NINE MILE POINT NUCLEAR STATION UNIT 1

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY - DECEMBER 1990

DOCKET NO.: 50-220

LICENSE NO.: DPR-63

NIAGARA MOHAWK POWER CORPORATION

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NINE MILE POINT NUCLEAR STATION

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY - DECEMBER 1990

SUPPLEMENTAL INFORMATION

Facility: Nine Mile Point Unit #1 Licensee: Niagara Mohawk Power Corporation

1. Technical Specification Limits:

A) Fission and activation gases:

1. The dose rate limit of noble gases from the site to areas at and beyond the site boundary shall be less than or equal to 500 mrems/year to the total body and less than or equal to 3000 mrems/year to the skin.

2. The air dose due to noble gases released in gaseous effluents from the Nine Mile Point 1 Station to areas at and beyond the site boundary shall be limited during any calendar quarter to less than or equal to 5 milliroentgen for gamma radiation and less than or equal to 10 mrads for beta radiation, and during any calendar year to less than or equal to 10 milliroentgen for gamma radiation and less than or equal to 20 mrads for beta radiation.

B&C) Tritium, Iodines and Particulates, half lives $\geq$ 8 days:

1. The dose rate limit of Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half-lives greater than eight days, released to the environs as part of the gaseous wastes from the site, shall be less than or equal to 1500 mrems/year to any organ.

2. The dose to a member of the public from Iodine-131, Iodine-133, Tritium and all radionuclides in particulate form with half lives greater than 8 days as part of gaseous effluents released from the Nine Mile Point 1 Station to areas at and beyond the site boundary shall be limited during any calendar quarter to less than or equal to 7.5 mrems to any organ and, during any calendar year to less than or equal to 15 mrems to any organ.

D) Liquid Effluents

1. The concentration of radioactive material released in liquid effluents to unrestricted areas shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gas, the concentration shall be limited to 2E-04 microcuries/ml total activity.

D. Liquid Effluents (Cont'd)

2. The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released from Nine Mile Point Unit 1 to unrestricted areas shall be limited during any calendar quarter to less than or equal to 1.5 mrems to the total body and to less than or equal to 5 mrems to any organ, and during any calendar year to less than or equal to 3 mrems to the total body and to less than or equal to 10 mrems to any organ.

2. Maximum Permissible Concentrations

A) Fission and activation gases:

None specified

B&C) Iodines and particulates, half lives $\geq$ 8 days:

None specified

D) Liquid Effluents:

10CFR20, Appendix B, Table II, Column 2.
Avg MPC (July - Sept.) = 2.90E-03 uCi/ml
Avg MPC (Oct. - Dec.) = no releases

3. Average Energy (Fission and Activation gases - Mev)[1]

July - Sept.: < LLD
Oct. - Dec. : < LLD

4. Measurements and Approximations of Total Radioactivity

Described below are the methods used to measure or approximate the total radioactivity and radionuclide composition in effluents.

A) Fission and Activation Gases: Noble gas effluent activity is determined by on-line gamma spectroscopic monitoring (intrinsic germanium crystal) or gross activity monitoring (calibrated against gamma isotopic analysis of a 4.0L Marinelli grab sample) of an isokinetic stack sample stream.

B) Iodines: Iodine effluent activity is determined by gamma spectroscopic analysis (at least weekly) of charcoal cartridges sampled from an isokinetic stack sample stream.

[1] No Noble Gases detected in July - December, concentrations less than the lower limit of detection.

4. (Cont'd)

C) Particulates: Activity released from main stack is determined by gamma spectroscopic analysis (at least weekly) of particulate filters sampled from an isokinetic sample stream.

For emergency condenser vent batch releases, effluent curie quantities are estimated by subtracting activity remaining in the shell side of the emergency condenser after batch release from activity delivered to the shell from Make-Up sources. Actual isotopic concentrations are found via gamma spectroscopy. Batch release activities of Sr-89, Sr-90 and Fe-55 are estimated by applying scaling factors to activity concentrations of gamma emitters. The activity of tritium released during normal operation or during batch releases is conservatively estimated by multiplying recent condensate storage tank H-3 activity by assumed steaming rates out the vents.

D) Tritium: Tritium effluent activity is estimated by liquid scintillation or gas proportional counting of monthly samples taken with an air sparging/water trap apparatus.

E) Liquid Effluents: Isotopic analysis of a representative sample of each batch and composite analysis of non-gamma emitters.

F) Solid Effluents: Isotopic contents of waste shipments are determined by gamma spectroscopy, gross alpha and water content analyses of a representative sample of each batch. Scaling factors established from primary composite sample analyses conducted off-site are applied, where appropriate, to find estimated concentration of non-gamma emitters. For low activity trash shipments, curie content is estimated by dose rate measurement and application of appropriate scaling factors.

5. Batch Releases

The following information relates to batch releases of radioactive materials in liquid and gaseous effluents.

A) Liquid

1.	Number of batch releases: 6				
2.	Total time period for batch releases:	28	hours	42	min.
3.	Maximum time period for a batch release:	5	hours	0	min.
4.	Average time period for a batch release:	4	hours	47	min.
5.	Minimum time period for a batch release:	4	hours	34	min.
6.	Average stream flow during period of release of effluent into a flowing stream:	Not Applicable			
7.	Total volume of water used to dilute the liquid effluent during release periods :	9.13E+08 Liters			
8.	Total volume of water available to dilute the liquid effluent during reporting period :	2.49E+11 Liters			

5. (Cont.)

B) Gaseous (Emergency Condenser Vent)

1. Number of batch releases: 1
2. Total time period for batch releases: 0 hours 15 min.
3. Maximum time period for a batch release: 0 hours 15 min.
4. Average time period for a batch release: 0 hours 14.5 min.
5. Minimum time period for a batch release: 0 hours 14 min.

6. Abnormal Releases

A. Liquids - none
B. Gaseous - none

TABLE 1A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL

JULY - DECEMBER 1990

	UNIT	3rd QUARTER	4th QUARTER	EST. TOTAL ERROR, %
A. Fission & Activation gases[1]				
1. Total release	Ci	**	**	
2. Average release rate for period	uCi/sec	**	**	
3. Percent of Technical[3] Specification Limit	%			
B. Iodines				
1. Total iodine-131	Ci	7.16E-05	8.99E-04	
2. Average release rate for period	uCi/sec	9.14E-06	1.13E-04	
3. Percent of Technical[3] Specification Limit	%			
C. Particulates[2]				
1. Particulates with half-lives >8 days	Ci	1.56E-04	5.83E-04	2.5E+01
2. Average release rate for period	uCi/sec	1.96E-05	7.33E-05	
3. Percent of Technical[3] Specification Limit	%			
4. Gross alpha radio-activity	Ci	7.89E-05	5.45E-04	2.5E+01
D. Tritium[2]				
1. Total release	Ci	6.00E+00	1.88E+01	2.0E+01
2. Average release rate for period	uCi/sec	1.36E-01	1.55E+00	
3. Percent of Technical[3] Specification Limit	%			

[1] Concentrations less than the lower limit of detection as required by Technical Specifications; i.e., 1.00E-04 uCi/ml for Noble Gases, 1.00E-11 uCi/ml for particulates and 1.00E-12 uCi/ml for Iodines, are indicated with a double asterisk.

[2] Tritium, Iron-55, and Strontium results for December 1990 were not received from the offsite vendor as of February 15, 1991. These numbers include estimates for December 1990. Actual numbers will be provided in the next Semi-Annual report.

[3] Refer to E on next page.

TABLE 1A (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL

JULY - DECEMBER 1990

	UNIT	3rd QUARTER	4th QUARTER
E. Percent of Technical Specification Limits			
Fission and Activation Gases:[1]			
1. Percent of Quarterly Gamma Air Dose Limit	%	**	**
2. Percent of Quarterly Beta Air Dose Limit	%	**	**
3. Percent of Annual Gamma Air Dose Limit to Date	%	**	**
4. Percent of Annual Beta Air Dose Limit to Date	%	**	**
5. Percent of Whole Body Dose Rate Limit	%	**	**
6. Percent of Skin Dose Rate Limit	%	**	**
Tritium, Iodines and Particulates (with half-lives greater than 8 days):			
1. Percent of Quarterly Dose Limit	%	4.19E-02	5.31E-01
2. Percent of Annual Dose Limit to Date	%	1.77E-01	3.27E-01
3. Percent of Organ Dose Rate Limit	%	8.45E-04	1.06E-02

[1] Percent of Technical Specification limits not reported above due to concentrations less than the lower limit of detection as required by Technical Specifications ie. 1.00E-04 uCi/ml for Noble Gases, are indicated with a double asterisk.

TABLE 1B

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-ELEVATED RELEASE
JULY - DECEMBER 1990

Nuclides Released[1]	Unit	CONTINUOUS MODE[3] 3rd Quarter	4th Quarter
1. Fission Gases			
Argon-41	Ci	**	**
Krypton-85	Ci	**	**
Krypton-85m	Ci	**	**
Krypton-87	Ci	**	**
Krypton-88	Ci	**	**
Xenon-127	Ci	**	**
Xenon-133	Ci	**	**
Xenon-135	Ci	**	**
Xenon-135m	Ci	**	**
Xenon-137	Ci	**	**
Xenon-138	Ci	**	**
2. Iodines			
Iodine-131	Ci	7.16E-05	8.99E-04
Iodine-133	Ci	2.08E-03	1.58E-02
Iodine-135	Ci	1.18E-04	1.80E-02
3. Particulates[2]			
Strontium-89	Ci	6.72E-05	1.79E-04
Strontium-90	Ci	1.91E-06	8.23E-06
Cesium-134	Ci	**	**
Cesium-137	Ci	**	1.23E-05
Cobalt-60	Ci	5.70E-07	2.12E-04
Cobalt-58	Ci	**	**
Manganese-54	Ci	**	**
Barium/Lanthanum-140	Ci	**	8.28E-05
Antimony-125	Ci	**	**
Niobium-95	Ci	**	**
Cerium-141	Ci	**	**
Cerium-144	Ci	**	**
Iron-59	Ci	**	**
Cesium-136	Ci	**	**
Chromium-51	Ci	**	**
Zinc-65	Ci	**	**
Iron-55	Ci	8.62E-05	8.86E-05
Molybdenum	Ci	**	**
4. Tritium	Ci	1.08E+00	1.23E+01

[1] Concentrations less than the lower limit of detection as required by Technical Specifications; i.e., 1.00E-04 uCi/ml for Noble Gases, 1.00E-11 uCi/ml for particulates and 1.00E-12 uCi/ml for Iodines, are indicated with a double asterisk.

[2] Tritium, Iron-55, and Strontium results for December 1990 were not received from the offsite vendor as of February 15, 1991. These numbers include estimates for December 1990. Actual numbers will be included in the next Semi-Annual report.

[3] No batch mode release occurred during the reporting period.

TABLE 1C

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-GROUND LEVEL (EMERGENCY CONDENSER VENT) RELEASES
JULY - DECEMBER 1990

Nuclides Released[1]	Unit	CONTINUOUS MODE 3rd Quarter	CONTINUOUS MODE 4th Quarter	BATCH MODE 3rd Quarter	BATCH MODE 4th Quarter
1: Fission Gases					
Argon-41	Ci	**	**	**	
Krypton-85	Ci	**	**	**	
Krypton-85m	Ci	**	**	**	
Krypton-87	Ci	**	**	**	
Krypton-88	Ci	**	**	**	
Xenon-133	Ci	**	**	**	
Xenon-135	Ci	**	**	**	
Xenon-135m	Ci	**	**	**	
Xenon-137	Ci	**	**	**	
Xenon-138	Ci	**	**	**	
					No Releases
2. Iodines					
Iodine-131	Ci	**	**	**	
Iodine-133	Ci	**	**	**	
Iodine-135	Ci	**	**	**	
3. Particulates					
Strontium-89	Ci	**	**	1.65E-09	
Strontium-90	Ci	**	**	6.50E-10	
Cesium-134	Ci	**	**	**	
Cesium-137	Ci	**	**	1.58E-08	
Cobalt-60	Ci	**	**	3.74E-07	
Cobalt-58	Ci	**	**	**	
Manganese-54	Ci	**	**	**	
Barium-Lanthanum-140	Ci	**	**	**	
Antimony-125	Ci	**	**	**	
Niobium-95	Ci	**	**	**	
Cerium-141	Ci	**	**	**	
Cerium-144	Ci	**	**	**	
Iron-59	Ci	**	**	**	
Cesium-136	Ci	**	**	**	
Chromium-51	Ci	**	**	**	
Zinc-65	Ci	**	**	**	
Iron-55	Ci	**	**	4.27E-06	
4. Tritium	Ci	4.02E+00	6.49E+00	1.55E-01	

[1] Concentrations less than the lower limit of detection as required by Technical Specifications; i.e., 1.00E-04 uCi/ml for Noble Gases, 1.00E-11 uCi/ml for particulates, and 1.00E-12 uCi/ml for Iodines, are indicated with a double asterisk.

TABLE 2A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES
JULY - DECEMBER 1990

	Unit	3rd Quarter	4th Quarter	Est. Total Error, %
A. Fission and activation products[1]				
1. Total release (not including tritium, gases, alpha)	Ci	1.28E-03		2.5E+01
2. Average diluted concentration during reporting period	uCi/ml	1.11E-11		
3. Percent of applicable[2] limit	%			
B. Tritium				
1. Total release	Ci	9.06E-01		2.0E+01
2. Average diluted concentration during reporting period	uCi/ml	7.88E-9		
3. Percent of applicable[2] limit	%			
C. Dissolved and entrained gases[1]			No Releases	
1. Total release	Ci	**		3.0E+01
2. Average diluted concentration during reporting period	uCi/ml			
3. Percent of applicable[2] limit	%			
D. Gross alpha radioactivity				
1. Total release	Ci			3.0E+01
E. Volumes				
1. Prior to dilution	liters	5.53E+05		1.0E+01
2. Volume of dilution water used during release period	liters	9.13E+08		2.0E+01
3. Volume of dilution water available during reporting period	liters	1.15E+11	1.34E+11	2.0E+01

[1] Concentrations less than the lower limit of detection as required by Technical Specifications are indicated with a double asterisk.
[2] Refer to F on next page.

TABLE 2A (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

JULY - DECEMBER 1990

		Unit	3rd Quarter	4th Quarter
F.	Percent of Technical Specification Limits			
1.	Percent of Quarterly Whole Body Dose Limit	%	2.25E-03	
2.	Percent of Quarterly Organ Dose Limit	%	1.56E-03	
3.	Percent of Annual Whole Body Dose Limit to Date	%	1.56E-03	No Releases
4.	Percent of Annual Organ Dose Limit to Date	%	9.40E-04	
5.	Percent of 10CFR20 Concentration Limit	%	2.71E-03	
6.	Percent of Dissolved or Entrained Noble Gas Limit	%	None	

TABLE 2B

RADIOACTIVE EFFLUENT RELEASE SEMI-ANNUAL REPORT
NINE MILE POINT NUCLEAR STATION #1
LIQUID EFFLUENTS RELEASED

JULY - DECEMBER 1990

	Unit	BATCH MODE 3rd Quarter	4th Quarter
Nuclides Released[1]			
Strontium-89	Ci	**	
Strontium-90	Ci	**	
Cesium-134	Ci	**	
Cesium-137	Ci	**	
Iodine-131	Ci	**	
Cobalt-58	Ci	**	
Cobalt-60	Ci	2.56E-04	
Iron-59	Ci	**	
Zinc-65	Ci	**	
Manganese-54	Ci	**	
Chromium-51	Ci	**	
Zirconium/niobium-95	Ci	**	No Releases
Molybdenum-99	Ci	**	
Technetium-99m	Ci	**	
Barium/Lanthanum[1]-40	Ci	**	
Cerium-141	Ci	**	
Tungsten-187	Ci	**	
Arsenic-76	Ci	**	
Iodine-133	Ci	**	
Iron-55	Ci	1.02E-03	
Neptunium-239	Ci	**	
Praseodymium-144	Ci	**	
Iodine-135	Ci	**	
Dissolved or Entrained Gases	Ci		
Tritium	Ci	9.06E-01	

[1] Concentrations less than the lower limit of detection are indicated with a double asterisk.

TABLE 3A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

A. 10CFR61 Solid Waste Shipped for Burial (Not irradiated fuel)

1. Class of Waste		July - December	Est.Total Error, %
a. Class A			
Spent Resins			
	m^3	2.33E+01	
	Curies	2.82E+00	2.5E+01
	Solidification Agent	None	
	Container	HIC	
	Package	Type A	
	Principle Isotopes	Fe55, Co60, Cs137	
Filter Sludge			
	m^3	5.10E+00	
	Curies	2.88E+01	4.0E+01
	Solidification Agent	Cement	
	Containers	Steel Liner	
	Package	Strong Tight Package	
	Principle Isotopes	Fe55, Co60, Cs137,	
b. Class B			
Filter Sludge			
	m^3	1.53E+01	
	Curies	2.04E+02	2.5E+01
	Solidification Agent	Cement	
	Container	Steel liner	
	Package	Type A	
	Principle Isotopes	Fe55, Co60, Cs137,	
c. Class C			
None			

TABLE 3A (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

2. Estimate of Major Nuclide Composition (by Type of Waste)

a. Resins - Filter Sludges

	Percent
Iron-55	5.26E+01
Cobalt-60	2.42E+01
Cesium-137	2.09E+01
Nickel-63	1.01E+00
Manganese-54	4.59E-01
Strontium-90	3.08E-01
Other	5.33E-01

3. Solid Waste Disposition

Number of Shipments	Mode	Destination
8	Truck	Chem-Nuclear Systems Barnwell, South Carolina

TABLE 3A (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode	Destination
None	-	-

C. Solid Waste Shipped to Vendors for Processing and Burial

Below is a summary of Dry Active Waste that was shipped offsite for processing and burial by vendor facilities (e.g., ALARON, QUADREX and/or SCIENTIFIC ECOLOGY GROUP) during July - December 1990. These totals were reported separately from "10CFR61 Solid Waste Shipped for Burial" (i.e., Section A of Table 3A) since (a) waste classification and burial was performed by the vendors and (b) NMP-1 Technical Specification 6.9.1 requires reporting of "information for each class of solid waste (as defined by 10CFR61) shipped offsite during the reporting period." The information provided in this section, therefore, is in addition to that required by the NMP-1 Technical Specifications.

1. Volume/Activity Summary

m^3	5.05E+01
Curies	3.93E+00
Principle Isotopes	Co60, Cs137, Fe55, H3, C14, Ni63

2. Estimate of Major Nuclide Composition

Cobalt-60	6.01E+01
Cesium-137	2.89E+01
Iron-55	6.34E+00
Hydrogen-3	2.03E+00
Carbon-14	1.15E+00
Nickel-63	1.01E+00
Other	4.70E-01

3. Solid Waste Disposition

Number of Shipments	Destination
38	Barnwell, South Carolina

TABLE 4

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
EXPLANATION OF INSTRUMENTATION INOPERABILITY

JULY - DECEMBER 1990

Instrument	Dates of Inoperability	Cause of Inoperability/Corrective Actions
Stack Flow Rate Measuring Device	July 1, 1990 - July 13, 1990	- Total stack flow was estimated by fan configuration in accordance with Technica Specification Table 3.6.14-2, footnote (d).
Sample Flow Rate Measuring Device	July 1, 1990 - July 13, 1990	- The sample flow rate was manually set on an auxiliary skid to maintain conditions isokinetic with stack flow. This ensures a representative sample.
OGESMS	July 1, 1990 - July 13, 1990	- The monitors were recalibrated in June 1990, with operability in July 1990 after several system modifications were completed (see Attachment 1). Stack noble gas grab samples were taken every 12 hours to comply with Technical Specifications.
High Range Stack Monitor (RAGEMS)	July 1, 1990 - Present	- Modification being performed to upgrade system to be more reliable (See Attachment 1)

TABLE 5

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
REVISIONS TO THE OFFSITE DOSE CALCULATION MANUAL

JULY - DECEMBER 1990

The Nine Mile Point Unit 1 Offsite Dose Calculation Manual (ODCM) for gaseous and liquid effluents, as described in ODCM Rev. 8, was not revised during the July-December 1990 reporting period.

TABLE 6

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
SUMMARY OF CHANGES TO THE PROCESS CONTROL PROGRAM

JULY - DECEMBER 1990

The Nine Mile Point Unit 1 Process Control Program (PCP) for waste solidification, as described in Administrative Procedure 3.7, Revision 3, was not revised during the July - December 1990 reporting period.

TABLE 7

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL
UPDATE OF JANUARY-JUNE 1990 DATA USING
ACTUAL RESULTS FROM THE OFFSITE VENDORS FOR
STRONTIUM, TRITIUM AND IRON-55

JANUARY - JUNE 1990

	UNIT	1st QUARTER	2nd QUARTER	EST. TOTAL ERROR, %
A. Fission & Activation gases				
1. Total release	Ci			
2. Average release rate for period	uCi/sec			
3. Percent of Technical[1] Specification Limit	%			
			Prolonged Unit Outage	
B. Iodines				
1. Total iodine-131	Ci			
2. Average release rate for period	uCi/sec			
3. Percent of Technical[1] Specification Limit	%			
C. Particulates				
1. Particulates with half-lives ≥8 days	Ci	8.61E-04	2.72E-04	3.0E+01
2. Average release rate for period	uCi/sec	1.08E-04	3.40E-04	
3. Percent of Technical[1] Specification Limit	%			
4. Gross alpha radio-activity	Ci	7.17E-05	4.16E-05	
D. Tritium				
1. Total release	Ci	2.86E+00	1.40E+00	2.5E+01
2. Average release rate for period	uCi/sec	3.60E-01	1.75E-01	
3. Percent of Technical[1] Specification Limit	%			

[1] Refer to E on next page.

TABLE 7 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL
UPDATE OF JANUARY-JUNE 1990 DATA USING
ACTUAL RESULTS FROM THE OFFSITE VENDORS FOR
STRONTIUM, TRITIUM AND IRON-55

JANUARY - JUNE 1990

	UNIT	1st QUARTER	2nd QUARTER
E. Percent of Technical Specification Limits			
Fission and Activation Gases:			
1. Percent of Quarterly Gamma Air Dose Limit	%		
2. Percent of Quarterly Beta Air Dose Limit	%		
3. Percent of Annual Gamma Air Dose Limit to Date	%		
4. Percent of Annual Beta Air Dose Limit to Date	%	Prolonged Unit Outage	
5. Percent of Whole Body Dose Rate Limit	%		
6. Percent of Skin Dose Rate Limit	%		
Tritium, Iodines and Particulates (with half-lives greater than 8 days):			
1. Percent of Quarterly Dose Limit	%	2.47E-01	3.74E-01
2. Percent of Annual Dose Limit to Date	%	3.77E-01	2.10E-01
3. Percent of Organ Dose Rate Limit	%	4.89E-03	1.74E-03

TABLE 7 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #1
GASEOUS EFFLUENTS-ELEVATED RELEASE
ELEVATED AND GROUND LEVEL
UPDATE OF JANUARY-JUNE 1990 DATA USING
ACTUAL RESULTS FROM THE OFFSITE VENDORS FOR
STRONTIUM, TRITIUM AND IRON-55

JANUARY - JUNE 1990

Nuclides Released[1]	Unit	CONTINUOUS MODE[2] 1st Quarter	2nd Quarter
1. Fission Gases			
Argon-41	Ci	**	**
Krypton-85	Ci	**	**
Krypton-85m	Ci	**	**
Krypton-87	Ci	**	**
Krypton-88	Ci	**	**
Xenon-127	Ci	**	**
Xenon-133	Ci	**	**
Xenon-135	Ci	**	**
Xenon-135m	Ci	**	**
Xenon-137	Ci	**	**
Xenon-138	Ci	**	**
2. Iodines			
Iodine-131	Ci	**	**
Iodine-133	Ci	**	**
Iodine-135	Ci	**	**
3. Particulates			
Strontium-89	Ci	8.46E-05	3.79E-06
Strontium-90	Ci	1.93E-06	1.31E-06
Cesium-134	Ci	**	**
Cesium-137	Ci	7.60E-05	7.92E-04
Cobalt-60	Ci	5.29E-04	1.47E-04
Cobalt-58	Ci	**	**
Manganese-54	Ci	**	**
Barium-Lanthanum-140	Ci	**	**
Antimony-125	Ci	**	**
Niobium-95	Ci	**	**
Cerium-141	Ci	**	**
Cerium-144	Ci	**	**
Iron-59	Ci	**	**
Cesium-136	Ci	**	**
Chromium-51	Ci	**	**
Zinc-65	Ci	**	**
Iron-55	Ci	7.70E-05	3.82E-05
Molybdenum	Ci	**	**
4. Tritium	Ci	9.35E-01	1.40E+00

[1] Concentrations less than the lower limit of detection as required by Technical Specifications i.e., 1.00E-04 uCi/ml for Noble Gases, 1.00E-11 uCi/ml for particulates and 1.00E-12 uCi/ml for Iodines, are indicated with a double asterisk.

[2] No batch mode release occurred during the reporting period.

ATTACHMENT 1

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

PROBLEMS WITH THE NMP1 STACK EFFLUENT MONITORING SYSTEM: CAUSES AND CORRECTIVE ACTIONS

JULY - DECEMBER 1990

The previous Semi-Annual Effluent Release Reports provided a status update for each of the specific modifications and changes associated with NMP-1's high range Radioactive Gaseous Effluent Monitoring System (RAGEMS) and normal operation (lower range) Old General Electric (GE) Stack Monitoring System (OGESMS). Progress continues to be made toward the resolution of the system's design deficiencies so that a more reliable stack monitoring system can be obtained. During the period of RAGEMS inoperability all stack radiological monitoring requirements, as defined in section 3.6.14b of the Technical Specifications, were met using the Old General Electric Stack Monitoring System (OGESMS) or an auxiliary sampling system as allowed by Technical Specifications Limiting Conditions of Operation.

Installation of all modifications to RAGEMS and OGESMS is complete. Additionally, it is the intent to maintain RAGEMS available using backup grab sample methods during most periods of commercial operation to meet NUREG 0737 monitoring requirements. OGESMS modifications are complete and became operable following operation acceptance on July 13, 1990.

STACK MONITORING SYSTEM Modification Update

The following is an update of recent modifications and design changes made to date on RAGEMS and OGESMS, and a summary of modifications needed to complete the entire system upgrade:

1. Developed a new Piping and Instrument Diagram (P&ID) to convey more detailed information on a complex system to enhance system operation. P&ID was updated to reflect the final modification, and issued 7/17/90 for Operations Acceptance of OGESMS per DCR's and field walkdown.

2. Revise the system's radiation alarming logic to include both the RAGEMS and the OGESMS to facilitate operator response. This design package was reworked to incorporate a valve and logic alignment switch to remotely place either unit into service. Installation is complete and was pre-operationally tested via N1-POT-288 dated 6/90.

3. Design and install flow alarming capabilities from the RAGEMS unit to the plant's main Control Room. This design was reworked to incorporate the logic switch identified earlier. Installation is complete. Functional testing was completed via N1-ISP-112-A006.

4. Replace RAGEMS' Tennelec Count Rate Meter to eliminate the periodic spiking signals. The new count rate meter was returned to the manufacturer to resolve signal interface concerns with the unit's programmable controller. It has subsequently been reinstalled. The spiking problem has been further addressed by evaluating and redesigning the power supplies to RAGEMS. Installation is complete and was tested via N1-ISP-201-A036.

5. Improve operator interface with the system's parameters by increasing the ability to chart/record the system's operation. Installation is complete.

   A. Placing the existing OGESMS radiation signals (counts per second or counts per minute) on new recorders.

   B. Addition of new parameters to be recorded (e.g., the RAGEMS radiation release rate, OGESMS system flow, RAGEMS system flow and total stack flow). During the reporting period a total stack flow value was estimated by fan configuration in accordance with Technical Specification Table 3.6.14-2, footnote (d).

6. Install a permanent power supply for the air conditioner in cabinet #4 of RAGEMS. Installation is complete.

7. Install cables for future expansion of the system. Installation is complete. Design packages which use these cables have been completed and issued. Installation is complete.

8. Install remote manual switches to the RAGEMS dilution system to manually override the RAGEMS process computer. The design of this work is complete. Installation of manually activated program to remotely control dilution is complete and functional testing is in progress.

9. Provide RAGEMS with the capability to isolate the plant's containment vent and purge valves. OGESMS currently has this isolation capability. The design of this modification is complete. Installation is completed and pre-op tested in N1-POT-288 in 6/90.

10. Replace the flow control valves in RAGEMS. The design of this work is complete. Installation is complete and functional testing is in progress.

11. Replace the flow control valve and associated controller on OGESMS. Installation is complete and pre-op tested via N1-POT-288 in 6/90.

12. Install calibration valves, leak test valves and gauges on both RAGEMS and OGESMS. RAGEMS valves have been installed. Installation of hardware for OGESMS is complete. Additional valves are being installed to facilitate remotely aligning each unit (RAGEMS/OGESMS) from the control room. Installation is complete and leak checked via N1-ISP-201-R531.

13. Redesign particulate and iodine filtration portion of OGESMS to provide filtration redundancy. Installation is complete and pre-op tested via N1-POT-288 in 6/90.

14. Install additional shielding designed to eliminate periodic spikes in the background radiation levels on the OGESMS monitors. Installation is complete.

15. Resolve computer software and hardware problems. This work includes the upgrade of the computer's modem capability. Hardware installation is complete. Software functional testing is in progress.

16. Modify RAGEMS/OGESMS computer input and output signals to provide additional essential input to the Safety Parameter Display System (SPDS). Modification is complete and software tested.

17. Revise the plant's process computer's descriptions and setpoints as they apply to the Stack Gas Monitoring System (OGESMS and RAGEMS). Revision is complete and pre-op tested via N1-POT-288 in 6/90.

18. Correct leakage problems with RAGEMS 3-way solenoid valves. Installation is complete and leak checked via N1-ISP-201-R531.

19. Redesign the 30cc chamber to ensure an isokinetic flow rate in/out of the detector chamber. The chamber has been engineered and fabricated, with installation scheduled for completion post Unit 1 maintenance outage.

ATTACHMENT 2

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #1
DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES
INSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

Doses to members of the public (as defined by the Technical Specifications) from the operation of the NMP1 facility as a result of activity inside the site boundary is controlled by activities at the Energy Center. This facility is open to the public and offers educational information, summer picnicking activities and fishing. Any possible doses received by a member of the public by utilizing the private road that transverses the east and west site boundaries are not considered here since it takes a matter of minutes to travel the distance.

The activity at the Energy Center that is used for the dose analysis is fishing because it is the most time consuming. Although there is no specific survey information available, many of the same individuals have been observed to return again and again because of the access to salmonid and lake trout populations. Dose pathways considered for this activity include direct radiation, inhalation and external ground (shoreline sediment or soil) doses. Other pathways, such as ingestion pathways, are not considered because they are either not applicable or insignificant. In addition, only releases from the NMP1 stack were evaluated for the inhalation pathway. The emergency condensers were operated during September of 1990. However, the wind was not blowing towards the critical receptor at that time.

The direct radiation pathway is evaluated in accordance with the methodology found in the Offsite Dose Calculation Manual (ODCM). This pathway considers three components: direct radiation from the generating facilities, direct radiation from any possible overhead plume and direct radiation from plume submersion. The direct radiation pathway is evaluated by the use of high sensitivity environmental TLDs. Since any significant fishing activity near the Energy Center occurs between April through December, environmental TLD data for the approximate period of April 1 - December 31, 1990 was considered. Data from two environmental TLDs from the approximate area where the fishing occurs were compared to three control environmental TLD locations for the same time period. The average fishing area TLD dose rate was 7.31E-03 mRem per hour for the period. The average control TLD dose rate was 6.26E-03 mRem per hour for the period (approximate second, third and fourth calendar quarters of the year). The average increase in dose as a result of fishing in this area at a conservative frequency of eight hours per day is 3.28E-01 mRem from direct radiation for the period in question. The majority of the dose from this pathway is from the NMP1 facility because of its proximity to the fishing area. A small portion may be due to the NMP2 facility.

ATTACHMENT 2 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #1
DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES
INSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

The inhalation dose pathway is evaluated by utilizing the inhalation equation in the Offsite Dose Calculation Manual, as adapted from the Regulatory Guide 1.109. The equation basically gives a total inhalation dose in mRem for the time period in question (April - December). The total dose equals the sum, for all applicable radionuclides, of the NMP1 stack release concentration, times the average NMP1 stack flowrate, times the applicable five year average calculated X/Q, times the inhalation dose factors from Regulatory Guide 1.109, Table E-7, times the Regulatory Guide 1.109 annual air intake, times the fractional portion of the year in question. In order to be slightly conservative, no radiological decay is assumed.

The 1990 calculation utilized the following information:

NMP1 Stack:

- Unit 1 average stack flowrate = 8.83+01 m^3/sec
- X/Q value = 8.9 E-06 (annual NWN sector, historical average)
- Inhalation dose factor = Table E-7 of Regulatory Guide 1.109
- Annual air intake = 8000 m^3 per year (adult)
- Fractional portion of the year = 0.0356 (312 hours)
- Cs-137 = 4.37E-02 pCi/m^3
- Co-60 = 1.72E-02 pCi/m^3
- Fe-55 = 1.07E-01 pCi/m^3
- Sr-89 = 1.28E-01 pCi/m^3
- Sr-90 = 3.22E-03 pCi/m^3
- H-3 = 2.41E+03 pCi/m^3
- Mn-54 = 1.27E-03 pCi/m^3
- Ba-140 = 3.96E-02 pCi/m^3
- I-131 = 4.63E-01 pCi/m^3
- I-133 = 8.54E+00 pCi/m^3

The inhalation dose to a member of the public as a result of activities inside the site boundary is 7.53E-04 mRem to the thyroid (maximum organ dose) and 8.77-05 mRem to the whole body.

The dose from standing on the shoreline to fish is based on the methodology in the Offsite Dose Calculation Manual as adapted from Regulatory Guide 1.109. During 1990, it was noted that fishing was performed from the shoreline on many occasions although waders were also utilized. In order to be conservative, it is assumed that the maximum exposed individual fished from the shoreline at all times. The use of waders, of course, would result in a dose of zero from this pathway. The shoreline sediment doses are not taken into consideration by environmental TLD data.

ATTACHMENT 2 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #1
DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES
INSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

The Offsite Dose Calculation Manual equation basically gives the total dose to the whole body and skin from the sum of all plant related radionuclides detected in shoreline sediment samples. The plant related radionuclide concentration is adjusted for background sample results, as applicable. The equation, therefore, yields the whole body and skin dose by multiplying the radionuclide concentration adjusted for any background data (as applicable), times a usage factor, times the sediment or soil density in grams per square meter (to a depth of one centimeter) times the applicable shore width factor, times the regulatory guide dose factor, times the fractional portion of the year over which the dose is applicable. In order to be conservative and to simplify the equation, no radiological decay is assumed since the applicable radionuclides are usually long lived.

The calculation utilized the following information:

- Usage factor = 312 hours.
- Density in grams per meter = 40,000.
- Shore width factor = 0.3.
- Whole body and skin dose factor for each radionuclide = Regulatory Guide 1.109, Table E-6.
- Fractional portion of the year = 1 (used average radionuclide concentration over total time period).
- Average Cs-137 concentration = 0.61 pCi/g.
- Average Co-60 concentration = 0.05 pCi/g.

The total whole body and skin dose from standing on the shoreline to fish is 1.28 E-02 mRem whole body and 1.49E-02 mRem skin dose for the period.

Doses to members of the public relative to activities inside the site boundary from aquatic pathways other than ground dose from shoreline sediment/soil are not applicable.

In summary, the total dose to a member of the public as a result of activities inside the site boundary from the direct radiation, inhalation and shoreline dose pathways is 3.41E-01 mRem to the whole body and 7.53E-04 mRem to the maximum exposed internal organ (thyroid). The dose to the skin of an adult is 1.49E-02 mRem. These doses are generally a result of the operation of NMP1. However, a portion of these doses for the direct radiation pathway are attributable to the NMP2 facility.

ATTACHMENT 3

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #1
RADIATION DOSES TO THE LIKELY MOST EXPOSED MEMBER OF THE PUBLIC
OUTSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

Radiation doses to the likely most exposed member of the public are evaluated relative to 40CFR190 requirements. The dose limits of 40CFR190 are 25 mRem (whole body or organ) per calendar year and 75 mRem (thyroid) per calendar year. The intent of 40CFR190 also requires that the effluents of NMP1 as well as other nearby uranium fuel cycle facilities be considered. In this case, the effluents of NMP1, NMP2 and the James A. FitzPatrick (JAF) facilities must be considered.

Doses to the likely most exposed member of the public as a result of effluents from the site can be evaluated by using calculated dose modeling based on the accepted methodologies of the facilities' Offsite Dose Calculation Manuals or may, in some cases, be calculated from the analysis results of actual environmental samples. Acceptable methods for calculating doses from environmental samples are also found in the facilities' Offsite Dose Calculation Manuals. These methods are based on Regulatory Guide 1.109 methodology.

Dose calculations from actual environmental samples are, at times, difficult to perform for some pathways. Some pathway doses should be estimated using calculational dose modeling. These pathways include noble gas air dose, inhalation dose, etc. Other pathway doses may be calculated directly from environmental sample concentrations using Regulatory Guide 1.109 methodology.

Since the effluents from the generating facilities are low, the resultant gaseous and liquid effluent doses are anticipated to be low. In view of this, doses can be based on calculated data. Doses are not based on actual environmental data for 1990 with the exception of doses from direct radiation, fish consumption and shoreline sediment. In addition, in order to be conservative and for the sake of simplicity, it is assumed in the dose calculations that the likely most exposed member of the public is positioned in the maximum receptor location for each pathway at the same time. This approach is utilized because the doses are very low and the computations are greatly simplified.

The following pathways are considered:

1. The inhalation dose is calculated at the critical residence because of the high occupancy factor. In order to be conservative, the maximum whole body and organ dose assumes no correction for residing inside a residence.

2. The milk ingestion dose is calculated utilizing the maximum milk cow location. As noted previously, in order to be conservative and for the sake of simplicity, the likely most exposed member of the public is assumed to be at all critical receptors at one time. In this case, the member of the public at the critical residence is assumed to consume milk from the critical milk location.

3. The maximum dose from the milk ingestion pathway as a result of consuming goat's milk is based on the same criteria established for item 2 above (ingestion of cow's milk).

4. The maximum dose associated from consuming meat is based on the critical meat animal. The likely most exposed member at the critical residence is assumed to consume meat from the critical meat animal location.

5. The maximum site dose associated with the consumption of vegetables is calculated from the critical vegetable garden location. As noted previously, the likely most exposed member of the public is assumed to be located at the critical residence and is assumed to consume vegetables from the critical garden location.

6. The dose as a result of direct gamma radiation from the site encompasses doses from direct "shine" from the generating facilities, direct radiation from any over head gaseous plumes, plume submersion and from ground deposition. This total dose is measured by environmental TLD. The critical location is based on the closest year round residence from the generating facilities as well as the closest residence in the critical downwind sector in order to evaluate both direct radiation from the generating facilities and gaseous plumes as determined by the local meteorology. During 1990, the closest residence and the critical downwind residence are at the same location.

   The measured average dose for 1990 at the critical residence was 60.8 mRem. The average control dose (average of three locations) was 58.8 mRem. The average dose at the critical residence is greater than the average control location dose. A major portion of this net dose is due to the differences between doses from naturally occurring radionuclides in the soil and rock at the different locations. This difference in dose rate can be demonstrated by observing the 1990 average dose for an environmental TLD located near the critical residence TLD, but approximately 700 feet closer to the generating facilities. The annual average dose for this TLD location was 54.4 mRem. The dose for this location is lower than the critical residence location even though they are close to one another and even though the TLD location with the lowest dose is closer to the generating facilities.

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #1
RADIATION DOSES TO THE LIKELY MOST EXPOSED MEMBER OF THE PUBLIC
OUTSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

7. The dose, as a result of fish consumption, is considered as part of the aquatic pathway. The dose for 1990 is calculated from actual results of the analysis of environmental fish samples. For the sake of being conservative, the average plant related radionuclide concentrations were utilized from fish samples taken near the site discharge points. The average concentration was adjusted to account for any background concentrations using average control sample data. Only Cs-137 was detected during 1990 (net concentration was 6.90E-03 pCi/g - wet). The calculated maximum adult organ dose was 1.58E-2 mRem to the liver. The maximum whole body dose is 1.03E-02 mRem to an adult.

8. The shoreline sediment pathway is considered relative to recreational activities. The dose due to recreational activities from shoreline sediment is based on the methodology in the Offsite Dose Calculation Manual as adapted from Regulatory Guide 1.109. The Offsite Dose Calculation Manual gives the total dose to the whole body and skin from the sum of plant related radionuclides detected in shoreline sediment samples. The plant related radionuclide concentration is adjusted for background sample results, as applicable. The total whole body and skin dose from shoreline recreational activities is 9.35-04 mRem whole body and 1.09E-03 mRem skin dose for the period.

9. During 1990, the emergency isolation condensers at NMP-1 were operated as required by Technical Specifications. The test was conducted on September 28, 1990. The dose due to this pathway was included as part of the NMP-1 dose calculation, and has been considered here as well.

In summary, the maximum dose to the most likely exposed member of the public is 6.78E-02 mRem to the thyroid (maximum organ dose) and 1.50 E-02 mRem to the whole body. It should be noted that the maximum organ dose and maximum whole body doses are based on the sum of the maximum doses observed for all three facilities regardless of age group. This results in some conservatism. The maximum organ and whole body doses were a result of gaseous effluents. Doses as a result of liquid effluents were secondary. The total whole body, maximum organ and skin dose from shoreline recreational activities and fish consumption are 1.12 E-02 mRem whole body, 1.58 E-02 mRem to the liver and 1.09 E-03 mRem skin dose for the period. The direct radiation dose to the critical residence from the generating facilities was insignificant or zero. These maximum total doses are a result of operations at the Nine Mile Point Unit 1, Nine Mile Point Unit 2 and the James A. Fitzpatrick facilities. The maximum organ dose and whole body dose are below the 40CRF190 criteria of 25 mRem per calendar year to the maximum exposed organ or the whole body, and below 75 mRem per calendar year to the thyroid.