

Memo

To: Nancy Darling
From: Drew Thatcher
CC: Gary Robertson
Date: 4/28/2010
Re: EIS Source Term Documentation

This memo and MICROSHIELD attachments serve to outline the process for the calculation and use of the source term for the LLRW EIS. It should be noted that these calculations were only used for the pathway analysis for the material removed by drilling a well onsite and are not used for the groundwater source term (although the numbers should equate). The output of the MICROSHIELD files were then used as the input for the numerous EXCEL files that calculated dose for the various alternatives.

The flowpath for source term calculations at the disposal site is as follows:

1. Mike Elsen provided an inventory projection for 19 radionuclides [Elsen, M. 1997]. The inventory included the activity to date through 1996 and a projection of future disposal volumes based upon the disposal activity for 1993 through 1996.
2. Using Elsen's average yearly disposal activity for each radionuclide, estimates of the total activity per radionuclide for each closure date were made. This data is contained in the file USEDECY3.XLS. These closure projections are subject to a few limitations for the consideration of ingrowth and decay. For the original source term through 1996, decay and ingrowth are included in the projections for the three closure dates for any future time period (beyond 1996). For projected activity beyond 1996, ingrowth is only considered from the closure date although decay is considered for each year of additional activity estimated.
3. Ingrowth and decay calculations are performed for the projected closure dates with the use of the MICROSHIELD computer code [Grove Engineering. 1998] based upon the projections contained in USEDECY3.XLS. Separate files are used for each closure date and are separated into four source terms that represent the 1996 original activity estimates, future projections, and the source term estimates for the PGE Trojan reactor and the WNP-2 reactor. The MICROSHIELD files for the three closure dates are as follows:
 - For the 2056 closure date the four files and their function are as follows:
 - 1. 19962163.MS5 Represents the 1996 inventory that is decay corrected to the year 2163, the year institutional controls are assumed to lapse.
 - 2. 2163ADDL.MS5 Represents the projected inventory from 1996 to 2056. What is entered into MICROSHIELD is the 2056 decay corrected activity of each radionuclide (projected and calculated in USEDECY3.XLS). The MICROSHIELD code then calculates the external dose rate and the decayed concentrations for the year 2163.

- 3. PGE2163.MS5 Represents the PGE inventory. The inventory is assumed to be disposed as a lump sum. The inventory is decayed to the year 2163.
 - 4. WNP22163.MS5 Same as that for WNP2 except for a different disposal date.
- For the year 2000 closure date:
1. 19962107.MS5 Represents the 1996 inventory that is decay corrected to the year 2107, the year institutional controls are assumed to lapse.
 2. 20002107.MS5 Represents the projected inventory from 1996 to 2000. What is entered into MICROSHIELD is the 2000 decay corrected activity of each radionuclide (projected and calculated in USEDECY3.XLS). The MICROSHIELD code then calculates the external dose rate and the decayed concentrations for the year 2107.
 3. PGE2107.MS5 Represents the PGE inventory, disposed as a lump sum, decayed to the year 2107.
 4. WNP2 waste from disposal is not included in the year 2000 closure as the reactor is still operating.
- For the year 2215 closure date:
1. 19962322.MS5 Represents the 1996 inventory, decay corrected to the year 2322, the year institutional controls are assumed to lapse.
 2. 20562322.MS5 Represents the projected inventory from 1996 to 2056. The file contains the year 2056 decay corrected activity. MICROSHIELD calculates the ingrowth from 2056 and decays this to the year 2322.
 3. 22152322.MS5 Represents the projected inventory from 2056 to 2215. The file contains the year 2215 decay corrected activity. MICROSHIELD calculates the ingrowth from 2215 and decays this to the year 2322.
 4. WNP22322.MS5 and PGE2322.MS5 Represents the PGE and WNP2 inventory. The inventory is assumed to be disposed as a lump sum. The inventory is decayed to the year 2322.

In addition, three files are also created to specifically estimate the contribution from the NARM waste. Those files are NARM2000.MS5, NARM2056.MS5, and NARM2215.MS5. These files all consider the incremental impact of NARM for the three closure dates, decay and ingrowth correcting to the three dates for the assumed lapse of institutional controls, 2107, 2163, and 2322 respectively.

4. The results from the MICROSHIELD files are combined for each closure date and entered into the spreadsheets for each alternative considered.

REFERENCES

Elsen, M. DOH memo to Maxine Dunkelman regarding inventory projection. Washington Department of Health, July 21, 1997.

Grove Engineering, Microshield, version 5.03, Rockville, MD., 1998.