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September 17, 2002
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U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen,

Subject: Saxton Nuclear Experimental Corporation (SNEC)
Operating License No., DPR-4
Docket No. 50-146
DCGL Tables and Bounding Equation Submittal

On September 12, 2002, two electronic files were e-mailed to you. These files contained an Excel spreadsheet with the latest SNEC DCGLs and a Word document with a bounding equation to calculate radiation dose. The purpose of this letter is to provide you with the hardcopy information that was contained in the e-mail. These hardcopies are attached for your information.

If you have any questions on this information, please contact Mr. James Byrne at (717) 948-8461.

Sincerely,

G. A. Kuehn
Program Director, SNEC

cc: NRC Project Manager
NRC Project Scientist, Region 1

A001

SNEC DCGLs

25 mrem/yr Limit

Isotope	DCGL (pCi/g)	Model - All Pathways Scenario	Dose Run File Location [1]
Am-241	9.9	Subsurface - Undisturbed Bedrock	AW-Bedrock\Am-241\Deterministic\Summary.REP
C-14	2	Subsurface - Spray Pond Overburden	AW-Overburden\C-14\Deterministic\Summary.REP
Co-60	3.5	Surface - Upper 1 Meter of Soil	ALL RUNS\NEW CO-60\NEW C060.SUM
Cs-137	6.6	Surface - Upper 1 Meter of Soil	ALL RUNS\NEW CS-137\NEW CS137.SUM
Eu-152	10.1	Surface - Upper 1 Meter of Soil	ALL RUNS\NEW EU-152\NEW EU152.SUM
H-3	132	Subsurface - Undisturbed Bedrock	AW-Bedrock\H-3\Deterministic\Summary.REP
Ni-63	747	Surface - Upper 1 Meter of Soil	ALL RUNS\NEW NI-63\NEW NI63.SUM
Pu-238	1.8	Subsurface - Undisturbed Bedrock	AW-Bedrock\Pu-238\Deterministic\Summary.REP
Pu-239	1.6	Subsurface - Undisturbed Bedrock	AW-Bedrock\Pu-239\Deterministic\Summary.REP
Pu-241	86	Subsurface - Undisturbed Bedrock	AW-Bedrock\Pu-241\Deterministic\Summary.REP
Sr-90	1.2	Surface - Upper 1 Meter of Soil	ALL RUNS\NEW SR-90\NEW SR90.SUM

4 mrem/yr Drinking Water (DW) Goal

Isotope	DCGL (pCi/g)	Model - DW Scenario	Dose Run File Location [1]
Am-241	2.3	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Am-241\Deterministic\Summary.Rep
C-14	5.4	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\C-14\Deterministic\Summary.Rep
Co-60	67	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Co-60\Deterministic\Summary.Rep
Cs-137	397	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Cs-137\Deterministic\Summary.Rep
Eu-152	1440	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Eu-152\Deterministic\Summary.Rep
H-3	31.1	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\H-3\Deterministic\Summary.Rep
Ni-63	1.90E+04	Subsurface - Undisturbed Overburden	Spray Ponds\Overburden\DW From Overburden\Ni-63\Deterministic\Summary.Rep
Pu-238	0.41	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Pu-238\Deterministic\Summary.Rep
Pu-239	0.37	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Pu-239\Deterministic\Summary.Rep
Pu-241	19.8	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Pu-241\Deterministic\Summary.Rep
Sr-90	0.61	Subsurface - Undisturbed Bedrock	Bedrock\DW From Bedrock\Sr-90\Deterministic\Summary.Rep

Footnote 1: Subsurface files are found in URS CD ROM disks. Surface files are found on SNEC CD ROM disks.

6.2.1 Building Occupancy Scenario

For the two-dimensional surface area model, the building occupancy scenario is used as the best representation. This model applies to the SNEC Containment Vessel (CV), SSGS, tunnels and/or other impacted site structures. Since these structures will either be demolished or left behind, the building occupancy scenario is most representative. Other buildings (garages and support structures) left behind will be surveyed and released using the building occupancy scenario. DandD Version 1.0 has been used as the preferred modeling software for the building occupancy scenario.

The exposure pathways selected for analysis in the building occupancy scenario include external exposure to penetrating radiation from surface sources, inhalation of resuspended surface contamination, and inadvertent ingestion of surface contamination. The selection of these pathways provides a balanced analysis for

a) External exposure to penetrating radiation from surface sources;
b) Inhalation of resuspended surface contamination;
c) Inadvertent ingestion of surface contamination; and
d) External exposure to penetrating radiation from embedded sources.

This scenario accounts for exposure to both fixed and removable thin-layer or surface radioactivity within a structure. This scenario assumes individuals (critical group) occupy the building in a passive mode without deliberately disturbing the residual radioactivity on building surfaces. Occupancy of the building is assumed to begin immediately after license termination. The exposure duration is assumed to be a full work year (approximately 2000 hours). The selection of this scenario assumes the following site conditions will exist to qualify:

1. The contamination on building surfaces (e.g. walls, floors, and ceilings) should be surficial and non-volumetric.
2. Contamination on surfaces is mostly fixed (not loose) with the fraction of loose contamination not to exceed 10% of the total surface activity.
3. This screening criteria will not apply to surfaces such as on buried components or conduit (e.g. drainage or sewer pipes). Such component and conduit surfaces will be treated on a case by case basis.

Surface contamination DCGLs were developed through the use of the DandD computer code using the standard default parameters. The results from the DandD runs for each of the 11 site related radionuclides are in units of mrem TEDE per dpm/100 cm^2. Default surface area DCGLs (Reference 6-8) are listed in Table 6-2. These default values were verified using DandD. The DandD output for the building occupancy scenario model is contained in Appendix 6-1.

Building and component surfaces will be decontaminated to as low as reasonably achievable to meet the release criteria building occupancy screening levels. For building debris that cannot be assessed using the surface screening criteria, a volumetric assessment of the materials will be made. These materials will be characterized (if not already known) as to radionuclide contaminant(s), type of material, corrosivity rates (metals), and leach rates (concrete/debris) for input. This switch to volumetric consideration brings the resident farmer scenario back as the release scenario. Since some of the material will

be buried 3 feet below grade the contamination zone may be in the saturated zone. A subsurface volumetric dose model has been developed to evaluate this condition.

Exposure pathway (d) listed above applies to areas where there is penetrating radiation from embedded sources of radioactivity, such as embedded piping. To the extent practical embedded sources will be encapsulated in a grout/concrete matrix. For modeling this scenario a bounding calculation using sum of the fractions method will be employed. This method will combine applicable surface and volumetric DCGLs along with a shielding code (e.g. MicroShield) to calculate the respective dose from residual activity remaining on structural surfaces, within residual piping, walls and floors or within activated metal (e.g. CV steel liner). Use of Equation 6-1 will ensure the combined exposure is bounded for all applicable sources and less than the 25 mrem/yr limit.

Equation 6-1

$$\sum_{i=1}^{n}\left(\frac{C_{si}}{DCGL_{si}}+\frac{C_{vi}}{DCGL_{vi}}\right)+\left[\frac{Direct\ \gamma\ Dose}{25}\right]\leq 1$$

Where: C_{si} = Surface contamination of radionuclide i (dpm/100 cm^2).
C_{vi} = Specific volume concentration of radionuclide i (pCi/g).
$DCGL_{si}$ = Surface contamination DCGL of radionuclide i from Table 6-2.
$DCGL_{vi}$ = Volumetric DCGL (25 mrem/yr) of radionuclide i from Table 6-2.
Direct γ Dose = Microshield (or equivalent) shielding code calculation (mrem/yr).