1 Calculation Overview (1)

The decay heat calculation was performed by using the fission product data from the database. Within the database is a heat load per container in 2010 and 2030, but this data cannot be used directly to provide decay heat for other points in time. Isotopic information is required to provide a continuum of decay heat data for these waste types.

The isotopic data in curies was exported from the database. This data contains the radionuclide information, in curies, for each fuel type per storage container. From this data is where the decay heat for each fuel unit was calculated. The radionuclide data was converted from curies to grams. The next step in the calculation was to convert the grams to watts. This was done in two steps because the decay heat curve generation spreadsheet needed gram inputs of the radionuclides to generate the graphs.

Using the watts per container data, the data was then binned into the decay heat bins. After the fuel types were in the bins, the group that was in each bin had their radionuclide inventory averaged per container to develop the general decay heat curve for each bin.

Below is a description of each of the exported data sets from the database that were used to perform these calculations and generate the tables and figures in the report. (1)

2 Exported data from the INL Database (v6.2.3 – 2011)

The attached Excel spreadsheet provides the calculation method used. Data is exported from the INL SNF database (v6.2.3). No modifications to the data has been made and this data was used in development of the SNF portion of the Decay Heat Report from June 2016. (1) The data in the database is contained in various different reports and queries, the ones used for the calculations are described below.

2.1 Fission Products 2010

This data was the primary data used in the calculation. This data is the average fission product content across the DOE SNF contained in the database, in curies. The headings in the spreadsheet are as follows:

SNFID	ID number assigned to SNF in the database
FUName	Fuel Unit Name of the SNF in the database
FU2035	Count of the Fuel Units that will be in possession in 2035
Fissile35	Fissile Mass of Fuel Unit in 2035 (kg)
UMass35	Mass of Uranium in the Fuel Unit in 2035 (kg)
MTHM35	Metric Tons of Heavy Metal in the Fuel Unit in 2035
Other Columns	The list of isotopes contained in the database broke out for each Fuel Unit that is contained in the database (curies) per container.

2.2 qryCountDispCont

This data is the container count required for the fuel units (in 2035) for the projected total.

SNFID	ID number assigned to SNF in the database

Count17X10	Count of 17X10 containers would be needed for the total SNFID in 2035
Count17X15	Count of 17X15 containers would be needed for the total SNFID in 2035
Count24X10	Count of 24X10 containers would be needed for the total SNFID in 2035
Count24X15	Count of 24X15 containers would be needed for the total SNFID in 2035
CountHIC	Count of HIC containers would be needed for the total SNFID in 2035
CountMCO	Count of MCO containers would be needed for the total SNFID in 2035
CountBWR	Count of BWR containers would be needed for the total SNFID in 2035
CountPWR	Count of PWR containers would be needed for the total SNFID in 2035

2.3 MTHM 2035

This data gives various information on the SNF in 2035. The primary data used in this section for the report was the Record of Decision disposition pathway of each of the fuel units.

SNFID	ID number assigned to SNF in the database
Compound	Fuel compound used in the Fuel Unit
FUConfig	Configuration of the Fuel Unit
Clad	Cladding on the Fuel Units
Site	Where the Fuel Unit was stored (at the date of the database)
FUName	Fuel Unit Name of the SNF in the database
FuCurrent	Count of the Fuel Units that will be in possession at the date of the database
FU2035	Count of the Fuel Units that will be in possession in 2035
UnitABBR	
Fissile Mass (kg)	Fissile Mass of Fuel Unit in 2035 (kg)
Efis%	Effective Fissile percentage of the Fuel Unit
EOLU235Pct	End of Life U-235 percent of the Fuel Unit
UMass(kg)	Mass of Uranium in the Fuel Unit in 2035 (kg)
Mass(kg)	Mass of Fuel Unit
Vol(M3)	Volume of Fuel Unit
MTHM35	Metric Tons of Heavy Metal in the Fuel Unit in 2035
RODStorSite	Record of Decision Storage Site
DispositionAbbr	Disposition pathway abbreviation
DispositionDesc	Disposition decision for each fuel unit

3 References

WILSON, J. Decay Heat of Selected DOE-Managed Waste Materials. June 2016. FCRD-UFD-2016-000636 SRNL-RP-2016-00249.