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April 25, 2005  
E910-05-009

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

Gentlemen:

Subject: Saxton Nuclear Experimental Corporation (SNEC)  
Operating License No. DPR-4  
Docket Nos. 50-146  
2004 Annual Radioactive Effluent Releases Report

The Annual Radioactive Effluent Releases Report required by SNEC Technical Specification 3.8.2.3; and the Off-Site Dose Calculation Manual Part 3, Section 2.0 is enclosed.

Attachment 1 contains a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the site as outlined in Reg. Guide 1.21, Rev. 1, with data summarized on a quarterly basis following the format of Appendix B thereof.

Attachment 2 contains information for each type of solid waste shipped offsite during the report period including the container volume, total curie quantity (specified as determined by measurement or estimate), principal radionuclides (specified as determined by measurement or estimate), type of waste, type of shipment and solidification agent(s).

Attachment 3 includes a summary of unplanned releases from the site to unrestricted areas of radioactive materials in gaseous and liquid effluents made during the reporting period.

Attachment 4 describes any changes made during 2004 to the Process Control Program (PCP) documents or to the Offsite Dose Calculation Manual (ODCM) and a listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to Part 1, Control 2.3.2 of the ODCM.

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Attachment 5 reports all instrumentation not returned to operable status within 30 days per the SNEC ODCM Part 1, Control 2.1.2.b.

Attachment 6 is an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the respective unit during 2004.


Attachment 7 is an assessment of the radiation doses from the radioactive liquid and gaseous effluents to members of the public due to their activities inside the site boundary during 2004.

Attachment 8 is an assessment of the radiation doses to the likely most exposed real individual from reactor releases and other nearby uranium fuel cycle sources including doses from primary effluent pathways and direct radiation for 2004. This assessment shows conformance with 40 CFR 190 "Environmental Radiation Protection Standards for Nuclear Power Operation."

Attachment 9 is a summation of deviations from the sampling and analysis regime specified in the SNEC ODCM.

Please contact Art Paynter (Radiation Safety Officer) at (814) 635-4384 if you have any questions concerning this report.

Sincerely,



G. A. Kuehn  
Program Director, SNEC

AFP  
Attachments

cc: NRC Project Manager NRR  
NRC Project Scientist, Region1

Attachment 1  
2004 Annual Radioactive Effluent Releases Report for SNEC  
E910-05-009

**Summary of Radioactive Liquid and Gaseous Effluents  
and Solid Waste Released from SNEC during 2004**

There were no radioactive liquid or gaseous effluents released from SNEC during 2004.  
There were no solid waste shipments that met the requirements as outlined in Reg. Guide 1.21,  
Rev. 1 released from SNEC during 2004.

Attachment 2  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**Solid Waste Shipped Offsite During 2004**

There were no solid waste shipments that meet the reporting criteria.

Attachment 3  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**Summary of Unplanned Releases from the SNEC Facility Site During 2004**

There were no unplanned releases to unrestricted areas from SNEC site during 2004.

**Changes to the Process Control Program and the  
Offsite Dose Calculation Manual during 2004,  
and a listing of new locations for dose calculations and/or environmental monitoring  
identified by the land use census**

**1. Changes to the Process Control Program**

There were no revisions to this program or procedure in 2004.

**2. Changes to the Offsite Dose Calculation Manual during 2004**

There were no revisions to this manual in 2004.

**3. A listing of new locations for dose calculations and/or environmental monitoring  
identified by the land use census**

Per the SNEC ODCM Section 2.3.2 broad leaf vegetation was collected and analyzed for gamma-emitting radionuclides in lieu of performing a land use census. Therefore, no new environmental monitoring locations were identified.

Attachment 5  
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**Instrumentation not returned to operable status within 30 days during 2004**

RMA-1 was shut down in October 2003. In 2004, it was permanently removed from service as permitted by Licensing Amendment 19 dated January 9, 2004.

During the CV Upper Dome removal, because of successful decontamination work on the CV Shell, there were no activities that had the potential to cause a MEASURABLE RELEASE to the environment. Therefore, there were no requirements for monitoring or instrumentation.

There was no instrumentation not returned to operable status within 30 days per the SNEC ODCM Part 1, Control 2.1.2.b. during 2004.

**Assessment of Radiation Doses Due to Radioactive Liquid and Gaseous Effluents  
Released from SNEC during 2004**

The attached table presents the maximum hypothetical doses to an individual and the general population resulting from 2004 SNEC releases of gaseous and liquid effluents. Provided below is a brief explanation of the table.

A. Liquid (Individual)

SNEC released no liquid effluents in 2004.

B. Gaseous (Individual)

There were no noble gases released from SNEC during 2004, the gamma and beta air doses were zero.

There were no particulate or tritium gaseous releases from SNEC during 2004. Therefore, the maximum organ dose due to the release of particulates and tritium from SNEC in 2004 was zero to the liver, total body, thyroid, kidney, lung and GI tract of a child residing 200 meters from the site in the N sector.

Note: In accordance with SNEC ODCM, four major pathways are considered in the dose calculations for SNEC gaseous effluents. These were: (1) individual inhalation of airborne nuclides (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man (3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man. In lieu of real time meteorology, the highest average gaseous dispersion factor was used in all dose calculations for gaseous effluents.



Attachment 6  
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C. Liquid and Gaseous (Population)

SNEC released no liquid or gaseous effluents in 2004. Therefore, the dose was calculated to be zero. These doses were summed over all pathways and the affected populations.

Note: The person-rem doses from gaseous effluents were based upon the population estimate and age distribution assumed in the analysis provided in GPU Nuclear letter to the Commissioners 6L20-98-20105 (Docket No. 50-146). Consistent with this analysis, dose calculations were not performed beyond 10 miles as specific population data is not easily available and releases from the site are considered to be at ground level. As a result, releases of particulates beyond 10 miles will be insignificant since it is assumed diffusion and wet and dry deposition beyond 10 miles will deplete the plume before it reaches 10 miles.

Additionally, since the plant has been shut down for so long and all spent fuel has been removed from the site, iodines and noble gases no longer exist.

SNEC gaseous effluents resulted in a whole body population dose of zero person-rem.

For 2004, SNEC liquid and gaseous effluents were estimated to be zero well below the maximum hypothetical doses of the quarterly and yearly 10 CFR 50 Appendix I limits.

Attachment 7  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**Assessment of Radiation Doses from Liquid and Gaseous Effluents Releases to  
Members of the Public within the SNEC Facility Site Boundaries during 2004**

The Offsite Dose Calculation Manual requires an assessment of the radiation doses from radioactive liquid and gaseous effluents to members of public due to their activities inside the site boundary during the reporting period. The public did not have unrestricted access to the SNEC site during 2004. Therefore, no assessment of this dose is applicable.

Attachment 8  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**Assessment of Radiation Dose to Most Likely Exposed Real Individual per 40 CFR 190**

Dose calculations were also performed to demonstrate compliance with 40 CFR 190 (ODCM Part II Section 6). Gaseous and liquid effluents released from SNEC in 2004 would have resulted in maximum individual doses (regardless of age group) of zero mrem to any organ including the whole body. The direct radiation component was determined using the highest 2004 fence line exposure rate as measured by a TLD and subtracting from it the lowest TLD exposure rate. This method more accurately determines the exposure from SNEC by subtracting out the exposure rate from other sources of radiation in the environment. Based on the maximum exposure rate of  $7.80\text{E}+00$  mrem/standard-month, a person residing at the fenceline for 67 hours (shoreline exposure from Reg. Guide 1.109) would have received an exposure of  $7.16\text{E}-01$  mrem. Based on the lowest exposure rate of  $4.00\text{E}+00$  mrem/standard-month and converting it by the same method gives a background exposure of  $3.671\text{E}-01\text{mR}$ . Therefore, the net exposure from direct radiation from SNEC is  $3.49\text{E}-01$  mrem. Combining the direct radiation exposure (assumed to be equal to dose) with the maximum organ doses from liquid and gaseous releases, the maximum potential (total) dose would have been  $3.94\text{E}-01\text{mrem}$  to any organ. Both doses are well below the limits specified in 40 CFR 190.

Table 1

Summary of Maximum Individual Offsite Doses for SNEC  
2004

Effluent	Quarter 1		Quarter 2		Quarter 3		Quarter 4		Annual	
	(mrem)	% Limit	(mrem)	% Limit	(mrem)	% Limit	(mrem)	% Limit	(mrem)	% Limit
Liquid Whole Body	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%
Liquid Organ	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%
Airborne Particulates	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%	0.00E+00	0.000000%

Maximum Exposed Individual per 40 CFR 190

Estimated Maximum Organ Dose (Including Whole Body) for Liquid Effluents (mrem)	0.00E+00
Estimated Maximum Organ Dose (Including Whole Body) for Gaseous Effluents (mrem)	0.00E+00
Maximum Exposure to Direct Radiation Based on 67 Hour Occupancy at Site Boundary (mrem)	3.49E-01
Total Estimated Exposure (mrem)	3.49E-01
Percent of Limit	1.39600%

Attachment 9  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**Deviation from the ODCM Sampling and Analysis Regime during 2004**

There were zero sampling and analysis regime deviations during 2004.

Enclosure 1  
2004 Annual Radioactive Effluent Releases Report for SNEC  
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**SNEC Facility Offsite Dose Calculation Manual, Revision 5**  
**E9000-PLN-4542.08**

This manual was not revised in 2004. Revision 5 was included in the 2003 Annual Radioactive Effluent Releases Report (ML041310347). Therefore, it is not included in this report.