10-3002969

Nuclear Fuel Services, Inc.
P.O. Box 337, MS 123
Erwin, TN 37650

(423) 743-9141

CERTIFIED MAIL
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GOV-01-55-03
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February 28, 2000

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Mr. Luis A. Reyes, Regional Administrator
U. S. Nuclear Regulatory Commission
Region II, Atlanta Federal Center
61 Forsyth Street, SW, Suite 23T85
Atlanta, GA 30303

References: 1) Docket No. 70-143; SNM License 124

Subject: **Bi-Annual Effluent Monitoring Report July - December 1999**

Dear Mr. Reyes:

In accordance with the requirements set forth in 10 CFR, Part 70.59, Nuclear Fuel Services, Inc. (NFS) submits the attached reports. Attachment A reports the Radioactivity in Effluent Liquid for the period July-December 1999. Attachment B reports the Radioactivity in Effluent Air for the period July-December 1999. Attachment C summarizes an evaluation of the dose and air activity concentration for the maximally exposed offsite individual, due to effluents during the period July-December 1999. A minor formatting change was made in the reports provided in Attachments A and B. The last column in these reports was changed from a percent value to a fraction value for each individual radionuclide listed. These fractions are summed to give a "Total" sum of fractions for each effluent source.

If you or your staff have any questions, require additional information, or wish to discuss this, please contact me or Ms. Janice Greene, Environmental Safety Manager at (423) 743-1730. Please reference our unique document identification number (21G-00-0026) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

B. Marie Moore
Vice President
Safety and Regulatory

TEH/rcy

Attachments

NMSS

21G-00-0026
GOV-01-55-03
ACF-00-0032

xc: Mr. William Gloersen, Project Inspector
U. S. Nuclear Regulatory Commission
Region II, Atlanta Federal Center
61 Forsyth Street, SW
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Atlanta, GA 30303

Director
Office of Nuclear Material Safety & Safeguards
U. S. Nuclear Regulatory Commission
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Senior Resident Inspector
U. S. Nuclear Regulatory Commission

21G-00-0026
GOV-01-55-03
ACF-00-0032

Attachment A
To Letter Dated February 28, 2000
B. M. Moore to Mr. Luis A. Reyes (NRC)

Report of Radioactivity in Effluent Liquid for the Period July - December 1999

(One Page to Follow)

Radioactivity in Effluent Liquid
July 1, 1999 to December 31, 1999

Location	Total Volume (l)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECL*
Banner Spring Down							
Pu-238	266,863,608	-7.36E-12	1.32E-10	2.19E-10	-1.96E-06	-1.15E-07	-3.68E-04
Pu-239/240	266,863,608	1.51E-10	1.62E-10	2.69E-10	4.03E-05	6.48E-04	7.56E-03
Tc-99	266,863,608	1.63E-09	6.26E-09	1.30E-08	4.35E-04	2.57E-02	2.72E-05
Th-228	266,863,608	9.58E-12	1.77E-10	4.39E-10	2.56E-06	3.12E-09	4.79E-05
Th-230	266,863,608	3.05E-10	2.88E-10	3.00E-10	8.15E-05	4.03E-03	3.05E-03
Th-232	266,863,608	4.65E-11	1.36E-10	2.71E-10	1.24E-05	1.14E+02	1.55E-03
U-234	266,863,608	7.74E-09	1.60E-09	3.30E-10	2.07E-03	3.31E-01	2.58E-02
U-235/236	266,863,608	3.48E-10	2.62E-10	2.72E-10	9.28E-05	4.30E+01	1.16E-03
U-238	266,863,608	1.12E-09	4.94E-10	2.67E-10	2.99E-04	8.91E+02	3.73E-03
						Total:	4.26E-02
Sewer							
Pu-238	20,149,362	-1.39E-13	2.52E-10	4.56E-10	-2.80E-09	-1.64E-10	-6.94E-07
Pu-239/240	20,149,362	1.12E-10	2.11E-10	4.03E-10	2.26E-06	3.63E-05	5.60E-04
Tc-99	20,149,362	2.14E-08	7.07E-09	1.36E-08	4.32E-04	2.56E-02	3.57E-05
Th-228	20,149,362	1.17E-10	2.78E-10	6.23E-10	2.37E-06	2.89E-09	5.87E-05
Th-230	20,149,362	6.98E-10	5.19E-10	4.53E-10	1.41E-05	6.96E-04	6.98E-04
Th-232	20,149,362	1.57E-11	8.07E-11	4.25E-10	3.16E-07	2.90E+00	5.23E-05
U-234	20,149,362	2.02E-08	3.54E-09	5.33E-10	4.06E-04	6.51E-02	6.72E-03
U-235/236	20,149,362	8.77E-10	5.27E-10	3.86E-10	1.77E-05	8.18E+00	2.92E-04
U-238	20,149,362	3.63E-09	1.13E-09	4.50E-10	7.31E-05	2.18E+02	1.21E-03
						Total:	9.63E-03
WWTF							
Cs-137	2,911,911	1.66E-08	3.59E-09	2.96E-09	4.82E-05	5.54E-07	1.66E-02
Na-22	2,911,911	6.66E-08	8.88E-09	3.07E-09	1.94E-04	3.11E-08	1.11E-02
Pu-238	2,911,911	1.80E-11	9.28E-11	1.26E-10	5.25E-08	3.07E-09	9.02E-04
Pu-239/240	2,911,911	2.13E-10	1.31E-10	1.45E-10	6.22E-07	9.99E-06	1.07E-02
Ra-224	2,911,911	3.58E-08	2.25E-08	3.58E-08	1.04E-04	6.56E-10	1.79E-01
Ra-226	2,911,911	1.86E-09	2.98E-10	2.91E-10	5.42E-06	5.48E-06	3.10E-02
Tc-99	2,911,911	8.33E-07	2.18E-08	1.34E-08	2.43E-03	1.44E-01	1.39E-02
Th-228	2,911,911	6.67E-11	2.49E-10	4.15E-10	1.94E-07	2.37E-10	3.34E-04
Th-230	2,911,911	5.79E-10	2.72E-10	2.03E-10	1.69E-06	8.35E-05	5.79E-03
Th-232	2,911,911	1.22E-11	7.69E-11	1.71E-10	3.56E-08	3.26E-01	4.07E-04
U-234	2,911,911	4.40E-08	5.57E-09	2.47E-10	1.28E-04	2.05E-02	1.47E-01
U-235/236	2,911,911	3.11E-09	7.04E-10	2.20E-10	9.06E-06	4.19E+00	1.04E-02
U-238	2,911,911	3.92E-09	8.20E-10	2.39E-10	1.14E-05	3.41E+01	1.31E-02
						Total:	4.40E-01

*ECL: Effluent Concentration Limit from 10CFR 20, Appendix B

21G-00-0026
GOV-01-55-03
ACF-00-0032

Attachment B
To Letter Dated February 28, 2000
B. M. Moore to Mr. Luis A. Reyes (NRC)

Report of Radioactivity in Effluent Air for the Period July - December 1999

(Three Pages to Follow)

Radioactivity in Effluent Air
July 1, 1999 to December 31, 1999

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECL[1]
Main Stack 416	**1147.47 m^3/min**		**19.12 m^3/sec**				
Tc-99	310,313,078	2.44E-11	9.12E-14	3.40E-14	7.56E-03	4.48E-01	2.71E-02
Th-228	310,313,078	1.01E-16	1.42E-17	1.37E-17	3.13E-08	3.85E-11	5.07E-03
U-232	310,313,078	4.59E-16	6.41E-17	6.15E-17	1.42E-07	6.65E-09	4.59E-02
U-234	310,313,078	4.31E-13	2.86E-14	2.09E-14	1.34E-04	2.14E-02	8.63E+00
U-235	310,313,078	7.91E-15	4.95E-16	3.50E-16	2.46E-06	1.14E+00	1.32E-01
U-236	310,313,078	7.83E-14	5.54E-15	4.22E-15	2.43E-05	3.74E-01	1.30E+00
U-238	310,313,078	2.63E-16	1.76E-17	1.29E-17	8.17E-08	2.44E-01	4.39E-03
						Total:	**1.01E+01**
Stack 185 Bldg. 131	**70.37 m^3/min**		**1.17 m^3/sec**				
Tc-99	18,543,210	5.21E-14	2.88E-14	3.78E-14	9.66E-07	5.72E-05	5.79E-05
U-234	18,543,210	1.48E-15	4.58E-15	9.54E-15	2.74E-08	4.40E-06	2.96E-02
U-238	18,543,210	2.87E-15	8.88E-15	1.85E-14	5.33E-08	1.59E-01	4.79E-02
						Total:	**7.75E-02**
Stack 2" Bldg. 234	**185.44 m^3/min**		**1.76 m^3/sec**				
Am-241	27,785,069	2.40E-15	1.22E-15	1.45E-15	6.66E-08	1.94E-08	1.20E-01
Pu-238	27,785,069	4.78E-16	2.43E-16	2.89E-16	1.33E-08	7.76E-10	2.39E-02
Pu-239	27,785,069	4.93E-15	2.49E-15	2.95E-15	1.37E-07	2.20E-06	2.46E-01
Pu-240	27,785,069	1.68E-15	8.50E-16	1.01E-15	4.67E-08	2.05E-07	8.40E-02
Pu-241	27,785,069	2.83E-14	6.60E-15	5.90E-15	7.86E-07	7.63E-09	3.54E-02
						Total:	**5.18E-01**
Stack 28 Bldg. 234	**141.03 m^3/min**		**2.35 m^3/sec**				
Am-241	37,164,547	2.94E-15	1.27E-15	1.48E-15	1.09E-07	3.19E-08	1.47E-01
Pu-238	37,164,547	5.88E-16	2.54E-16	2.97E-16	2.19E-08	1.28E-09	2.94E-02
Pu-239	37,164,547	5.96E-15	2.56E-15	3.00E-15	2.22E-07	3.56E-06	2.98E-01
Pu-240	37,164,547	2.04E-15	8.78E-16	1.03E-15	7.59E-08	3.33E-07	1.02E-01
Pu-241	37,164,547	2.58E-14	6.35E-15	6.01E-15	9.58E-07	9.30E-09	3.22E-02
						Total:	**6.09E-01**
Stack 332 Bldg. 120	**50.18 m^3/min**		**0.84 m^3/sec**				
Tc-99	13,222,764	6.84E-14	3.13E-14	3.78E-14	9.05E-07	5.35E-05	7.60E-05
Th-228	13,222,764	4.30E-16	8.50E-16	1.63E-15	5.68E-09	6.94E-12	2.15E-02
Th-230	13,222,764	2.00E-16	3.96E-16	7.57E-16	2.64E-09	1.31E-07	1.00E-02
Th-232	13,222,764	4.22E-16	8.36E-16	1.60E-15	5.58E-09	5.12E-02	1.06E-01
U-234	13,222,764	3.40E-15	6.73E-15	1.29E-14	4.50E-08	7.21E-06	6.80E-02
U-235	13,222,764	5.56E-16	1.10E-15	2.10E-15	7.35E-09	3.40E-03	9.26E-03
U-238	13,222,764	2.41E-15	4.76E-15	9.12E-15	3.18E-08	9.50E-02	4.01E-02
						Total:	**2.55E-01**
Stack 3"o Bldg. 301	**119.34 m^3/min**		**1.9" m^3/sec**				
Tc-99	31,183,933	6.70E-14	1.94E-14	2.69E-14	2.09E-06	1.24E-04	7.44E-05
U-234	31,183,933	7.93E-15	9.82E-15	1.96E-14	2.47E-07	3.96E-05	1.59E-01
U-235	31,183,933	1.21E-16	1.49E-16	2.99E-16	3.76E-09	1.74E-03	2.01E-03

[1] ECL Effluent Concentration Limit from 10-CFR 20, Appendix B. Fraction of ECL in the stack is provided for reference only. Concentrations at off-site receptors are significantly less than those reported here (at stack) due to the atmospheric dispersion that occurs before the effluent exits the site.

Radioactivity in Effluent Air
July 1, 1999 to December 31, 1999

Location	Total Volume (m^3)	Activity Concentration ($\mu Ci/ml$)	Error Estimate ($\mu Ci/ml$)	LLD ($\mu Ci/ml$)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECL[1]
Stack 576 Bldg. 381		**118.34 m^3/min**	**1.97 m^3/sec**				
U-236	31,183,933	4.02E-18	4.98E-18	9.97E-18	1.25E-10	1.93E-06	6.70E-05
U-238	31,183,933	2.41E-18	2.99E-18	5.98E-18	7.53E-11	2.25E-04	4.02E-05
						Total:	**1.61E-01**
Stack 421 Bldg. 100		**30.30 m^3/min**	**0.50 m^3/sec**				
Tc-99	7,984,400	8.55E-14	2.12E-14	2.69E-14	6.83E-07	4.04E-05	9.50E-05
Th-228	7,984,400	4.98E-17	1.45E-17	1.99E-17	3.97E-10	4.85E-13	2.49E-03
U-232	7,984,400	2.24E-16	6.51E-17	8.97E-17	1.79E-09	8.36E-11	2.24E-02
U-234	7,984,400	3.97E-14	1.15E-14	1.59E-14	3.17E-07	5.08E-05	7.95E-01
U-235	7,984,400	5.72E-16	1.66E-16	2.29E-16	4.57E-09	2.12E-03	9.54E-03
U-236	7,984,400	9.17E-15	2.67E-15	3.67E-15	7.32E-08	1.13E-03	1.53E-01
U-238	7,984,400	2.49E-17	7.23E-18	9.97E-18	1.99E-10	5.93E-04	4.15E-04
						Total:	**9.82E-01**
Stack 547 Bldg. 100		**54.93 m^3/min**	**0.92 m^3/sec**				
Tc-99	14,476,389	7.17E-14	3.18E-14	3.72E-14	1.04E-06	6.14E-05	7.97E-05
Th-228	14,476,389	8.87E-18	1.50E-17	2.77E-17	1.28E-10	1.57E-13	4.44E-04
U-232	14,476,389	3.99E-17	6.74E-17	1.24E-16	5.78E-10	2.70E-11	3.99E-03
U-234	14,476,389	7.08E-15	1.20E-14	2.21E-14	1.03E-07	1.64E-05	1.42E-01
U-235	14,476,389	1.02E-16	1.72E-16	3.18E-16	1.48E-09	6.84E-04	1.70E-03
U-236	14,476,389	1.63E-15	2.76E-15	5.09E-15	2.37E-08	3.64E-04	2.72E-02
U-238	14,476,389	4.44E-18	7.49E-18	1.38E-17	6.42E-11	1.92E-04	7.39E-05
						Total:	**1.75E-01**
Stack 573 Bldg 306-W		**92.57 m^3/min**	**1.54 m^3/sec**				
Tc-99	25,193,248	7.70E-14	2.46E-14	3.49E-14	1.94E-06	1.15E-04	8.55E-05
U-234	25,193,248	9.54E-15	1.26E-14	2.54E-14	2.40E-07	3.85E-05	1.91E-01
U-235	25,193,248	1.45E-16	1.91E-16	3.87E-16	3.66E-09	1.69E-03	2.42E-03
U-236	25,193,248	4.84E-18	6.38E-18	1.29E-17	1.22E-10	1.88E-06	8.07E-05
U-238	25,193,248	2.91E-18	3.83E-18	7.74E-18	7.32E-11	2.19E-04	4.84E-05
						Total:	**1.93E-01**
Stack 583 Bldg. 234		**10.82 m^3/min**	**0.18 m^3/sec**				
Am-241	2,852,463	2.68E-15	1.39E-15	1.48E-15	7.65E-09	2.23E-09	1.34E-01
Pu-238	2,852,463	5.36E-16	2.78E-16	2.96E-16	1.53E-09	8.95E-11	2.68E-02
Pu-239	2,852,463	5.44E-15	2.82E-15	3.00E-15	1.55E-08	2.49E-07	2.72E-01
Pu-240	2,852,463	1.86E-15	9.66E-16	1.03E-15	5.31E-09	2.33E-08	9.31E-02
Pu-241	2,852,463	8.49E-14	1.05E-14	6.00E-15	2.42E-07	2.35E-09	1.06E-01
						Total:	**6.32E-01**
Stack 600 Bldg. 110		**290.45 m^3/min**	**4.84 m^3/sec**				
Tc-99	79,047,764	2.09E-13	3.02E-14	3.49E-14	1.65E-05	9.76E-04	2.32E-04
Th-228	79,047,764	3.53E-17	1.59E-17	2.58E-17	2.79E-09	3.41E-12	1.77E-03
U-232	79,047,764	1.59E-16	7.14E-17	1.16E-16	1.26E-08	5.87E-10	1.59E-02
U-234	79,047,764	2.82E-14	1.27E-14	2.06E-14	2.23E-06	3.57E-04	5.64E-01

[1] ECL: Effluent Concentration Limit from 10 CFR 20 Appendix B. Fraction of ECL of the stack is provided for reference only. Concentrations at off-site locations are significantly less than those reported here (at stack) due to the atmospheric dispersion that occurs before the effluent exits the site.

Radioactivity in Effluent Air
July 1, 1999 to December 31, 1999

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	L.L.D (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECL[1]
Stack 600 Bldg. 110		**290.45 m^3/min**	**4.84 m^3/sec**				
U-235	79,047,764	4.06E-16	1.83E-16	2.97E-16	3.21E-08	1.49E-02	6.77E-03
U-236	79,047,764	6.51E-15	2.92E-15	4.75E-15	5.14E-07	7.93E-03	1.08E-01
U-238	79,047,764	1.77E-17	7.94E-18	1.29E-17	1.40E-09	4.17E-03	2.94E-04
						Total:	**6.98E-01**
Stack 615 Bldg. 306-W		**46.61 m^3/min**	**0.78 m^3/sec**				
Tc-99	12,685,251	6.73E-14	2.39E-14	3.49E-14	8.54E-07	5.06E-05	7.48E-05
U-234	12,685,251	8.89E-15	1.24E-14	2.54E-14	1.13E-07	1.81E-05	1.78E-01
U-235	12,685,251	1.35E-16	1.89E-16	3.87E-16	1.72E-09	7.95E-04	2.26E-03
U-236	12,685,251	4.52E-18	6.30E-18	1.29E-17	5.73E-11	8.83E-07	7.53E-05
U-238	12,685,251	2.71E-18	3.78E-18	7.74E-18	3.44E-11	1.03E-04	4.52E-05
						Total:	**1.86E-01**
Stack 646 Bldg. 110		**63.80 m^3/min**	**1.06 m^3/sec**				
Tc-99	16,812,013	4.25E-14	2.72E-14	3.77E-14	7.14E-07	4.22E-05	4.72E-05
Th-228	16,812,013	3.80E-18	1.32E-17	2.80E-17	6.39E-11	7.81E-14	1.90E-04
U-232	16,812,013	1.71E-17	5.92E-17	1.26E-16	2.88E-10	1.34E-11	1.71E-03
U-234	16,812,013	3.04E-15	1.05E-14	2.24E-14	5.10E-08	8.18E-06	6.07E-02
U-235	16,812,013	4.37E-17	1.51E-16	3.22E-16	7.35E-10	3.40E-04	7.29E-04
U-236	16,812,013	7.01E-16	2.42E-15	5.16E-15	1.18E-08	1.81E-04	1.17E-02
U-238	16,812,013	1.90E-18	6.58E-18	1.40E-17	3.20E-11	9.54E-05	3.17E-05
						Total:	**7.51E-02**
Stack 649 Bldg. 330		**24.52 m^3/min**	**0.41 m^3/sec**				
Tc-99	6,462,141	6.86E-14	1.96E-14	2.69E-14	4.43E-07	2.62E-05	7.62E-05
U-234	6,462,141	6.12E-15	7.59E-15	1.53E-14	3.96E-08	6.34E-06	1.22E-01
U-235	6,462,141	2.07E-16	2.56E-16	5.18E-16	1.34E-09	6.19E-04	3.45E-03
U-238	6,462,141	1.63E-15	2.02E-15	4.09E-15	1.05E-08	3.15E-02	2.72E-02
						Total:	**1.53E-01**
Stack 667 Bldg. 410		**1648.72 m^3/min**	**27.48 m^3/sec**				
Am-241	434,470,767	1.86E-15	3.00E-16	3.25E-16	8.09E-07	2.36E-07	9.32E-02
Pu-238	434,470,767	3.33E-16	5.36E-17	5.81E-17	1.45E-07	8.47E-09	1.67E-02
Pu-239	434,470,767	3.82E-15	6.15E-16	6.66E-16	1.66E-06	2.67E-05	1.91E-01
Pu-240	434,470,767	1.29E-15	2.07E-16	2.24E-16	5.58E-07	2.45E-06	6.43E-02
Pu-241	434,470,767	1.45E-13	1.54E-14	1.71E-14	6.28E-05	6.10E-07	1.81E-01
Ra-224	434,470,767	7.09E-15	1.13E-15	1.22E-15	3.04E-06	1.91E-11	3.50E-03
Th-228	434,470,767	7.00E-15	1.13E-15	1.22E-15	3.04E-06	3.72E-09	3.50E-01
Th-230	434,470,767	3.56E-15	5.73E-16	6.21E-16	1.55E-06	7.66E-05	1.78E-01
Th-232	434,470,767	7.00E-15	1.13E-15	1.22E-15	3.04E-06	2.79E+01	1.75E+00
U-234	434,470,767	1.75E-14	2.82E-15	3.05E-15	7.61E-06	1.22E-03	3.50E-01
U-235	434,470,767	2.73E-15	4.40E-16	4.76E-16	1.19E-06	5.50E-01	4.56E-02
U-238	434,470,767	1.59E-14	2.55E-15	2.77E-15	6.89E-06	2.06E+01	2.64E-01
						Total:	**3.49E+00**

[1] ECL - Effluent Concentration Limit from 10 CFR 20 Appendix B. Fraction of ECL in the stack is provided for reference only. Concentrations at offsite locations are significantly less than those reported here (at stack) due to the atmospheric dispersion that occurs before the effluent exits the site.

21G-00-0026
GOV-01-55-03
ACF-00-0032

Attachment C
To Letter Dated February 28, 2000
B. M. Moore to Mr. Luis A. Reyes (NRC)

Report of Dose and Activity Concentration for the Maximally Exposed Off-Site Individual for the Release Period July - December 1999

(Two Pages to Follow)

Summary of Dose and Activity Concentrations from Radioactive Air Effluents Released July to December 1999

Introduction

Average radionuclide concentrations in air effluents from stacks 416 and 667 (as measured at the point of release) exceeded values listed in 10 CFR Part 20, Appendix B, Table 2, Column 1 during the release period (i.e., the sum of fractions exceeded 1.0 at the point of release). For this reason, an evaluation was performed in accordance with SNM-124, Part I, Section 5.1.1.3 to estimate the potential dose to the maximally exposed off-site individual (MEI) and the maximum off-site activity concentrations in air. The source term for this evaluation was gaseous effluents released by NFS stacks and vents from July 1, 1999 to December 31, 1999 (given in Attachment B of this correspondence). Methods used and results of this evaluation are summarized below.

Summary of Methods

In accordance with SNM-124, Section 5.1.1.4, the U.S. Department of Energy's CAP88-PC computer program (version 2.0) was used to estimate off-site doses and activity concentrations for gaseous effluents. CAP88-PC accommodates up to six stacks and considers stacks to be co-located (i.e., at the same physical location on the site). NFS operated fifteen (15) radiological stacks during the 2nd half of 1999. Releases from these stacks were grouped into four effective stacks for modeling purposes. The location of the four effective stacks for modeling purposes was taken to be the approximate center of the plant site. The distance to the site boundary (nearest model receptor distance) was taken to be 100 meters for all sectors and is conservative. Meteorological data were based on five-year average wind speed and direction frequencies as presented in NFS' 1996 Environmental Report. Atmospheric stability class D (neutral atmosphere) was used for all releases (default value recommended by the U.S. Environmental Protection Agency in "User's Guide for COMPLY"). The most conservative inhalation class and particle size were assumed for modeling purposes.

Because CAP88-PC models releases over an entire year, the six-month source term (i.e., total curies of each radionuclide released over the period, given in Attachment B) had to be annualized (i.e., transformed into a 12-month release) so that airborne activity concentrations would not be under-estimated during the release period. To annualize releases the six-month source term was multiplied by a normalization factor, NF, of 1.98 (NF = 365/184).

Summary of Results

The dose results reported below are equal to the CAP88-PC dose output at the location of the maximally exposed individual (MEI) divided by the normalization factor above (to adjust annualized results back to the six-month release period). Activity concentrations reported below come directly from the CAP88-PC concentration output file (available at the NFS plant site for inspection).

Table 1 summarizes the dose to a hypothetical individual at the MEI location, which was determined to be approximately 450 meters toward the North Northeast of the center of the plant site. The effective dose equivalent (EDE) to the MEI was estimated to be 0.027 mrem for gaseous effluents released during the 2nd half of 1999. The highest organ committed dose equivalent (CDE) to the MEI was estimated to be 0.194 mrem to the endosteal tissue (bone surfaces). These MEI doses are well below SNM-124 license action levels and applicable regulatory limits/ALARA constraints.

Table 2 summarizes the maximum off-site air activity concentrations, as determined by CAP88-PC, for radionuclides released. The total sum of fractions based on maximum values indicates that exposures to off-site public from gaseous effluents were much less than 1% of the limit that applies to the public. The sum of fractions at the boundary to the NFS unrestricted area would be even lower than this value based on the maximums. It is noted that the location of the maximum airborne concentration for a given

radionuclide will not necessarily correspond to the MEI location. This is due in part to the fact that the MEI dose includes both inhalation and ingestion pathways. Also, locations of maximum concentrations will generally vary among radionuclides due to differences in inputs to the dispersion model for each of the effective stacks—such inputs include stack height, stack diameter, flow rate, and isotopic breakdown of radionuclides released per stack.

Table 1. Organ Dose Equivalents and Effective Dose Equivalent at the MEI Location

Organ	Committed Dose Equivalent (mrem per 2nd Half of 1999)
Gonads	2.02E-3
Breast	8.11E-4
Red Bone Marrow	1.59E-2
Lungs	1.09E-1
Thyroid	1.54E-2
Endosteal Tissue (Bone Surfaces)	1.94E-1
Remainder Organs	1.57E-2
Effective Dose Equivalent	**2.66E-2 mrem**
Location of MEI:	430 meters North Northeast

Notes: Dose results are from the CAP88-PC "Synopsis Report" generated for the 2nd Half of 1999. CAP88-PC uses organ dose weighting factors from 10 CFR Part 61.1003 to compute the effective dose equivalent.

Table 2. Maximum Off-site Air Concentrations

Nuclide	Maximum Offsite Airborne Concentration (uCi/ml)	Location of Maximum Offsite Airborne Concentration Sector	Distance (m)	Value from 10 CFR Part 20, Appendix B, Table II, Col. 1 (uCi/ml)	Ratio of Maximum Concentration to 10 CFR Part 20 Value
Tc-99	6.70E-16	NNE	700	9.00E-10	9.67E-07
Th-228	1.90E-18	NNE	250	2.00E-14	9.50E-05
Th-230	9.90E-19	NNE	300	2.00E-14	4.95E-05
Th-232	1.90E-18	NNE	250	4.00E-15	4.75E-04
Ra-224	1.90E-18	NNE	250	9.00E-13	2.11E-06
U-232	2.10E-20	NNE	650	1.00E-14	2.10E-06
U-234	1.90E-17	NNE	650	5.00E-14	3.80E-04
U-235	8.40E-19	NNE	300	6.00E-14	1.40E-05
U-236	3.00E-18	NNE	700	6.00E-14	5.00E-05
U-238	4.50E-18	NNE	300	6.00E-14	7.50E-05
Am-241	7.10E-19	NNE	250	2.00E-14	3.55E-05
Pu-238	1.30E-19	NNE	250	2.00E-14	6.50E-06
Pu-239	1.40E-18	NNE	250	2.00E-14	7.00E-05
Pu-240	4.90E-19	NNE	250	2.00E-14	2.45E-05
Pu-241	4.20E-17	NNE	250	8.00E-13	5.25E-05
				Total Sum of Ratios:	1.33E-03 (0.133%)

Notes: The maximum activity values shown above were extracted from the CAP88-PC "Concentration" output report generated for the 2nd Half of 1999

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Date Prepared: 1/20/2000

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Date Reviewed: 1/31/00