+02	4.61E+02	4.60E+02
Se 79	3.48E+02	3.48E+02	3.48E+02	3.48E+02	3.48E+02
Sm147	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00
Sm151	9.12E+05	3.54E+05	1.64E+05	7.58E+04	3.51E+04
Sn126	4.62E+02	4.61E+02	4.61E+02	4.61E+02	4.60E+02
Sr 90	3.59E+07	1.74E+06	1.48E+05	1.26E+04	1.08E+03
Tc 99	9.39E+03	9.38E+03	9.38E+03	9.38E+03	9.37E+03
Te125m	3.98E+03	3.30E-10	3.10E-21	2.28E-32	0.00E+00

Table 2. Total DOE SNF Radionuclide Inventory for the Years 2010 to 2433 (Continued)

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Th227	2.69E+01	6.71E+01	6.77E+01	6.78E+01	6.78E+01
Th228	5.14E+02	4.38E+03	1.63E+03	6.08E+02	2.30E+02
Th229	2.55E+01	1.25E+02	2.04E+02	2.83E+02	3.62E+02
Th230	9.77E-01	2.87E+00	4.49E+00	6.13E+00	7.78E+00
Th231	8.18E+01	8.19E+01	8.19E+01	8.20E+01	8.20E+01
Th232	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Th234	5.05E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Ti206	6.26E-09	9.98E-08	2.73E-07	5.29E-07	8.66E-07
Ti207	1.88E+01	6.78E+01	6.85E+01	6.85E+01	6.86E+01
Ti208	1.58E+02	1.58E+03	5.85E+02	2.18E+02	8.26E+01
Ti209	3.25E-01	2.62E+00	4.29E+00	5.95E+00	7.59E+00
U232	1.44E+04	4.26E+03	1.58E+03	5.84E+02	2.16E+02
U233	9.24E+03	9.24E+03	9.23E+03	9.23E+03	9.22E+03
U234	1.60E+03	1.73E+03	1.78E+03	1.80E+03	1.81E+03
U235	8.18E+01	8.19E+01	8.19E+01	8.20E+01	8.20E+01
U236	2.61E+02	2.63E+02	2.64E+02	2.66E+02	2.67E+02
U237	3.92E+02	1.06E+00	8.91E-03	5.34E-04	4.64E-04
U238	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Y 90	3.59E+07	1.74E+06	1.48E+05	1.26E+04	1.08E+03
Zr 93	1.75E+03	1.75E+03	1.75E+03	1.75E+03	1.75E+03

Table 3. Total DOE SNF Radionuclide Inventory for the Years 2533 to 12033

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Ac225	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Ac227	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Ac228	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Am241	8.77E+05	3.94E+05	7.93E+04	6.61E+02	9.07E+00
Am242	1.23E+02	1.05E+01	7.71E-02	3.03E-08	6.41E-19
Am242m	1.23E+02	1.06E+01	7.74E-02	3.05E-08	6.44E-19
Am243	1.93E+03	1.84E+03	1.68E+03	1.26E+03	7.90E+02
At217	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Ba137m	2.45E+02	2.35E-03	2.17E-13	0.00E+00	0.00E+00
Bi210	9.71E-01	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Bi211	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Bi212	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Bi213	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Bi214	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02
C 14	9.67E+02	9.11E+02	8.07E+02	5.61E+02	3.06E+02
Cd113m	2.69E-08	5.68E-19	0.00E+00	0.00E+00	0.00E+00
Cl 36	4.09E+00	4.09E+00	4.08E+00	4.05E+00	4.01E+00
Cm242	1.02E+02	8.69E+00	6.37E-02	2.52E-08	5.32E-19
Cm243	2.49E-03	1.30E-08	3.56E-19	0.00E+00	0.00E+00
Cm244	1.93E-04	9.29E-13	2.17E-29	0.00E+00	0.00E+00
Cm245	1.92E+01	1.84E+01	1.70E+01	1.33E+01	8.84E+00
Cm246	3.45E+00	3.20E+00	2.77E+00	1.78E+00	8.57E-01
Cm247	5.91E-06	5.91E-06	5.91E-06	5.91E-06	5.91E-06
Co 60	2.78E-25	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 3. Total DOE SNF Radionuclide Inventory for the Years 2533 to 12033 (Continued)

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Cs135	3.91E+02	3.91E+02	3.91E+02	3.91E+02	3.90E+02
Cs137	2.60E+02	2.49E-03	2.30E-13	0.00E+00	0.00E+00
Eu154	1.17E-13	3.42E-31	0.00E+00	0.00E+00	0.00E+00
Eu155	1.51E-29	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe 55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fr221	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Fr223	9.49E-01	9.52E-01	9.56E-01	9.68E-01	9.90E-01
H 3	1.56E-08	9.67E-21	0.00E+00	0.00E+00	0.00E+00
I129	2.11E+01	2.11E+01	2.11E+01	2.11E+01	2.11E+01
Kr 85	3.93E-09	3.57E-23	0.00E+00	0.00E+00	0.00E+00
Nb 93m	1.75E+03	1.75E+03	1.75E+03	1.75E+03	1.74E+03
Nb 94	3.98E+01	3.92E+01	3.78E+01	3.42E+01	2.88E+01
Ni 59	4.22E+02	4.20E+02	4.16E+02	4.05E+02	3.86E+02
Ni 63	3.32E+03	1.04E+02	1.02E-01	9.73E-11	8.93E-26
Np237	3.96E+02	4.93E+02	5.57E+02	5.72E+02	5.71E+02
Np238	5.55E-01	4.75E-02	3.48E-04	1.37E-10	2.90E-21
Np239	1.93E+03	1.84E+03	1.68E+03	1.26E+03	7.90E+02
Pa231	6.88E+01	6.89E+01	6.92E+01	7.01E+01	7.17E+01
Pa233	3.96E+02	4.93E+02	5.57E+02	5.72E+02	5.71E+02
Pa234	1.01E+00	1.01E+00	1.01E+00	1.01E+00	1.01E+00
Pa234m	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Pb209	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Pb210	9.71E-01	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Pb211	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Pb212	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Pb214	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Pd107	3.66E+01	3.66E+01	3.66E+01	3.66E+01	3.66E+01
Pm147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po210	9.71E-01	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Po211	1.89E-01	1.90E-01	1.90E-01	1.93E-01	1.97E-01
Po212	5.75E+01	5.08E+00	4.72E+00	4.72E+00	4.72E+00
Po213	4.30E+02	7.99E+02	1.49E+03	3.21E+03	5.19E+03
Po214	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Po215	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Po216	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Po218	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Pu238	9.65E+03	2.03E+02	1.39E-01	6.69E-08	1.42E-18
Pu239	6.44E+05	6.34E+05	6.16E+05	5.66E+05	4.90E+05
Pu240	4.98E+05	4.72E+05	4.25E+05	3.10E+05	1.83E+05
Pu241	1.92E+01	1.85E+01	1.70E+01	1.33E+01	8.86E+00
Pu242	2.78E+02	2.78E+02	2.77E+02	2.76E+02	2.73E+02
Pu243	5.91E-06	5.91E-06	5.91E-06	5.91E-06	5.91E-06
Ra223	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Ra224	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Ra225	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Ra226	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02
Ra228	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Rh106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn219	6.88E+01	6.90E+01	6.93E+01	7.02E+01	7.18E+01
Rn220	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Rn222	1.08E+00	3.54E+00	1.16E+01	4.93E+01	1.24E+02

Table 3. Total DOE SNF Radionuclide Inventory for the Years 2533 to 12033 (Continued)

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Ru106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb126	6.44E+01	6.42E+01	6.37E+01	6.24E+01	6.03E+01
Sb126m	4.60E+02	4.58E+02	4.55E+02	4.46E+02	4.31E+02
Se 79	3.48E+02	3.47E+02	3.47E+02	3.44E+02	3.41E+02
Sm147	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00
Sm151	1.62E+04	3.45E+02	1.56E-01	1.44E-11	2.70E-28
Sn126	4.60E+02	4.58E+02	4.55E+02	4.46E+02	4.31E+02
Sr 90	9.17E+01	4.12E-04	8.31E-15	0.00E+00	0.00E+00
Tc 99	9.37E+03	9.36E+03	9.33E+03	9.23E+03	9.08E+03
Te125m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th227	6.78E+01	6.80E+01	6.83E+01	6.92E+01	7.08E+01
Th228	8.98E+01	7.94E+00	7.36E+00	7.36E+00	7.36E+00
Th229	4.39E+02	8.17E+02	1.52E+03	3.28E+03	5.30E+03
Th230	9.43E+00	1.77E+01	3.41E+01	8.23E+01	1.59E+02
Th231	8.21E+01	8.24E+01	8.30E+01	8.48E+01	8.74E+01
Th232	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.36E+00
Th234	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Ti206	1.28E-06	4.68E-06	1.53E-05	6.50E-05	1.64E-04
Ti207	6.86E+01	6.88E+01	6.91E+01	7.00E+01	7.16E+01
Ti208	3.23E+01	2.85E+00	2.65E+00	2.65E+00	2.65E+00
Ti209	9.22E+00	1.71E+01	3.19E+01	6.89E+01	1.11E+02
U232	8.02E+01	5.59E-01	2.72E-05	3.14E-18	0.00E+00
U233	9.22E+03	9.20E+03	9.16E+03	9.05E+03	8.87E+03
U234	1.81E+03	1.81E+03	1.81E+03	1.80E+03	1.79E+03
U235	8.21E+01	8.24E+01	8.30E+01	8.48E+01	8.74E+01
U236	2.69E+02	2.76E+02	2.89E+02	3.21E+02	3.57E+02
U237	4.59E-04	4.41E-04	4.06E-04	3.18E-04	2.12E-04
U238	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Y 90	9.17E+01	4.12E-04	8.31E-15	0.00E+00	0.00E+00
Zr 93	1.75E+03	1.75E+03	1.75E+03	1.75E+03	1.74E+03

Table 4. Total DOE SNF Radionuclide Inventory for the Years 12033 to 1002033

Age (years)	10023	20023	30023	100023	300023	1000023
Calendar Year	12033	22033	32033	102033	302033	1002033
Nuclide	Inventory (Ci)					
Ac225	5.30E+03	7.27E+03	7.89E+03	6.47E+03	3.03E+03	5.66E+02
Ac227	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Ac228	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Am241	9.07E+00	3.92E+00	1.73E+00	5.74E-03	4.98E-10	0.00E+00
Am243	7.90E+02	3.08E+02	1.20E+02	1.67E-01	5.84E-06	5.66E-06
At217	5.30E+03	7.27E+03	7.89E+03	6.47E+03	3.03E+03	5.66E+02
Bi210	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Bi211	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Bi212	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Bi213	5.30E+03	7.27E+03	7.88E+03	6.47E+03	3.03E+03	5.66E+02
Bi214	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
C 14	3.06E+02	9.14E+01	2.73E+01	5.72E-03	1.77E-13	0.00E+00
Cd113	8.35E-15	8.35E-15	8.35E-15	8.35E-15	8.35E-15	8.35E-15
Cl 36	4.01E+00	3.91E+00	3.83E+00	3.26E+00	2.05E+00	4.10E-01

Table 4. Total DOE SNF Radionuclide Inventory for the Years 12033 to 1002033 (Continued)

Age (years)	10023	20023	30023	100023	300023	1000023
Calendar Year	12033	22033	32033	102033	302033	1002033
Nuclide	Inventory (Ci)					
Cm245	8.84E+00	3.91E+00	1.73E+00	5.73E-03	4.72E-10	0.00E+00
Cm246	8.57E-01	1.98E-01	4.57E-02	1.61E-06	3.01E-19	0.00E+00
Cm247	5.91E-06	5.91E-06	5.90E-06	5.89E-06	5.84E-06	5.66E-06
Cs135	3.90E+02	3.89E+02	3.88E+02	3.80E+02	3.57E+02	2.89E+02
Fr221	5.30E+03	7.27E+03	7.89E+03	6.47E+03	3.03E+03	5.66E+02
Fr223	9.90E-01	1.04E+00	1.09E+00	1.32E+00	1.44E+00	1.44E+00
I129	2.11E+01	2.11E+01	2.11E+01	2.10E+01	2.08E+01	2.02E+01
Nb 93m	1.74E+03	1.74E+03	1.73E+03	1.67E+03	1.53E+03	1.11E+03
Nb 94	2.88E+01	2.05E+01	1.45E+01	1.33E+00	1.44E-03	5.98E-14
Ni 59	3.86E+02	3.52E+02	3.21E+02	1.68E+02	2.65E+01	4.11E-02
Np237	5.71E+02	5.70E+02	5.68E+02	5.55E+02	5.20E+02	4.15E+02
Np239	7.90E+02	3.08E+02	1.20E+02	1.67E-01	5.84E-06	5.66E-06
Pa231	7.17E+01	7.51E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Pa233	5.71E+02	5.70E+02	5.68E+02	5.55E+02	5.20E+02	4.15E+02
Pa234	1.01E+00	1.01E+00	1.01E+00	1.01E+00	1.01E+00	1.01E+00
Pa234m	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Pb209	5.30E+03	7.27E+03	7.88E+03	6.47E+03	3.03E+03	5.66E+02
Pb210	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Pb211	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Pb212	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Pb214	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Pd107	3.66E+01	3.65E+01	3.65E+01	3.62E+01	3.55E+01	3.29E+01
Po210	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Po211	1.97E-01	2.07E-01	2.16E-01	2.64E-01	2.86E-01	2.86E-01
Po212	4.72E+00	4.72E+00	4.72E+00	4.72E+00	4.72E+00	4.73E+00
Po213	5.19E+03	7.12E+03	7.72E+03	6.33E+03	2.97E+03	5.54E+02
Po214	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Po215	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Po216	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Po218	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Pu239	4.90E+05	3.68E+05	2.76E+05	3.69E+04	1.17E+02	5.87E-06
Pu240	1.83E+05	6.35E+04	2.21E+04	1.36E+01	9.08E-09	0.00E+00
Pu241	8.86E+00	3.92E+00	1.73E+00	5.74E-03	4.73E-10	0.00E+00
Pu242	2.73E+02	2.68E+02	2.63E+02	2.31E+02	1.60E+02	4.36E+01
Pu243	5.91E-06	5.91E-06	5.90E-06	5.89E-06	5.84E-06	5.66E-06
Ra223	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Ra224	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Ra225	5.30E+03	7.27E+03	7.89E+03	6.47E+03	3.03E+03	5.66E+02
Ra226	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Ra228	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Rn219	7.18E+01	7.52E+01	7.86E+01	9.59E+01	1.04E+02	1.04E+02
Rn220	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Rn222	1.24E+02	2.69E+02	3.99E+02	1.00E+03	1.28E+03	8.66E+02
Sb126	6.03E+01	5.62E+01	5.25E+01	3.23E+01	8.08E+00	6.31E-02
Sb126m	4.31E+02	4.02E+02	3.75E+02	2.31E+02	5.77E+01	4.51E-01
Se 79	3.41E+02	3.34E+02	3.27E+02	2.82E+02	1.85E+02	4.26E+01
Sm147	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00
Sn126	4.31E+02	4.02E+02	3.75E+02	2.31E+02	5.77E+01	4.51E-01
Tc 99	9.08E+03	8.79E+03	8.51E+03	6.76E+03	3.51E+03	3.52E+02
Th227	7.08E+01	7.41E+01	7.76E+01	9.46E+01	1.03E+02	1.03E+02
Th228	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00

Table 4. Total DOE SNF Radionuclide Inventory for the Years 12033 to 1002033 (Continued)

Age (years)	10023	20023	30023	100023	300023	1000023
Calendar Year	12033	22033	32033	102033	302033	1002033
Nuclide	Inventory (Ci)					
Th229	5.30E+03	7.27E+03	7.89E+03	6.47E+03	3.03E+03	5.66E+02
Th230	1.59E+02	3.01E+02	4.28E+02	1.00E+03	1.28E+03	8.66E+02
Th231	8.74E+01	9.16E+01	9.47E+01	1.03E+02	1.04E+02	1.04E+02
Th232	7.36E+00	7.36E+00	7.36E+00	7.36E+00	7.37E+00	7.38E+00
Th234	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Ti206	1.64E-04	3.55E-04	5.27E-04	1.33E-03	1.69E-03	1.14E-03
Ti207	7.16E+01	7.50E+01	7.84E+01	9.56E+01	1.04E+02	1.04E+02
Ti208	2.65E+00	2.65E+00	2.65E+00	2.65E+00	2.65E+00	2.65E+00
Ti209	1.11E+02	1.53E+02	1.66E+02	1.36E+02	6.37E+01	1.19E+01
U233	8.87E+03	8.52E+03	8.18E+03	6.18E+03	2.90E+03	5.59E+02
U234	1.79E+03	1.76E+03	1.73E+03	1.56E+03	1.22E+03	8.39E+02
U235	8.74E+01	9.16E+01	9.47E+01	1.03E+02	1.04E+02	1.04E+02
U236	3.57E+02	3.90E+02	4.02E+02	4.07E+02	4.05E+02	3.96E+02
U237	2.12E-04	9.36E-05	4.14E-05	1.37E-07	1.13E-14	0.00E+00
U238	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02	7.77E+02
Zr 93	1.74E+03	1.74E+03	1.73E+03	1.67E+03	1.53E+03	1.11E+03

Table 5. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2010 to 2433

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Ac225	5.34E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Ac227	5.10E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Ac228	3.30E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Am241	2.17E+03	1.92E+03	1.64E+03	1.39E+03	1.19E+03
Am242	5.69E-01	3.11E-01	1.90E-01	1.16E-01	7.12E-02
Am242m	5.72E-01	3.12E-01	1.91E-01	1.17E-01	7.15E-02
Am243	1.44E+01	1.42E+01	1.41E+01	1.40E+01	1.38E+01
At217	5.34E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Ba137m	1.63E+06	9.55E+04	9.47E+03	9.40E+02	9.32E+01
Bi210	1.35E-03	3.01E-02	7.13E-02	1.24E-01	1.87E-01
Bi211	2.53E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Bi212	4.37E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Bi213	5.34E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Bi214	1.56E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
C 14	1.12E+02	1.10E+02	1.09E+02	1.08E+02	1.07E+02
Cd113m	8.72E+00	2.07E-02	1.52E-04	1.11E-06	8.16E-09
Cl 36	1.45E+00	1.45E+00	1.45E+00	1.44E+00	1.44E+00
Cm242	3.82E+01	2.57E-01	1.57E-01	9.62E-02	5.89E-02
Cm243	3.09E+00	1.55E-01	1.36E-02	1.20E-03	1.05E-04
Cm244	7.28E+02	6.58E+00	1.43E-01	3.10E-03	6.73E-05
Cm245	1.97E-01	1.96E-01	1.94E-01	1.92E-01	1.91E-01
Cm246	4.38E-02	4.30E-02	4.24E-02	4.18E-02	4.12E-02
Cm247	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.41E-07
Co 60	9.46E+01	9.01E-06	1.74E-11	3.38E-17	6.54E-23
Cs134	2.91E+03	3.31E-15	8.31E-30	0.00E+00	0.00E+00
Cs135	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01
Cs137	1.73E+06	1.01E+05	1.00E+04	9.95E+02	9.87E+01
Eu154	1.44E+03	7.08E-02	2.22E-05	6.94E-09	2.17E-12
Eu155	9.94E+01	1.24E-06	4.57E-13	1.69E-19	6.24E-26

Table 5. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2010 to 2433 (Continued)

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Fe 55	7.75E-02	2.17E-15	2.03E-26	0.00E+00	0.00E+00
Fr221	5.34E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Fr223	7.04E-03	1.31E-01	1.33E-01	1.33E-01	1.33E-01
H 3	3.56E+03	3.55E+00	1.28E-02	4.65E-05	1.68E-07
I129	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Kr 85	1.08E+05	3.84E+01	5.97E-02	9.28E-05	1.44E-07
Nb 93m	1.11E+01	5.43E+02	5.46E+02	5.46E+02	5.46E+02
Nb 94	1.05E-01	1.04E-01	1.04E-01	1.03E-01	1.03E-01
Ni 59	8.82E+00	8.81E+00	8.80E+00	8.79E+00	8.78E+00
Ni 63	2.46E+02	1.05E+02	5.25E+01	2.63E+01	1.31E+01
Np237	8.90E+00	8.98E+00	9.04E+00	9.09E+00	9.13E+00
Np238	2.57E-03	1.41E-03	8.60E-04	5.26E-04	3.22E-04
Np239	1.44E+01	1.42E+01	1.41E+01	1.40E+01	1.38E+01
Pa231	9.69E+00	9.67E+00	9.65E+00	9.63E+00	9.61E+00
Pa233	5.41E+00	8.98E+00	9.04E+00	9.09E+00	9.13E+00
Pa234	2.66E-05	4.10E-05	4.10E-05	4.10E-05	4.10E-05
Pa234m	2.05E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Pb209	5.34E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Pb210	1.36E-03	3.01E-02	7.13E-02	1.24E-01	1.87E-01
Pb211	2.53E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Pb212	4.37E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Pb214	1.56E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
Pd107	4.73E-01	4.73E-01	4.73E-01	4.73E-01	4.73E-01
Pm147	3.03E+01	2.39E-13	7.99E-25	0.00E+00	0.00E+00
Po210	1.85E-04	3.01E-02	7.13E-02	1.24E-01	1.87E-01
Po211	6.96E-04	2.61E-02	2.65E-02	2.65E-02	2.65E-02
Po212	2.80E+01	2.80E+02	1.05E+02	3.99E+01	1.59E+01
Po213	5.22E+00	4.73E+01	7.84E+01	1.09E+02	1.40E+02
Po214	1.56E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
Po215	2.53E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Po216	4.37E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Po218	1.56E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
Pu238	5.14E+04	1.95E+04	8.83E+03	4.01E+03	1.82E+03
Pu239	1.41E+02	1.41E+02	1.40E+02	1.40E+02	1.40E+02
Pu240	2.15E+02	2.14E+02	2.12E+02	2.10E+02	2.07E+02
Pu241	4.82E+03	1.29E+01	2.96E-01	1.93E-01	1.91E-01
Pu242	3.40E-01	3.40E-01	3.40E-01	3.40E-01	3.39E-01
Pu243	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.41E-07
Ra223	2.53E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Ra224	4.37E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Ra225	7.19E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Ra226	1.57E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
Ra228	3.30E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Rh106	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn219	2.53E-01	9.49E+00	9.65E+00	9.64E+00	9.62E+00
Rn220	4.37E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Rn222	1.56E-03	4.14E-02	8.64E-02	1.42E-01	2.09E-01
Ru106	1.12E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb125	5.58E+02	1.56E-11	1.46E-22	0.00E+00	0.00E+00
Sb126	9.69E-01	1.11E+00	1.11E+00	1.11E+00	1.11E+00

Table 5. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2010 to 2433 (Continued)

Age (years)	0.1	123	223	323	423
Calendar Year	2010	2133	2233	2333	2433
Nuclide	Inventory (Ci)				
Sb126m	7.95E+00	7.94E+00	7.94E+00	7.93E+00	7.93E+00
Se 79	1.58E+01	1.58E+01	1.58E+01	1.58E+01	1.58E+01
Sm147	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00
Sm151	2.75E+04	1.07E+04	4.94E+03	2.29E+03	1.06E+03
Sn126	7.95E+00	7.94E+00	7.94E+00	7.93E+00	7.93E+00
Sr 90	1.64E+06	7.95E+04	6.77E+03	5.77E+02	4.92E+01
Tc 99	4.00E+02	4.00E+02	4.00E+02	4.00E+02	3.99E+02
Te125m	4.60E+01	3.81E-12	3.58E-23	0.00E+00	0.00E+00
Th227	3.65E-01	9.36E+00	9.51E+00	9.50E+00	9.49E+00
Th228	5.10E+01	4.37E+02	1.63E+02	6.23E+01	2.48E+01
Th229	8.79E+00	4.83E+01	8.01E+01	1.12E+02	1.43E+02
Th230	5.88E-01	9.51E-01	1.25E+00	1.56E+00	1.86E+00
Th231	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
Th232	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Th234	2.05E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Ti206	1.78E-09	3.97E-08	9.41E-08	1.63E-07	2.47E-07
Ti207	2.52E-01	9.46E+00	9.62E+00	9.61E+00	9.59E+00
Ti208	1.57E+01	1.57E+02	5.87E+01	2.24E+01	8.91E+00
Ti209	1.12E-01	1.01E+00	1.68E+00	2.34E+00	3.00E+00
U232	1.43E+03	4.22E+02	1.56E+02	5.79E+01	2.15E+01
U233	3.68E+03	3.68E+03	3.68E+03	3.68E+03	3.68E+03
U234	3.16E+02	3.27E+02	3.31E+02	3.32E+02	3.33E+02
U235	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
U236	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.20E+01
U237	1.13E-01	3.09E-04	7.07E-06	4.62E-06	4.57E-06
U238	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Y 90	1.64E+06	7.95E+04	6.78E+03	5.77E+02	4.92E+01
Zr 93	5.46E+02	5.46E+02	5.46E+02	5.46E+02	5.46E+02

Table 6. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2533 to 12033

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Ac225	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Ac227	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Ac228	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Am241	1.01E+03	4.54E+02	9.16E+01	8.83E-01	8.76E-02
Am242	4.35E-02	3.73E-03	2.73E-05	1.08E-11	2.27E-22
Am242m	4.37E-02	3.74E-03	2.74E-05	1.08E-11	2.28E-22
Am243	1.37E+01	1.31E+01	1.19E+01	8.98E+00	5.61E+00
At217	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Ba137m	9.24E+00	8.87E-05	8.18E-15	0.00E+00	0.00E+00
Bi210	2.60E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
Bi211	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Bi212	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Bi213	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Bi214	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
C 14	1.05E+02	9.90E+01	8.78E+01	6.10E+01	3.33E+01
Cd113m	5.98E-11	1.27E-21	0.00E+00	0.00E+00	0.00E+00

Table 6. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2533 to 12033 (Continued)

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Cl 36	1.44E+00	1.44E+00	1.44E+00	1.43E+00	1.41E+00
Cm242	3.60E-02	3.08E-03	2.26E-05	8.92E-12	1.89E-22
Cm243	9.25E-06	4.83E-11	1.32E-21	0.00E+00	0.00E+00
Cm244	1.46E-06	7.06E-15	1.60E-31	0.00E+00	0.00E+00
Cm245	1.89E-01	1.82E-01	1.67E-01	1.31E-01	8.72E-02
Cm246	4.06E-02	3.77E-02	3.26E-02	2.10E-02	1.01E-02
Cm247	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.41E-07
Co 60	1.27E-28	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs134	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs135	1.02E+01	1.02E+01	1.02E+01	1.02E+01	1.02E+01
Cs137	9.79E+00	9.40E-05	8.66E-15	0.00E+00	0.00E+00
Eu154	6.80E-16	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Eu155	2.28E-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fe 55	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Fr221	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Fr223	1.33E-01	1.31E-01	1.29E-01	1.22E-01	1.12E-01
H 3	6.08E-10	3.76E-22	0.00E+00	0.00E+00	0.00E+00
I129	1.10E+00	1.10E+00	1.10E+00	1.10E+00	1.10E+00
Kr 85	2.24E-10	2.04E-24	0.00E+00	0.00E+00	0.00E+00
Nb 93m	5.46E+02	5.46E+02	5.45E+02	5.45E+02	5.43E+02
Nb 94	1.03E-01	1.01E-01	9.76E-02	8.81E-02	7.43E-02
Ni 59	8.77E+00	8.73E+00	8.65E+00	8.42E+00	8.04E+00
Ni 63	6.57E+00	2.06E-01	2.03E-04	1.92E-13	1.77E-28
Np237	9.16E+00	9.27E+00	9.35E+00	9.35E+00	9.34E+00
Np238	1.97E-04	1.68E-05	1.23E-07	4.86E-14	1.03E-24
Np239	1.37E+01	1.31E+01	1.19E+01	8.98E+00	5.61E+00
Pa231	9.60E+00	9.51E+00	9.34E+00	8.86E+00	8.12E+00
Pa233	9.16E+00	9.27E+00	9.35E+00	9.35E+00	9.34E+00
Pa234	4.10E-05	4.10E-05	4.10E-05	4.10E-05	4.10E-05
Pa234m	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Pb209	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Pb210	2.60E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
Pb211	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Pb212	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Pb214	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
Pd107	4.73E-01	4.73E-01	4.73E-01	4.73E-01	4.73E-01
Pm147	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Po210	2.60E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
Po211	2.64E-02	2.62E-02	2.57E-02	2.44E-02	2.23E-02
Po212	6.98E+00	1.78E+00	1.75E+00	1.75E+00	1.75E+00
Po213	1.70E+02	3.17E+02	5.92E+02	1.28E+03	2.06E+03
Po214	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.31E+01
Po215	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Po216	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Po218	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.32E+01
Pu238	8.25E+02	1.59E+01	5.89E-03	2.40E-11	5.02E-22
Pu239	1.39E+02	1.38E+02	1.34E+02	1.24E+02	1.08E+02
Pu240	2.05E+02	1.95E+02	1.75E+02	1.28E+02	7.52E+01
Pu241	1.90E-01	1.82E-01	1.68E-01	1.31E-01	8.73E-02
Pu242	3.39E-01	3.39E-01	3.39E-01	3.37E-01	3.34E-01

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Table 6. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 2533 to 12033
(Continued)

Age (years)	523	1023	2023	5023	10023
Calendar Year	2533	3033	4033	7033	12033
Nuclide	Inventory (Ci)				
Pu243	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.41E-07
Ra223	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Ra224	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Ra225	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Ra226	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.32E+01
Ra228	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Rh106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Rn219	9.60E+00	9.52E+00	9.35E+00	8.87E+00	8.13E+00
Rn220	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Rn222	2.85E-01	8.05E-01	2.39E+00	9.42E+00	2.32E+01
Ru106	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Sb126	1.11E+00	1.11E+00	1.10E+00	1.07E+00	1.04E+00
Sb126m	7.92E+00	7.89E+00	7.84E+00	7.68E+00	7.42E+00
Se 79	1.58E+01	1.58E+01	1.58E+01	1.57E+01	1.55E+01
Sm147	3.02E+00	3.02E+00	3.02E+00	3.02E+00	3.02E+00
Sm151	4.90E+02	1.04E+01	4.70E-03	4.33E-13	8.15E-30
Sn126	7.92E+00	7.89E+00	7.84E+00	7.68E+00	7.42E+00
Sr 90	4.19E+00	1.88E-05	3.80E-16	0.00E+00	0.00E+00
Tc 99	3.99E+02	3.99E+02	3.97E+02	3.93E+02	3.87E+02
Te125m	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Th227	9.47E+00	9.39E+00	9.22E+00	8.74E+00	8.01E+00
Th228	1.09E+01	2.79E+00	2.73E+00	2.73E+00	2.73E+00
Th229	1.74E+02	3.24E+02	6.05E+02	1.31E+03	2.11E+03
Th230	2.17E+00	3.68E+00	6.70E+00	1.55E+01	2.95E+01
Th231	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
Th232	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Th234	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Ti206	3.43E-07	1.06E-06	3.15E-06	1.24E-05	3.05E-05
Ti207	9.58E+00	9.49E+00	9.32E+00	8.84E+00	8.10E+00
Ti208	3.92E+00	1.00E+00	9.81E-01	9.81E-01	9.81E-01
Ti209	3.65E+00	6.81E+00	1.27E+01	2.74E+01	4.43E+01
U232	7.95E+00	5.55E-02	2.70E-06	3.12E-19	0.00E+00
U233	3.67E+03	3.67E+03	3.65E+03	3.60E+03	3.53E+03
U234	3.33E+02	3.33E+02	3.32E+02	3.29E+02	3.25E+02
U235	1.49E+00	1.49E+00	1.49E+00	1.49E+00	1.49E+00
U236	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.20E+01
U237	4.53E-06	4.35E-06	4.01E-06	3.14E-06	2.09E-06
U238	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Y 90	4.19E+00	1.88E-05	3.80E-16	0.00E+00	0.00E+00
Zr 93	5.46E+02	5.46E+02	5.45E+02	5.45E+02	5.43E+02

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Table 7. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 12033 to 1002033

Age (years)	10023	20023	30023	100023	300023	1000023
Calendar Year	12033	22033	32033	102033	302033	1002033
Nuclide	Inventory (Ci)					
Ac225	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Ac227	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Ac228	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Am241	8.76E-02	3.86E-02	1.71E-02	5.66E-05	4.91E-12	0.00E+00
Am243	5.61E+00	2.19E+00	8.56E-01	1.18E-03	1.39E-07	1.35E-07
At217	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Bi210	2.32E+01	4.93E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
Bi211	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Bi212	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Bi213	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Bi214	2.32E+01	4.94E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
C 14	3.33E+01	9.94E+00	2.96E+00	6.22E-04	1.92E-14	0.00E+00
Cl 36	1.41E+00	1.38E+00	1.35E+00	1.15E+00	7.25E-01	1.45E-01
Cm245	8.72E-02	3.86E-02	1.71E-02	5.65E-05	4.65E-12	0.00E+00
Cm246	1.01E-02	2.33E-03	5.38E-04	1.89E-08	3.55E-21	0.00E+00
Cm247	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.39E-07	1.35E-07
Cs135	1.02E+01	1.01E+01	1.01E+01	9.91E+00	9.33E+00	7.55E+00
Fr221	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Fr223	1.12E-01	9.47E-02	8.06E-02	3.43E-02	2.09E-02	2.06E-02
I129	1.10E+00	1.10E+00	1.09E+00	1.09E+00	1.08E+00	1.05E+00
Nb 93m	5.43E+02	5.41E+02	5.38E+02	5.22E+02	4.76E+02	3.47E+02
Nb 94	7.43E-02	5.28E-02	3.75E-02	3.44E-03	3.72E-06	1.54E-16
Ni 59	8.04E+00	7.33E+00	6.68E+00	3.50E+00	5.51E-01	8.54E-04
Np237	9.34E+00	9.31E+00	9.28E+00	9.07E+00	8.50E+00	6.78E+00
Np239	5.61E+00	2.19E+00	8.56E-01	1.18E-03	1.39E-07	1.35E-07
Pa231	8.12E+00	6.86E+00	5.83E+00	2.48E+00	1.51E+00	1.50E+00
Pa233	9.34E+00	9.31E+00	9.28E+00	9.07E+00	8.50E+00	6.78E+00
Pa234	4.10E-05	4.10E-05	4.10E-05	4.10E-05	4.10E-05	4.10E-05
Pa234m	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Pb209	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Pb210	2.32E+01	4.93E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
Pb211	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Pb212	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Pb214	2.32E+01	4.94E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
Pd107	4.73E-01	4.72E-01	4.72E-01	4.68E-01	4.59E-01	4.26E-01
Po210	2.32E+01	4.93E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
Po211	2.23E-02	1.89E-02	1.61E-02	6.83E-03	4.16E-03	4.11E-03
Po212	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00	1.75E+00
Po213	2.06E+03	2.83E+03	3.06E+03	2.46E+03	1.03E+03	5.58E+01
Po214	2.32E+01	4.93E+01	7.25E+01	1.72E+02	1.77E+02	2.87E+01
Po215	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Po216	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Po218	2.32E+01	4.94E+01	7.26E+01	1.72E+02	1.77E+02	2.87E+01
Pu239	1.08E+02	8.21E+01	6.19E+01	8.32E+00	2.65E-02	1.35E-07
Pu240	7.52E+01	2.62E+01	9.10E+00	5.60E-03	3.74E-12	0.00E+00
Pu241	8.73E-02	3.86E-02	1.71E-02	5.66E-05	4.66E-12	0.00E+00
Pu242	3.34E-01	3.28E-01	3.22E-01	2.83E-01	1.95E-01	5.32E-02
Pu243	1.41E-07	1.41E-07	1.41E-07	1.41E-07	1.39E-07	1.35E-07
Ra223	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Ra224	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Ra225	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01

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Table 7. Total Radionuclide Inventory for Uranium/Thorium Carbide Fuels for the Years 12033 to 1002033 (Continued)

Age (years)	10023	20023	30023	100023	300023	1000023
Calendar Year	12033	22033	32033	102033	302033	1002033
Nuclide	Inventory (Ci)					
Ra226	2.32E+01	4.94E+01	7.26E+01	1.72E+02	1.77E+02	2.87E+01
Ra228	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Rn219	8.13E+00	6.86E+00	5.84E+00	2.48E+00	1.51E+00	1.50E+00
Rn220	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Rn222	2.32E+01	4.94E+01	7.26E+01	1.72E+02	1.77E+02	2.87E+01
Sb126	1.04E+00	9.69E-01	9.04E-01	5.56E-01	1.39E-01	1.09E-03
Sb126m	7.42E+00	6.92E+00	6.46E+00	3.97E+00	9.94E-01	7.76E-03
Se 79	1.55E+01	1.52E+01	1.49E+01	1.28E+01	8.43E+00	1.94E+00
Sm147	3.01E+00	3.01E+00	3.01E+00	3.01E+00	3.01E+00	3.01E+00
Sn126	7.42E+00	6.92E+00	6.46E+00	3.97E+00	9.94E-01	7.76E-03
Tc 99	3.87E+02	3.75E+02	3.62E+02	2.88E+02	1.49E+02	1.50E+01
Th227	8.01E+00	6.77E+00	5.76E+00	2.45E+00	1.49E+00	1.47E+00
Th228	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Th229	2.11E+03	2.89E+03	3.12E+03	2.51E+03	1.06E+03	5.70E+01
Th230	2.95E+01	5.51E+01	7.76E+01	1.72E+02	1.76E+02	2.87E+01
Th231	1.49E+00	1.49E+00	1.49E+00	1.50E+00	1.50E+00	1.50E+00
Th232	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00	2.73E+00
Th234	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Ti206	3.06E-05	6.51E-05	9.57E-05	2.28E-04	2.33E-04	3.78E-05
Ti207	8.10E+00	6.84E+00	5.82E+00	2.48E+00	1.51E+00	1.49E+00
Ti208	9.81E-01	9.81E-01	9.81E-01	9.81E-01	9.81E-01	9.81E-01
Ti209	4.43E+01	6.06E+01	6.56E+01	5.27E+01	2.22E+01	1.20E+00
U233	3.53E+03	3.38E+03	3.23E+03	2.39E+03	1.00E+03	5.45E+01
U234	3.25E+02	3.16E+02	3.07E+02	2.52E+02	1.43E+02	1.99E+01
U235	1.49E+00	1.49E+00	1.49E+00	1.50E+00	1.50E+00	1.50E+00
U236	1.20E+01	1.20E+01	1.20E+01	1.20E+01	1.19E+01	1.17E+01
U237	2.09E-06	9.23E-07	4.08E-07	1.35E-09	1.11E-16	0.00E+00
U238	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02	3.15E-02
Zr 93	5.43E+02	5.41E+02	5.38E+02	5.22E+02	4.76E+02	3.47E+02

7. ATTACHMENTS

Hardcopy attachments are listed in Table 8. Electronic output and data files are provided on CD (CRWMS M&O 2000), and are listed in Table 9. The column labeled "Date and Time Transferred or Created" indicates the time the ORIGEN-S output files were transferred from the HP to the personal computer (PC) in order to copy it onto CD or the time the file was created on the PC.

Table 8. List of Attachments

Attachment Number	Description	Number of Pages
I	ORIGEN-S files used to create DOESNF.2 and DOESNF.3 (See Table 9)	5
II	ORIGEN-S files for Uranium/Thorium Carbide fuels (See Table 9)	5
III	Document Input Reference Sheet	1

Table 9. Electronic Files Supporting CAL-MGR-NU-000003 REV 00

File Name	Description	File Size (bytes)	Date and Time Transferred or Created
DOESNF.2.output	ORIGEN-S output file for all DOE SNF for the years 2010 to 12033 (Input files provided in Attachment I)	160,941	1-18-00, 1:39 p.m.
DOESNF.3.output	ORIGEN-S output file for all DOE SNF for the years 12033 to 1002033 (Input files provided in Attachment I)	116,367	1-18-00, 1:39 p.m.
UThCarbide.2.output	ORIGEN-S input file for all Uranium/Thorium Carbide fuels for the years 2010 to 12033 (Input files provided in Attachment II)	162,116	1-18-00, 1:39 p.m.
UThCarbide.3.output	ORIGEN-S input file for all Uranium/Thorium Carbide fuels for the years 12033 to 1002033 (Input files provided in Attachment II)	117,866	1-18-00, 1:39 p.m.

1. DOESNF.2 (Input for DOESNF.2.output)

=origens

0\$\$\$ a8 26 e

1\$\$\$ 1

1t

ORIGEN-S case to determine total DOE SNF inventory

3\$\$\$ A16 4 a33 -88 e

2t

35\$\$\$ 0

4t

56\$\$\$ 0 10 a6 0 a13 57 5 3 0 2 e

5t

ORIGEN-S case to determine total DOE SNF inventory Initial input for the year 2010

ORIGEN-S case to determine total DOE SNF inventory Initial input for the year 2010

60** .1 123 223 323 423 523 1023 2023 5023 10023

61** f1-15

65\$\$\$ 3z 1 2z 1 2z 1 2z 1

a25 1 2z 1 2z 1 2z 1

a46 1 2z 1 2z 1 2z 1 e

73\$\$\$ 892270 952410 952421 952430 60140

481131 170360 962420 962430 962440

962450 962460 962470 270600 551340

551350 551370 631540 631550 260550

10030 531290 360850 410931 410940

280590 280630 932370 912310 822100

461070 611470 942380 942390 942400

942410 942420 882260 882280 441060

511250 340790 621470 621510 501260

380900 430990 902290 902300 902320

922320 922330 922340 922350 922360

922380 400930

74** 3.6662E+01 1.4503E+06 1.6134E+03 2.0270E+03

1.0306E+03 3.9336E+03 4.0995E+00 5.1797E+02 8.3353E+02

9.6237E+04

2.0023E+01

3.7211E+00

5.9117E-06

2.1004E+05

4.1056E+05

3.9125E+02

4.6017E+07

2.4860E+05

6.6189E+04

1.0476E+05

9.1982E+04

2.1084E+01

1.9126E+06

1.4269E+03

4.0551E+01

4.2388E+02

1.2435E+05

1.6710E+02

6.8634E+01

4.7676E-03

3.6604E+01

4.2752E+06

5.8856E+05

6.5331E+05

5.2598E+05

1.6839E+07

2.7836E+02

8.2890E-03

8.5138E+00

8.0388E+04

4.9623E+04

3.4814E+02

3.0184E+00

9.1282E+05

4.6159E+02

3.5959E+07

9.3879E+03

2.5413E+01

9.7506E-01

7.3627E+00

1.4435E+04

9.2408E+03

1.6041E+03

8.1772E+01

2.6069E+02

7.7721E+02

1.7526E+03

75\$\$ 2 2 2 2 3

3 1 2 2 2

2 2 2 1 3

3 3 3 3 1

3 3 3 3 3

1 1 2 2 2

3 3 2 2 2

2 2 2 2 3

3 3 3 3 3

3 3 2 2 2

2 2 2 2 2

2 3

81\$\$ 2 0 26 1 e

82\$\$ 2 2 2 2 2 2 2 2 2 2

6t

.1

123

223

323

423

523

1023

2023

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5023
10023
56\$\$ f0
5t
end

2. DOESNF.3 (Input file for DOESNF.3.output)

=origens
0\$\$ a8 26 e
1\$\$ l
lt
ORIGEN-S case to determine total DOE SNF inventory
3\$\$ A16 4 a33 -88 e
2t
35\$\$ 0
4t
56\$\$ 0 6 a6 0 a13 57 5 3 0 2 e
5t
ORIGEN-S case to determine total DOE SNF inventory Initial input for the year 2010
ORIGEN-S case to determine total DOE SNF inventory Initial input for the year 2010
60** 10023 20023 30023 100023 300023 1000023
61** f1-15
65\$\$ 3z 1 2z 1 2z 1 2z 1
a25 1 2z 1 2z 1 2z 1
a46 1 2z 1 2z 1 2z 1 e
73\$\$ 892270 952410 952421 952430 60140
481131 170360 962420 962430 962440
962450 962460 962470 270600 551340
551350 551370 631540 631550 260550
10030 531290 360850 410931 410940
280590 280630 932370 912310 822100
461070 611470 942380 942390 942400
942410 942420 882260 882280 441060
511250 340790 621470 621510 501260
380900 430990 902290 902300 902320
922320 922330 922340 922350 922360
922380 400930
74** 3.6662E+01 1.4503E+06 1.6134E+03 2.0270E+03
1.0306E+03 3.9336E+03 4.0995E+00 5.1797E+02 8.3353E+02
9.6237E+04
2.0023E+01
3.7211E+00
5.9117E-06
2.1004E+05
4.1056E+05
3.9125E+02
4.6017E+07
2.4860E+05
6.6189E+04
1.0476E+05
9.1982E+04

2.1084E+01
1.9126E+06
1.4269E+03
4.0551E+01
4.2388E+02
1.2435E+05
1.6710E+02
6.8634E+01
4.7676E-03
3.6604E+01
4.2752E+06
5.8856E+05
6.5331E+05
5.2598E+05
1.6839E+07
2.7836E+02
8.2890E-03
8.5138E+00
8.0388E+04
4.9623E+04
3.4814E+02
3.0184E+00
9.1282E+05
4.6159E+02
3.5959E+07
9.3879E+03
2.5413E+01
9.7506E-01
7.3627E+00
1.4435E+04
9.2408E+03
1.6041E+03
8.1772E+01
2.6069E+02
7.7721E+02
1.7526E+03
75\$\$ 2 2 2 2 3
3 1 2 2 2
2 2 2 1 3
3 3 3 3 1
3 3 3 3 3
1 1 2 2 2
3 3 2 2 2
2 2 2 2 3
3 3 3 3 3
3 3 2 2 2
2 2 2 2 2
2 3
81\$\$ 2 0 26 l e
82\$\$ 2 2 2 2 2 2 2 2 2 2
6t
10023
20023

30023

100023

300023

1000023

56\$\$ f0

5t

end

Title: Radionuclide Inventories for DOE SNF Waste Stream and Uranium/Thorium
Carbide Fuels

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Attachment II, Page II-1 of II-5

1. UThCarbide.2 (Input for UThCarbide.2.output)

=origens

0\$\$ a8 26 e

1\$\$ 1

1t

ORIGEN-S case to determine total Uranium/Thorium Carbide inventory

3\$\$ A16 4 a33 -88 e

2t

35\$\$ 0

4t

56\$\$ 0 10 a6 0 a13 57 5 3 0 2 e

5t

ORIGEN-S case to determine total Uranium/Thorium Carbide inventory

Initial input for the year 2010

60** .1 123 223 323 423 523 1023 2023 5023 10023

61** f1-15

65\$\$ 3z 1 2z 1 2z 1 2z 1

a25 1 2z 1 2z 1 2z 1

a46 1 2z 1 2z 1 2z 1 e

73\$\$	892270	952410	952421	952430	60140
	481131	170360	962420	962430	962440
	962450	962460	962470	270600	551340
	551350	551370	631540	631550	260550
	10030	531290	360850	410931	410940
	280590	280630	932370	912310	822100
	461070	611470	942380	942390	942400
	942410	942420	882260	882280	441060
	511250	340790	621470	621510	501260
	380900	430990	902290	902300	902320
	922320	922330	922340	922350	922360
	922380	400930			

74**

4.811E-01

2.172E+03

5.719E-01

1.441E+01

1.121E+02

8.764E+00

1.446E+00

4.453E+01

3.094E+00

7.308E+02

1.975E-01

4.379E-02

1.413E-07

9.581E+01

3.008E+03

1.021E+01

1.735E+06

1.447E+03

1.009E+02
7.954E-02
3.579E+03
1.096E+00
1.092E+05
8.832E+00
1.046E-01
8.817E+00
2.459E+02
8.898E+00
9.687E+00
1.359E-03
4.735E-01
3.109E+01
5.146E+04
1.413E+02
2.149E+02
4.847E+03
3.397E-01
1.540E-03
3.309E+00
1.198E+00
5.726E+02
1.583E+01
3.015E+00
2.754E+04
7.950E+00
1.644E+06
4.000E+02
8.759E+00
5.878E-01
2.729E+00
1.431E+03
3.682E+03
3.157E+02
1.492E+00
1.198E+01
3.150E-02
5.458E+02

75\$\$ 2 2 2 2 3
3 1 2 2 2
2 2 2 1 3
3 3 3 3 1
3 3 3 3 3
1 1 2 2 2
3 3 2 2 2
2 2 2 2 3
3 3 3 3 3
3 3 2 2 2
2 2 2 2 2
2 3
81\$\$ 2 0 26 1 e

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82\$\$ 2 2 2 2 2 2 2 2 2 2

6t

.1

123

223

323

423

523

1023

2023

5023

10023

56\$\$ f0

5t

end

2. UThCarbide.3 (Input file for UThCarbide.3.output)

=origens

0\$\$ a8 26 e

1\$\$ 1

1t

ORIGEN-S case to determine total Uranium/Thorium Carbide inventory

3\$\$ A16 4 a33 -88 e

2t

35\$\$ 0

4t

56\$\$ 0 6 a6 0 a13 57 5 3 0 2 e

5t

ORIGEN-S case to determine total Uranium/Thorium Carbide inventory

Initial input for the year 2010

60** 10023 20023 30023 100023 300023 1000023

61** f1-15

65\$\$ 3z 1 2z 1 2z 1 2z 1

a25 1 2z 1 2z 1 2z 1

a46 1 2z 1 2z 1 2z 1 e

73\$\$ 892270 952410 952421 952430 60140

481131 170360 962420 962430 962440

962450 962460 962470 270600 551340

551350 551370 631540 631550 260550

10030 531290 360850 410931 410940

280590 280630 932370 912310 822100

461070 611470 942380 942390 942400

942410 942420 882260 882280 441060

511250 340790 621470 621510 501260

380900 430990 902290 902300 902320

922320 922330 922340 922350 922360

922380 400930

74**

4.811E-01

2.172E+03

5.719E-01

1.441E+01
1.121E+02
8.764E+00
1.446E+00
4.453E+01
3.094E+00
7.308E+02
1.975E-01
4.379E-02
1.413E-07
9.581E+01
3.008E+03
1.021E+01
1.735E+06
1.447E+03
1.009E+02
7.954E-02
3.579E+03
1.096E+00
1.092E+05
8.832E+00
1.046E-01
8.817E+00
2.459E+02
8.898E+00
9.687E+00
1.359E-03
4.735E-01
3.109E+01
5.146E+04
1.413E+02
2.149E+02
4.847E+03
3.397E-01
1.540E-03
3.309E+00
1.198E+00
5.726E+02
1.583E+01
3.015E+00
2.754E+04
7.950E+00
1.644E+06
4.000E+02
8.759E+00
5.878E-01
2.729E+00
1.431E+03
3.682E+03
3.157E+02
1.492E+00
1.198E+01
3.150E-02

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5.458E+02

75\$\$ 2 2 2 2 3

3 1 2 2 2

2 2 2 1 3

3 3 3 3 1

3 3 3 3 3

1 1 2 2 2

3 3 2 2 2

2 2 2 2 3

3 3 3 3 3

3 3 2 2 2

2 2 2 2 2

2 3

81\$\$ 2 0 26 1 e

82\$\$ 2 2 2 2 2 2 2 2 2 2

6t

10023

20023

30023

100023

300023

1000023

56\$\$ f0

5t

end

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DOCUMENT INPUT REFERENCE SYSTEM**

1. Document Identifier No./Rev.: CAL-MGR-NU-000003 Rev. 00			Change:	Title: RADIONUCLIDE INVENTORIES FOR DOE SNF WASTE STREAM AND URANIUM/THORIUM CARBIDE FUELS					
Input Document			4. Input Status	5. Section Used in	6. Input Description	7. TBV/TBD Priority	8. TBVDue To		
2a.	2. Technical Product Input Source Title and Identifier(s) with Version	3. Section					Unqual.	From Uncontrolled Source	Un- Confirmed
4	CRWMS M&O 2000. <i>Electronic Data for Radionuclide Inventories for DOE SNF Waste Stream and Uranium/Thorium Carbide Fuels.</i> CAL-MGR-NU-000003 REV 00. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.20000210.0105.	Entire	N/A - Technical Product Output	5 and 6	Output files generated by CAL-MGR-NU-000003 REV 00.	N/A	N/A	N/A	N/A
5	INEEL (Idaho National Engineering and Environmental Laboratory) 1999. <i>CD-Design Basis Event Data (DBE), Revision 1, National Spent Nuclear Fuel Program.</i> Idaho Falls, Idaho: Idaho National Engineering and Environmental Laboratory. ACC: MOL.19990225.0479.	DBE2010 Worksheet	TBV-3238	5	DOE SNF PARAMETERS: SNFID #, SNF NAME, SNF FUEL TYPE, SNF FUEL CONDITION, # OF CANISTERS, ISOTOPIC COMPOSITION, ARFS AND RFS	3	X	N/A	N/A
6	CRWMS M&O 1997. <i>Software Qualification Report for the SCALE Modular Code System Version 4.3.</i> CSCI: 30011 V4.3. DI: 30011-2002, Rev. 01. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19970731.0884.	Entire	N/A - Reference Only	2 and 4	Reference to Software Qualification Report		N/A	N/A	N/A