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

(423) 743-9141

http://www.nuclearfuelservices.com

21G-08-0123
GOV-01-55
ACF-08-0225

August 28, 2008

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

Mr. Stephen P. Burris
Senior Resident Inspector
U. S. Nuclear Regulatory Commission

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

Subject: **Biannual Effluent Monitoring Report January through June 2008**

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 January through June 2008. Attachment B reports the Radioactivity in Effluent Air for the period January through June 2008. Attachment C summarizes an evaluation of the dose and air activity concentrations for the maximally exposed offsite individual due to gaseous effluents, during the period January through June 2008.

If you or your staff have any questions, require additional information, or wish to discuss this, please contact me or Mr. Robert Holley, Environmental Safety Manager, at (423) 743-1777. Please reference our unique document identification number (21G-08-0123) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

BMMoore

B. Marie Moore
Vice President
Safety and Regulatory

CJB/rrm/rcy
Attachments

xc: Mr. Manuel Crespo, 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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Mr. Mark G. Poirier, Account Engineer
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95 Glastonbury Boulevard
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Mr. Stephen Burris
Senior Resident Inspector
U. S. Nuclear Regulatory Commission

Attachment A
To Letter Dated August 28, 2008
B. M. Moore to Mr. Luis Reyes (NRC)

Report of Radioactivity in Effluent Liquid for the Period
January – June 2008

(Two Pages to Follow)

Radioactivity in Effluent Liquid
January 1, 2008 to June 30, 2008

Location	Total Volume (l)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
BLEU Sewer							
Pu-238	5,958,057	1.58E-11	1.31E-10	3.14E-10	9.38E-08	5.49E-09	7.88E-04
Pu-239/240	5,958,057	-1.95E-11	1.19E-10	3.24E-10	-1.16E-07	-1.87E-06	-9.74E-04
Tc-99	5,958,057	5.59E-09	4.24E-08	7.36E-08	3.33E-05	1.97E-03	9.32E-05
Th-228	5,958,057	5.22E-11	3.53E-10	7.05E-10	3.11E-07	3.80E-10	2.61E-04
Th-230	5,958,057	2.98E-10	2.80E-10	3.46E-10	1.77E-06	8.78E-05	2.98E-03
Th-232	5,958,057	4.57E-11	1.43E-10	3.02E-10	2.72E-07	2.50E100	1.52E-03
U-232	5,958,057	3.69E-11	1.61E-10	3.76E-10	2.20E-07	1.03E-08	6.16E-04
U-233/234	5,958,057	5.54E-10	3.47E-10	3.40E-10	3.30E-06	5.29E-04	1.85E-03
U-235/236	5,958,057	7.18E-11	1.50E-10	2.87E-10	4.28E-07	1.98E-01	2.39E-04
U-238	5,958,057	1.05E-10	1.70E-10	3.15E-10	6.25E-07	1.87E+00	3.50E-04
						Total:	**7.72E-03**
Sewer							
Pu-238	34,065,895	2.01E-11	1.43E-10	3.80E-10	6.86E-07	4.01E-08	1.01E-04
Pu-239/240	34,065,895	-7.55E-12	1.56E-10	3.95E-10	-2.57E-07	-4.14E-06	-3.78E-05
Tc-99	34,065,895	-2.20E-09	4.19E-08	7.29E-08	-7.48E-05	-4.42E-03	-3.66E-06
Th-228	34,065,895	3.16E-10	4.08E-10	6.42E-10	1.08E-05	1.31E-08	1.58E-04
Th-230	34,065,895	-1.31E-12	1.63E-10	3.67E-10	-4.46E-08	-2.21E-06	-1.31E-06
Th-232	34,065,895	4.64E-11	1.38E-10	2.92E-10	1.58E-06	1.45E+01	1.55E-04
U-232	34,065,895	4.15E-11	2.20E-10	4.43E-10	1.41E-06	6.60E-08	6.91E-05
U-233/234	34,065,895	8.74E-09	1.24E-09	2.79E-10	2.98E-04	4.77E-02	2.91E-03
U-235/236	34,065,895	9.17E-10	3.98E-10	2.67E-10	3.12E-05	1.45E+01	3.06E-04
U-238	34,065,895	1.89E-09	6.02E-10	1.90E-10	6.43E-05	1.92E+02	6.29E-04
						Total:	**4.29E-03**
WWTF							
Am-241	3,683,433	-2.05E-11	1.79E-10	4.40E-10	-7.56E-08	-2.21E-08	-1.03E-03
Cs-137	3,683,433	3.45E-09	1.19E-09	1.54E-09	1.27E-05	1.46E-07	3.45E-03
Na-22	3,683,433	6.34E-11	1.04E-09	1.51E-09	2.34E-07	3.74E-11	1.06E-05
Np-237	3,683,433	3.72E-11	1.71E-10	3.98E-10	1.37E-07	1.95E-04	1.86E-03
Pb-212	3,683,433	2.46E-10	3.09E-09	3.46E-09	9.06E-07	6.55E-13	1.23E-04
Pu-238	3,683,433	9.76E-12	1.47E-10	3.26E-10	3.59E-08	2.10E-09	4.88E-04
Pu-239/240	3,683,433	3.09E-11	1.74E-10	4.44E-10	1.14E-07	1.83E-06	1.55E-03
Pu-241	3,683,433	-9.16E-10	7.75E-09	1.35E-08	-3.37E-06	-3.27E-08	-9.16E-04
Ra-224	3,683,433	1.71E-08	2.38E-09	5.52E-09	6.32E-05	3.97E-10	8.57E-02
Tc-99	3,683,433	2.60E-09	4.27E-08	7.43E-08	9.58E-06	5.67E-04	4.34E-05
Th-228	3,683,433	1.77E-10	2.87E-10	5.26E-10	6.51E-07	7.94E-10	8.83E-04
Th-230	3,683,433	5.45E-11	1.55E-10	3.20E-10	2.01E-07	9.94E-06	5.45E-04
Th-231	3,683,433	3.32E-09	3.43E-08	3.85E-08	1.22E-05	2.30E-11	6.63E-05
Th-232	3,683,433	-1.39E-12	1.30E-10	3.33E-10	-5.12E-09	-4.70E-02	-4.63E-05
U-232	3,683,433	1.18E-10	2.04E-10	3.98E-10	4.34E-07	2.03E-08	1.96E-03
U-233/234	3,683,433	6.26E-08	3.87E-09	4.15E-10	2.30E-04	3.69E-02	2.09E-01

[1] ECV Effluent Concentration Value from 10 CFR-20, Appendix B.

Radioactivity in Effluent Liquid
January 1, 2008 to June 30, 2008

Location	Total Volume (l)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
WWTF							
U-235/236	3,683,433	6.21E-09	1.24E-09	3.29E-10	2.29E-05	1.06E+01	2.07E-02
U-238	3,683,433	8.21E-10	4.66E-10	3.90E-10	3.02E-06	9.03E+00	2.74E-03
						Total:	**3.27E-01**

[1] ECV Effluent Concentration Value from 10-CFR-20, Appendix B

Attachment B
To Letter Dated August 28, 2008
B. M. Moore to Mr. Luis Reyes (NRC)

Report of Radioactivity in Effluent Air for the Period
January – June 2008

(Five Pages to Follow)

Radioactivity in Effluent Air
January 1, 2008 to June 30, 2008

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
Main Stack 416		**886.60 m^3/min**	**14.78 m^3/sec**				
Tc-99	232,360,278	1.07E-13	4.29E-14	5.21E-14	2.49E-05	1.47E-03	1.19E-04
Th-228	232,360,278	4.14E-16	1.14E-16	9.96E-17	9.62E-08	1.17E-10	2.07E-02
Th-230	232,360,278	2.21E-16	6.07E-17	5.31E-17	5.13E-08	2.54E-06	1.10E-02
Th-232	232,360,278	1.38E-16	3.79E-17	3.32E-17	3.21E-08	2.94E-01	3.45E-02
U-234	232,360,278	1.28E-13	3.52E-14	3.08E-14	2.97E-05	4.77E-03	2.56E+00
U-235	232,360,278	8.14E-15	2.24E-15	1.96E-15	1.89E-06	8.75E-01	1.36E-01
U-238	232,360,278	1.02E-15	2.81E-16	2.46E-16	2.37E-07	7.08E-01	1.70E-02
						Total:	**2.78E+00**
Stack 185 Bldg. 131		**100.64 m^3/min**	**1.68 m^3/sec**				
Tc-99	26,375,229	4.40E-14	3.41E-14	5.15E-14	1.16E-06	6.87E-05	4.89E-05
Th-230	26,375,229	-4.28E-20	6.60E-19	1.46E-18	-1.13E-12	-5.58E-11	-2.14E-06
Th-231	26,375,229	5.62E-16	4.35E-16	6.58E-16	1.48E-08	2.78E-14	6.24E-08
U-234	26,375,229	-9.55E-16	1.48E-14	3.26E-14	-2.52E-08	-4.04E-06	-1.91E-02
U-235	26,375,229	-1.60E-17	2.48E-16	5.48E-16	-4.23E-10	-1.96E-04	-2.67E-04
U-238	26,375,229	-1.85E-20	2.85E-19	6.31E-19	-4.87E-13	-1.45E-06	-3.08E-07
						Total:	**-1.93E-02**
Stack 327 Bldg. 330		**168.97 m^3/min**	**2.82 m^3/sec**				
Tc-99	43,950,252	1.18E-13	4.16E-14	5.72E-14	5.18E-06	3.07E-04	1.31E-04
Th-230	43,950,252	1.62E-18	1.04E-18	1.56E-18	7.12E-11	3.52E-09	8.10E-05
Th-231	43,950,252	1.51E-15	5.31E-16	7.31E-16	6.62E-08	1.24E-13	1.67E-07
U-234	43,950,252	3.62E-14	2.32E-14	3.49E-14	1.59E-06	2.55E-04	7.24E-01
U-235	43,950,252	6.07E-16	3.90E-16	5.85E-16	2.67E-08	1.24E-02	1.01E-02
U-238	43,950,252	6.99E-19	4.49E-19	6.74E-19	3.07E-11	9.17E-05	1.17E-05
						Total:	**7.34E-01**
Stack 376 Bldg. 301		**111.60 m^3/min**	**1.86 m^3/sec**				
Tc-99	9,320,557	3.69E-14	3.45E-14	5.46E-14	3.44E-07	2.04E-05	4.10E-05
Th-230	9,320,557	2.75E-19	7.00E-19	1.39E-18	2.56E-12	1.27E-10	1.38E-05
Th-231	9,320,557	4.71E-16	4.40E-16	6.97E-16	4.39E-09	8.25E-15	5.23E-08
U-234	9,320,557	6.15E-15	1.56E-14	3.10E-14	5.73E-08	9.18E-06	1.23E-01
U-235	9,320,557	1.03E-16	2.62E-16	5.20E-16	9.62E-10	4.45E-04	1.72E-03
U-238	9,320,557	1.19E-19	3.02E-19	5.99E-19	1.11E-12	3.31E-06	1.98E-06
						Total:	**1.25E-01**
Stack 421 Bldg. 100		**23.22 m^3/min**	**0.39 m^3/sec**				
Tc-99	6,085,450	1.75E-13	5.41E-14	7.21E-14	1.07E-06	6.30E-05	1.95E-04
Th-230	6,085,450	2.81E-18	1.40E-18	1.98E-18	1.71E-11	8.46E-10	1.40E-04
Th-231	6,085,450	2.24E-15	6.91E-16	9.21E-16	1.36E-08	2.56E-14	2.48E-07
U-234	6,085,450	6.27E-14	3.12E-14	4.42E-14	3.82E-07	6.12E-05	1.25E+00
U-235	6,085,450	1.05E-15	5.24E-16	7.41E-16	6.41E-09	2.97E-03	1.76E-02

[1] ECV Effluent Concentration Value from 10-CFR-20, Appendix B. Fraction of ECV at 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
January 1, 2008 to June 30, 2008

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
Stack 421 Bldg. 100		**23.22 m^3/min**	**0.39 m^3/sec**				
U-238	6,085,450	1.21E-18	6.04E-19	8.54E-19	7.38E-12	2.20E-05	2.02E-05
						Total:	**1.27E+00**
Stack 424 Bldg. 100		**23.08 m^3/min**	**0.38 m^3/sec**				
Tc-99	6,048,343	5.88E-14	3.59E-14	5.07E-14	3.55E-07	2.10E-05	6.53E-05
Th-230	6,048,343	6.95E-20	6.89E-19	1.44E-18	4.20E-13	2.08E-11	3.48E-06
Th-231	6,048,343	7.50E-16	4.58E-16	6.47E-16	4.54E-09	8.53E-15	8.33E-08
U-234	6,048,343	1.55E-15	1.54E-14	3.21E-14	9.39E-09	1.51E-06	3.11E-02
U-235	6,048,343	2.61E-17	2.58E-16	5.38E-16	1.58E-10	7.30E-05	4.34E-04
U-238	6,048,343	3.00E-20	2.98E-19	6.20E-19	1.82E-13	5.42E-07	5.00E-07
						Total:	**3.16E-02**
Stack 501 Bldg. 510		**61.00 m^3/min**	**1.02 m^3/sec**				
Tc-99	15,987,435	3.98E-14	1.84E-14	2.42E-14	6.36E-07	3.76E-05	4.42E-05
Th-228	15,987,435	1.25E-15	1.52E-15	2.51E-15	2.00E-08	2.44E-11	6.26E-02
Th-230	15,987,435	1.41E-15	1.71E-15	2.82E-15	2.25E-08	1.11E-06	7.04E-02
Th-232	15,987,435	1.31E-15	1.60E-15	2.64E-15	2.10E-08	1.93E-01	3.29E-01
U-234	15,987,435	4.28E-15	5.20E-15	8.58E-15	6.84E-08	1.10E-05	8.55E-02
U-235	15,987,435	7.99E-16	9.71E-16	1.60E-15	1.28E-08	5.91E-03	1.33E-02
U-238	15,987,435	1.39E-15	1.69E-15	2.78E-15	2.22E-08	6.62E-02	2.31E-02
						Total:	**5.84E-01**
Stack 502 OCB		**210.82 m^3/min**	**3.51 m^3/sec**				
Tc-99	55,251,675	2.07E-14	1.59E-14	2.42E-14	1.14E-06	6.76E-05	2.30E-05
Th-228	55,251,675	-2.44E-17	1.11E-15	2.52E-15	-1.35E-09	-1.64E-12	-1.22E-03
Th-230	55,251,675	-2.74E-17	1.25E-15	2.84E-15	-1.51E-09	-7.50E-08	-1.37E-03
Th-232	55,251,675	-2.56E-17	1.17E-15	2.65E-15	-1.41E-09	-1.30E-02	-6.40E-03
U-234	55,251,675	-8.33E-17	3.80E-15	8.62E-15	-4.60E-09	-7.37E-07	-1.67E-03
U-235	55,251,675	-1.56E-17	7.10E-16	1.61E-15	-8.59E-10	-3.98E-04	-2.59E-04
U-238	55,251,675	-2.70E-17	1.23E-15	2.80E-15	-1.49E-09	-4.45E-03	-4.50E-04
						Total:	**-1.13E-02**
Stack 503 EPB		**5.99 m^3/min**	**0.10 m^3/sec**				
Tc-99	1,570,620	3.66E-14	1.80E-14	2.42E-14	5.76E-08	3.41E-06	4.07E-05
Th-228	1,570,620	2.53E-16	1.23E-15	2.53E-15	3.98E-10	4.86E-13	1.27E-02
Th-230	1,570,620	2.85E-16	1.38E-15	2.84E-15	4.48E-10	2.22E-08	1.43E-02
Th-232	1,570,620	2.66E-16	1.29E-15	2.65E-15	4.18E-10	3.83E-03	6.65E-02
U-234	1,570,620	8.66E-16	4.19E-15	8.63E-15	1.36E-09	2.18E-07	1.73E-02
U-235	1,570,620	1.62E-16	7.82E-16	1.61E-15	2.54E-10	1.18E-04	2.70E-03
U-238	1,570,620	2.81E-16	1.36E-15	2.80E-15	4.41E-10	1.32E-03	4.68E-03
						Total:	**1.18E-01**
Stack 573 Bldg 306-W		**73.09 m^3/min**	**1.22 m^3/sec**				
Tc-99	19,154,324	4.07E-14	3.31E-14	5.07E-14	7.79E-07	4.61E-05	4.52E-05

[1] ECV Effluent Concentration Value from 10-CFR-20, Appendix B. Fraction of ECV at 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
January 1, 2008 to June 30, 2008

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
Stack 573 Bldg 306-W		**73.09 m^3/min**	**1.22 m^3/sec**				
Th-230	19,154,324	-4.82E-20	6.48E-19	1.43E-18	-9.24E-13	-4.57E-11	-2.41E-06
Th-231	19,154,324	5.19E-16	4.23E-16	6.47E-16	9.94E-09	1.87E-14	5.77E-08
U-234	19,154,324	-1.08E-15	1.45E-14	3.20E-14	-2.06E-08	-3.31E-06	-2.15E-02
U-235	19,154,324	-1.81E-17	2.43E-16	5.38E-16	-3.46E-10	-1.60E-04	-3.01E-04
U-238	19,154,324	-2.08E-20	2.80E-19	6.19E-19	-3.99E-13	-1.19E-06	-3.47E-07
						Total:	**-2.18E-02**
Stack 600 Bldg. 110		**292.14 m^3/min**	**4.87 m^3/sec**				
Tc-99	76,565,346	3.13E-13	2.94E-14	3.41E-14	2.40E-05	1.42E-03	3.48E-04
Th-230	76,565,346	1.59E-18	6.08E-19	8.88E-19	1.22E-10	6.03E-09	7.95E-05
Th-231	76,565,346	4.00E-15	3.75E-16	4.36E-16	3.06E-07	5.75E-13	4.44E-07
U-234	76,565,346	3.55E-14	1.36E-14	1.98E-14	2.72E-06	4.36E-04	7.10E-01
U-235	76,565,346	5.96E-16	2.28E-16	3.33E-16	4.56E-08	2.11E-02	9.94E-03
U-238	76,565,346	6.86E-19	2.63E-19	3.83E-19	5.26E-11	1.57E-04	1.14E-05
						Total:	**7.21E-01**
Stack 615 Bldg. 306-W		**32.00 m^3/min**	**0.53 m^3/sec**				
Tc-99	8,386,046	4.04E-14	3.34E-14	5.12E-14	3.38E-07	2.00E-05	4.48E-05
Th-230	8,386,046	3.06E-20	6.80E-19	1.45E-18	2.57E-13	1.27E-11	1.53E-06
Th-231	8,386,046	5.15E-16	4.26E-16	6.54E-16	4.32E-09	8.12E-15	5.72E-08
U-234	8,386,046	6.84E-16	1.52E-14	3.23E-14	5.73E-09	9.19E-07	1.37E-02
U-235	8,386,046	1.15E-17	2.55E-16	5.42E-16	9.63E-11	4.46E-05	1.91E-04
U-238	8,386,046	1.32E-20	2.94E-19	6.24E-19	1.11E-13	3.31E-07	2.20E-07
						Total:	**1.39E-02**
Stack 646 Bldg. 110		**52.67 m^3/min**	**0.88 m^3/sec**				
Tc-99	13,803,581	5.68E-14	4.23E-14	6.33E-14	7.83E-07	4.64E-05	6.31E-05
Th-230	13,803,581	-1.93E-20	8.24E-19	1.79E-18	-2.66E-13	-1.32E-11	-9.65E-07
Th-231	13,803,581	7.25E-16	5.40E-16	8.08E-16	1.00E-08	1.88E-14	8.05E-08
U-234	13,803,581	-4.31E-16	1.84E-14	4.01E-14	-5.95E-09	-9.53E-07	-8.62E-03
U-235	13,803,581	-7.23E-18	3.09E-16	6.72E-16	-9.99E-11	-4.62E-05	-1.21E-04
U-238	13,803,581	-8.33E-21	3.56E-19	7.74E-19	-1.15E-13	-3.43E-07	-1.39E-07
						Total:	**-8.68E-03**
Stack 649 Bldg. 330		**21.28 m^3/min**	**0.35 m^3/sec**				
Tc-99	5,078,684	6.97E-14	2.33E-14	3.41E-14	3.54E-07	2.10E-05	7.75E-05
Th-230	5,078,684	1.05E-19	4.18E-19	8.97E-19	5.34E-13	2.65E-11	5.26E-06
Th-231	5,078,684	8.93E-16	2.98E-16	4.37E-16	4.54E-09	8.53E-15	9.92E-08
U-234	5,078,684	2.35E-15	9.35E-15	2.00E-14	1.19E-08	1.91E-06	4.70E-02
U-235	5,078,684	3.96E-17	1.57E-16	3.37E-16	2.01E-10	9.30E-05	6.60E-04
U-238	5,078,684	4.54E-20	1.81E-19	3.87E-19	2.31E-13	6.89E-07	7.57E-07
						Total:	**4.78E-02**

[1] ECV Effluent Concentration Value from 10-CFR-20, Appendix B Fraction of ECV at 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
January 1, 2008 to June 30, 2008

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
Stack 701 Bldg. 307		**157.99 m^3/min**	**2.63 m^3/sec**				
Tc-99	41,405,768	4.86E-14	3.44E-14	5.07E-14	2.01E-06	1.19E-04	5.40E-05
Th-230	41,405,768	2.54E-19	7.41E-19	1.44E-18	1.05E-11	5.21E-10	1.27E-05
Th-231	41,405,768	6.21E-16	4.39E-16	6.47E-16	2.57E-08	4.83E-14	6.90E-08
U-234	41,405,768	5.68E-15	1.65E-14	3.21E-14	2.35E-07	3.77E-05	1.14E-01
U-235	41,405,768	9.53E-17	2.78E-16	5.38E-16	3.95E-09	1.83E-03	1.59E-03
U-238	41,405,768	1.10E-19	3.20E-19	6.20E-19	4.54E-12	1.36E-05	1.83E-06
						Total:	**1.15E-01**
Stack 702 Bldg. 307		**157.03 m^3/min**	**2.62 m^3/sec**				
Tc-99	41,154,342	3.91E-14	3.29E-14	5.07E-14	1.61E-06	9.53E-05	4.35E-05
Th-230	41,154,342	-1.99E-20	6.57E-19	1.44E-18	-8.21E-13	-4.06E-11	-9.97E-07
Th-231	41,154,342	5.00E-16	4.20E-16	6.47E-16	2.06E-08	3.87E-14	5.55E-08
U-234	41,154,342	-4.46E-16	1.47E-14	3.21E-14	-1.83E-08	-2.94E-06	-8.91E-03
U-235	41,154,342	-7.48E-18	2.46E-16	5.38E-16	-3.08E-10	-1.43E-04	-1.25E-04
U-238	41,154,342	-8.61E-21	2.84E-19	6.20E-19	-3.54E-13	-1.06E-06	-1.44E-07
						Total:	**-8.99E-03**
Stack 703 Exhaust Room Air		**771.29 m^3/min**	**12.85 m^3/sec**				
Tc-99	202,140,826	3.60E-14	2.99E-14	4.60E-14	7.27E-06	4.30E-04	4.00E-05
Th-228	202,140,826	1.10E-16	9.39E-16	1.96E-15	2.23E-08	2.72E-11	5.51E-03
Th-230	202,140,826	9.36E-17	7.97E-16	1.67E-15	1.89E-08	9.36E-07	4.68E-03
Th-232	202,140,826	1.04E-16	8.88E-16	1.86E-15	2.11E-08	1.93E-01	2.61E-02
U-234	202,140,826	1.12E-15	9.54E-15	1.99E-14	2.26E-07	3.63E-05	2.24E-02
U-235	202,140,826	1.54E-16	1.31E-15	2.74E-15	3.11E-08	1.44E-02	2.57E-03
U-238	202,140,826	5.96E-17	5.08E-16	1.06E-15	1.20E-08	3.59E-02	9.93E-04
						Total:	**6.22E-02**
Stack 704 Process Exhaust (H2)		**70.57 m^3/min**	**1.18 m^3/sec**				
Tc-99	18,493,830	4.15E-14	3.36E-14	5.14E-14	7.68E-07	4.55E-05	4.62E-05
Th-228	18,493,830	4.30E-17	1.03E-15	2.19E-15	7.96E-10	9.72E-13	2.15E-03
Th-230	18,493,830	3.66E-17	8.74E-16	1.86E-15	6.76E-10	3.35E-08	1.83E-03
Th-232	18,493,830	4.07E-17	9.73E-16	2.07E-15	7.53E-10	6.91E-03	1.02E-02
U-234	18,493,830	4.38E-16	1.05E-14	2.23E-14	8.09E-09	1.30E-06	8.75E-03
U-235	18,493,830	6.02E-17	1.44E-15	3.06E-15	1.11E-09	5.15E-04	1.00E-03
U-238	18,493,830	2.33E-17	5.56E-16	1.18E-15	4.31E-10	1.29E-03	3.88E-04
						Total:	**2.44E-02**
Stack 773 Bldg. 440		**202.47 m^3/min**	**3.37 m^3/sec**				
Tc-99	26,531,076	2.82E-13	6.64E-14	6.27E-14	7.49E-06	4.43E-04	3.14E-04
Th-228	26,531,076	1.16E-15	2.70E-15	5.05E-15	3.08E-08	3.77E-11	5.81E-02
Th-230	26,531,076	1.31E-15	3.04E-15	5.68E-15	3.47E-08	1.72E-06	6.54E-02
Th-232	26,531,076	1.22E-15	2.83E-15	5.30E-15	3.24E-08	2.97E-01	3.05E-01
U-234	26,531,076	3.97E-15	9.22E-15	1.72E-14	1.05E-07	1.69E-05	7.94E-02

[1] ECV: Effluent Concentration Value from 10-CFR-20, Appendix B. Fraction of ECV at 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
January 1, 2008 to June 30, 2008

Location	Total Volume (m^3)	Activity Concentration (µCi/ml)	Error Estimate (µCi/ml)	LLD (µCi/ml)	Quantity Released (Ci)	Quantity Released (g)	Fraction of ECV[1]
Stack 773 Bldg. 440		**202.47 m^3/min**	**3.37 m^3/sec**				
U-235	26,531,076	7.42E-16	1.72E-15	3.22E-15	1.97E-08	9.12E-03	1.24E-02
U-238	26,531,076	1.29E-15	2.99E-15	5.59E-15	3.42E-08	1.02E-01	2.15E-02
						Total:	**5.42E-01**

[1] ECV: Effluent Concentration Value from 10-CFR-20, Appendix B. Fraction of ECV at 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.

Attachment C
To Letter Dated August 28, 2008
B. M. Moore to Mr. Luis Reyes (NRC)

Report of Gaseous Effluent Dose and Activity Concentrations
for the Maximally Exposed
Off-Site Individual for the Release Period
January – June 2008

(Three Pages to Follow)

Report of Potential Gaseous Effluent Dose to the Maximally Exposed Offsite Individual and on the Maximum Radionuclide Concentrations for the Period: January through June 2008

Introduction

During this biannual period, NRC License SNM-124, Part I, Section 5.1.1.3 required NFS to assess the total effective dose equivalent (TEDE) to the maximally exposed offsite receptor and the maximum radioactive air concentrations at the site boundary, attributable to NFS' air effluents. The required biannual assessment has been completed and the details of the assessment are provided in the subsequent sections.

Summary of Methods

In accordance with SNM-124, Section 5.1.1.4 and internal procedure NFS-HS-A-27, the U.S. Department of Energy's CAP88-PC computer program was used to estimate off-site doses and activity concentrations for gaseous effluents. NFS operated nineteen (19) radiological stacks during the 1st half of 2008. Based on effluent types and stack physical characteristics, releases from these stacks were grouped into effective stacks for modeling purposes. To accommodate the co-location limitation of the model, the effective stacks were taken to be at the approximate center of the plant site. The distance to the site boundary (nearest model receptor distance) was conservatively taken to be 150 meters for all sectors. 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 was assumed for each radionuclide released. A particle size (activity median aerodynamic diameter or AMAD) of 1.0 microns was assumed for modeling purposes since no information on actual particle sizes exists.

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) was annualized (i.e., transformed into a 12-month release) so that airborne activity concentrations would not be under-estimated during the release period.

Summary of Results

Doses are reported in table 1 below and are derived from the CAP88-PC "Synopsis Report". These doses are at the location of the maximally exposed (off-site) individual (MEI). The results include an adjustment (using the normalization factor mentioned above) to convert the "annualized" doses back to those doses that were actually received in the six-month release period. Activity concentrations reported in table 2 come directly from the CAP88-PC "Concentration Tables" report; no adjustments are needed for these concentrations. The CAP88-PC output reports are available for review at NFS.

Table 1 summarizes the six-month dose to a hypothetical individual at the MEI location, which was determined to be approximately 500 meters North Northeast from the center of the plant site. The TEDE to the MEI was estimated to be 1.3E-03 mrem for gaseous effluents released during the 1st half of 2008. The highest organ committed dose equivalent (CDE) to the MEI was estimated to be 2.1E-03 mrem to the spleen. These MEI doses are well below SNM-124 license action levels and applicable regulatory limits/ALARA constraints.

Table 2. Maximum Predicted Airborne Concentrations at or Beyond the Site Boundary

Maximum Predicted Airborne Concentrations at or Beyond the Site Boundary					
Nuclide	Maximum Concentration (µCi/mL)	Concentration Location		10 CFR 20, App. B, Table 2, Col. 1 Value (µCi/mL)	Ratio of Maximum Concentration to 10 CFR 20 Value
		Sector	Dist. (m)		
^{99}Tc	2.7E-17	NNE	400	9.E-10	3.0E-08
^{228}Th	4.2E-20	NNE	400	2.E-14	2.1E-06
^{230}Th	4.3E-20	NNE	350	2.E-14	2.2E-06
^{231}Th	2.3E-19	NNE	350	9.E-09	2.6E-11
^{232}Th	4.0E-20	NNE	350	4.E-15	1.0E-05
^{234}U	5.4E-18	NNE	550	5.E-14	1.1E-04
^{235}U	2.8E-19	NNE	550	6.E-14	4.7E-06
^{238}U	5.4E-20	NNE	500	6.E-14	9.0E-07
				Sum of Fractions:	**1.3E-04**

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

Organ	Committed Dose Equivalent (mrem per 1st half of 2008)
Adrenals	2.7E-05
Bone Surface	9.4E-05
Breasts	2.0E-04
Stomach Wall	2.7E-05
Upper Large Intestine Wall	2.9E-05
Kidneys	2.7E-05
Lungs	1.2E-03
Ovaries	1.1E-04
Red Bone Marrow	7.5E-04
Spleen	2.1E-03
Thymus	4.2E-05
Uterus	4.0E-05
Bladder Wall	3.7E-04
Brain	2.9E-05
Esophagus	2.8E-05
Small Intestine Wall	2.7E-05
Lower Large Intestine Wall	3.5E-05
Liver	3.5E-05
Muscle	2.7E-05
Pancreas	3.0E-05
Skin	2.7E-05
Testes	5.6E-04
Thyroid	2.7E-05
Total Effective Dose Equivalent	**1.3E-03 mrem**
Location of MEI:	500 meters North Northeast

Table 2 summarizes the maximum radioactive air concentrations at or beyond the site boundary, as determined by CAP88-PC, for the radionuclides released. The total sum of fractions was estimated to be 1.3E-04 and indicates that exposures to offsite public from gaseous effluents were much less than 1% of the 10 CFR 20, Appendix B, Table 2, Col. 1 values for all offsite receptors including the site boundary. It is noted that the location of the maximum airborne concentration for a given radionuclide does not necessarily correspond to the MEI location. This is due primarily to the fact that the maximum concentrations for individual nuclides can vary due to large differences in values input into the dispersion model for each of the effective stacks—such inputs include stack height, stack diameter, flow rate, and total radionuclide activities released per stack. Another reason for the disparity is the fact that the MEI dose includes both inhalation and ingestion pathways.