NINE MILE POINT NUCLEAR STATION - UNIT 2

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY - DECEMBER 1990

DOCKET NO.: 50-410

LICENSE NO.: NPF-69

- NIAGARA MOHAWK POWER CORPORATION

NINE MILE POINT NUCLEAR STATION - UNIT 2

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

JULY - DECEMBER 1990

Facility: Nine Mile Point Unit #2 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 or beyond the site boundary shall be less than or equal to 500 mrem/year to the whole body and less than or equal to 3000 mrem/year to the skin.

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

B&C) Tritium, Iodines and Particulates, half lives > 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 in gaseous effluents from the site to areas at or beyond the site boundary, shall be less than or equal to 1500 mrem/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 2 Station to areas at or beyond the site boundary shall be limited during any calendar quarter to less than or equal to 7.5 mrem to any organ and, during any calendar year to less than or equal to 15 mrem 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 gases, 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 2 to unrestricted areas shall be limited during any calendar quarter to less than or equal to 1.5 mrem to the whole body and to less than or equal to 5 mrem to any organ, and during any calendar year to less than or equal to 3 mrem to the whole body and to less than or equal to 10 mrem to any organ.

2. Maximum Permissible Concentrations

A) Fission and activation gases:

None specified

B&C) Iodines and particulates, half lives > 8 days:

None specified

D) Liquid Effluents:

10CFR20, Appendix B, Table II, Column 2.
Avg MPC (July - Sept.) = 1.12E-03 uCi/ml
Avg MPC (Oct. - Dec.) = 1.92E-03 uCi/ml

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

July - Sept.: $\bar{E}_\beta$ = 0.384; $\bar{E}_\gamma$ = 1.580
Oct. - Dec. : $\bar{E}_\beta$ = < LLD; $\bar{E}_\gamma$ = < LLD

4. Measurements and Approximations of Total Radioactivity

Described below are the normal 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) of an isokinetic sample stream.

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

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

[1] No noble gases detected in October - December, concentrations less than the lower limit of detection (LLD).

4. (Cont'd)

D) Tritium: Tritium effluent activity is measured 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.

F) Solid Effluents: Isotopic contents of waste shipments are determined by gamma spectroscopy analyses and water content estimates 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: 50				
2.	Total time period for batch releases:	166	hours	8	min.
3.	Maximum time period for a batch release:	3	hours	28	min.
4.	Average time period for a batch release:	3	hours	23	min.
5.	Minimum time period for a batch release:	3	hours	17	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 :	1.15E+09 liters			
8.	Total volume of water available to dilute the liquid effluent during reporting period :	3.20E+10 liters			

B) Gaseous (Primary Containment Purge)[1]

1.	Number of batch releases: 2				
2.	Total time period for batch releases:	25	hours		
3.	Maximum time period for a batch release:	13	hours		
4.	Average time period for a batch release:	12	hours	30	min.
5.	Minimum time period for a batch release:	12	hours		

6. Abnormal Releases
   A. Liquids - none
   B. Gaseous - none

[1] Actual purge times are less than shown. The times presented are the sampling times, and represent a conservative approximation to actual purge times (approximately 12 hours per purge).

TABLE 1A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
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	3.49E+00	**	5.0E+01
2. Average release rate for period	uCi/sec	4.18E-01	**	
3. Percent of Technical[2] Specification Limit	%			
B. Iodines				
1. Total iodine	Ci	2.15E-03	7.39E-07	5.0E+01
2. Average release rate for period	uCi/sec	2.73E-04	9.30E-08	
3. Percent of Technical[2] Specification Limit	%			
C. Particulates[3]				
1. Particulates with half-lives > 8 days	Ci	2.05E-03	6.99E-04	5.0E+01
2. Average release rate for period	uCi/sec	2.58E-04	8.79E-05	
3. Percent of Technical[2] Specification Limit	%			
4. Gross alpha radio-activity	Ci	1.74E-05	1.05E-05	5.0E+01
D. Tritium				
1. Total release	Ci	2.96E+01	9.73E-01	5.0E+01
2. Average release rate for period	uCi/sec	1.24E+01	1.22E-01	
3. Percent of Technical[2] Specification Limit	%			

[1] Concentrations less than the lower limit of detection 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] Refer to Section E on next page

[3] Includes Mo-99

TABLE 1A
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
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	%	3.90E-02	**
2. Percent of Quarterly Beta Air Dose Limit	%	1.47E-04	**
3. Percent of Annual Gamma Air Dose Limit to Date	%	7.15E-01	7.15E-01
4. Percent of Annual Beta Air Dose Limit to Date	%	1.49E-02	1.49E-02
5. Percent of Whole Body Dose Rate Limit	%	1.40E-03	**
6. Percent of Skin Dose Rate Limit	%	2.69E-04	**
Tritium, Iodines and Particulates (with half-lives greater than 8 days):			
1. Percent of Quarterly Dose Limit	%	3.34E-02	4.52E-03
2. Percent of Annual Dose Limit to Date	%	2.83E-02	2.84E-02
3. Percent of Organ Dose Rate Limit	%	5.16E-04	3.41E-05

[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 #2
GASEOUS EFFLUENTS-ELEVATED (STACK)

JULY - DECEMBER 1990

Nuclides Released[1]	Unit	CONTINUOUS MODE 3rd Quarter	CONTINUOUS MODE 4th Quarter	BATCH MODE[2] 3rd Quarter	BATCH MODE[2] 4th Quarter
1. Fission Gases					
Argon-41	Ci	1.21E+00	**	**	
Krypton-85m	Ci	**	**	**	
Krypton-87	Ci	**	**	**	
Krypton-88	Ci	1.97E+00	**	**	
Xenon-133	Ci	**	**	**	
Xenon-135	Ci	1.91E-01	**	**	
Xenon-135m	Ci	1.21E-01	**	**	
Xenon-137	Ci	**	**	**	
Xenon-138	Ci	**	**	**	
2. Iodines					
Iodine-131	Ci	9.60E-05	7.39E-07	**	
Iodine-133	Ci	1.34E-03	**	**	
Iodine-135	Ci	6.99E-04	**	**	
3. Particulates					No Discharges
Strontium-89	Ci	1.61E-05		**	
Strontium-90	Ci	**		**	
Cesium-134	Ci	**	**	**	
Cesium-137	Ci	**	**	**	
Cobalt-60	Ci	1.99E-05	3.96E-06	**	
Cobalt-58	Ci	**	**	**	
Manganese-54	Ci	4.35E-06	**	**	
Barium/Lanthanum-140	Ci	7.40E-06	**	**	
Antimony-125	Ci	**	**	**	
Niobium-95	Ci	**	**	**	
Cerium-141	Ci	**	**	**	
Cerium-144	Ci	**	**	**	
Iron-59	Ci	**	**	**	
Cesium-136	Ci	**	**	**	
Chromium-51	Ci	1.48E-05	**	**	
Zinc-65	Ci	3.26E-05	2.64E-05	**	
Iron-55	Ci	**		**	
Molybdenum-99	Ci	2.18E-05	**	**	
4. Tritium	Ci	2.09E+00	1.95E-01	5.26E-02	

[1] Concentrations less than the lower limit of detection 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 discharges in 4th Quarter.

TABLE 1C

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
GASEOUS EFFLUENTS-COMBINED GROUND LEVEL-ELEVATED (REACTOR BUILDING VENT)
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	**	**		
2. Iodines					
Iodine-131	Ci	1.18E-06	**		
Iodine-133	Ci	1.46E-05	**		
Iodine-135	Ci	**	**		
3. Particulates[2]				No batch releases	
Cobalt-57	Ci	2.97E-04	2.84E-06		
Strontium-89	Ci	**			
Strontium-90	Ci	**			
Cesium-134	Ci	**	**		
Cesium-137	Ci	**	**		
Cobalt-60	Ci	1.53E-04	1.13E-04		
Cobalt-58	Ci	2.54E-05	1.45E-05		
Manganese-54	Ci	9.29E-05	6.80E-05		
Barium/Lanthanum-140	Ci	**	**		
Antimony-125	Ci	**	**		
Niobium-95	Ci	**	**		
Cerium-141	Ci	**	**		
Cerium-144	Ci	**	**		
Iron-59	Ci	3.50E-05	1.63E-05		
Cesium-136	Ci	**	**		
Chromium-51	Ci	6.74E-04	2.50E-05		
Zinc-65	Ci	2.51E-04	3.30E-04		
Iron-55	Ci	1.86E-04			
Molybdenum-99	Ci	2.98E-05	**		
Selenium-75	Ci	1.72E-04	6.91E-06		
4. Tritium	Ci	2.65E+01	7.78E-01		

[1] Concentrations less than the lower limit of detection 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] Se-75 was not included in dose calculations. We will update in the next semi-annual report.

TABLE 2A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

JULY - DECEMBER 1990

	Unit	3rd Quarter	4th Quarter	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	5.76E-04	3.08E-02	2.50E+1
2. Average diluted concentration during reporting period	uCi/ml	3.40E-11	2.05E-09	
3. Percent of applicable limit	%	4.39E-05	3.06E-03	
B. Tritium				
1. Total release	Ci	3.21E-01	2.23E+00	2.50E+1
2. Average diluted concentration during reporting period	uCi/ml	1.89E-08	1.48E-07	
3. Percent of applicable limit	%	6.30E-04	4.92E-03	
C. Dissolved and entrained gases[1]				
1. Total release	Ci	**	**	5.00E+1
2. Average diluted concentration during reporting period	uCi/ml	**	**	
3. Percent of applicable[2] limit	%	**	**	
D. Gross alpha radioactivity[1]				
1. Total release	Ci	**	**	-------
E. Volumes				
1. Prior to dilution	liters	3.69E+05	4.16E+06	2.50E+1
2. Volume of dilution water used during release period	liters	1.04E+08	1.04E+09	2.50E+1
3. Volume of dilution water available during reporting period	liters	1.70E+10	1.51E+10	2.50E+1

[1] Concentrations less than the lower limit of detection required by Technical Specifications; i.e., 1.00E-05 uCi/ml for entrained Noble Gases and 1.00E-07 uCi/ml for gross alpha radioactivity, are indicated with a double asterisk.

[2] Refer to F on next page.

TABLE 2A
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
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	%	6.62E-03	1.27E+00
2.	Percent of Quarterly Organ Dose Limit	%	4.26E-03	8.42E-01
3.	Percent of Annual Whole Body Dose Limit to Date	%	3.95E-01	1.03E+00
4.	Percent of Annual Organ Dose Limit to Date	%	2.63E-01	6.84E-01
5.	Percent of 10CFR20 Concentration Limit	%	6.84E-04	7.88E-03
6.	Percent of Dissolved or Entrained Noble Gas Limit	%	--	--

TABLE 2B

RADIOACTIVE EFFLUENT RELEASE SEMI-ANNUAL REPORT
NINE MILE POINT NUCLEAR STATION #2
LIQUID EFFLUENTS RELEASED

JULY - DECEMBER 1990

		CONTINUOUS MODE		BATCH MODE	
	Unit	3rd Quarter	4th Quarter	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	**	**	1.80E-04	5.94E-03
Iron-59	Ci	**	**	**	5.66E-05
Zinc-65	CI	**	**	1.33E-04	2.17E-02
Manganese-54	Ci	**	**	**	2.07E-03
Chromium-51	Ci	**	**	2.65E-04	1.07E-03
Zirconium/niobium-95	Ci	**	**	**	**
Molybdenum-99	Ci	**	**	**	**
Technetium-99m	Ci	**	**	**	**
Barium/lanthanum-140	Ci	**	**	**	**
Cerium-141	Ci	**	**	**	**
Hydrogen-3	Ci	**	**	3.21E-01	2.23E+00
Sodium-24	Ci	**	**	**	**
Iron-55	Ci	**	**	1.29E-03	**
Manganese-56	Ci	**	**	**	**
Nickel-65	Ci	**	**	**	**
Arsenic-76	Ci	**	**	**	**
Iodine-133	Ci	**	**	**	**
Tungsten-187	Ci	**	**	**	**
Xenon-133	Ci	**	**	**	**
Xenon-135	Ci	**	**	**	**

[1] Concentrations less than the lower limit of detection required by Technical Specifications; i.e., 1.00E-04 uCi/ml for entrained Noble Gases and 1.00E-07 uCi/ml for gross alpha radioactivity are indicated with a double asterisk.

TABLE 3A

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

A. Solid Waste Shipped Off-Site for Burial or Disposal (Not irradiated fuel)

1. Type of Waste	UNIT	6-MONTH PERIOD	EST. TOTAL ERROR, %
a.* Spent resins, filter sludge bottoms, etc.	m^3	9.78E+01	
	Ci	5.33E+01	2.50E+01
b. Dry compressible waste, contaminated equip., etc.	m^3	3.06E+01	
	Ci	4.53E-01	5.00E+01
c. Irradiated components, control rods, etc.	m^3	None	--------
	Ci	None	--------

*All were solidified in cement as Class A waste in strong, tight containers. All were shipped as radioactive LSA.

TABLE 3A
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

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

a. Spent Resins, filter sludges, evaporator bottoms, etc.

	Percent
Zinc-65	6.37E+01
Cobalt-60	1.38E+01
Chromium-51	8.08E+00
Manganese-54	6.74E+00
Iron-55	4.23E+00
Cobalt-58	1.77E+00
Others	1.76E+00

b. Dry Compressible Waste, Contaminated Equips, Etc.

	Percent
Chromium-51	5.87E+01
Zinc-65	1.59E+01
Iron-55	1.31E+01
Cobalt-60	4.12E+00
Tritium	2.37E+00
Manganese-54	2.22E+00
Iron-59	1.46E+00
Others	2.13E+00

c. Irradiated components, control rods, etc.

NONE

TABLE 3A
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
20	Truck	Burial in Barnwell, SC

B. IRRADIATED FUEL SHIPMENTS (DISPOSITION)

Number of Shipments	Mode of Transportation	Destination
None	-	-

C. SOLID WASTE SHIPPED OFFSITE TO VENDORS FOR PROCESSING AND SUBSEQUENT BURIAL

Below is a summary of Dry Activated 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-2 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-2 Technical Specifications. Therefore, the following data represents the actual shipments made from Quadrex of our non-compacted commingled trash. This trash was shipped to Oakridge, TN for processing prior to burial.

1. Type of Waste - noncompacted commingled trash shipped to Oakridge, TN for processing prior to burial at Barnwell, SC	Unit	Shipment 1990	Est. Total Error, %
	m^3	5.60E+00	
	Ci	1.68E-1	5.00E+01

2. Estimate of Major Nuclide Composition

	Percent
Cobalt-58	3.25E+01
Cobalt-60	2.96E+01
Zinc-65	2.28E+01
Manganese-54	8.29E+00
Cesium-137	4.60E+00
Iron-55	2.20E+00

TABLE 3A
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

JULY - DECEMBER 1990

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
2	Truck	-Processing in Oakridge, TN -Burial in Barnwell, SC

TABLE 4

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
EXPLANATION OF INSTRUMENTATION INOPERABILITY

JULY - DECEMBER 1990

In accordance with NMP Unit 2 Technical Specifications, Radioactive Effluent Instrumentation which is inoperable for 30 consecutive days within the reporting period must be reported in the Semi-Annual Radioactive Effluent Release Report. Below is a listing of monitors which technically fall into this category during the July - December 1990 reporting period along with a description of causes for the inoperability and, as appropriate, corrective actions taken to resolve the problems.

Instrument	Date of Instrument Inoperability	Date Returned to Service	Cause of Inoperability/ Corrective Actions
Service Water A Radiation Monitor	May 10, 1990	Jan. 26, 1991	Inoperable periods were due to unreliable sample pumps. Pumps were recently upgraded by plant modification.
Service Water B Radiation Monitors	Dec. 23, 1989	Aug. 8, 1990	
	Oct. 1, 1990	Feb. 4, 1991	

To comply with Technical Specifications, 12 hour grab samples were taken for service water during periods of inoperability.

Reactor/Radwaste Vent Sample flow device	Nov. 15, 1990	Jan. 11, 1991	Grounding deficiencies caused system electrical interference problems and difficulties in troubleshooting. Probable cause of interference was welding/heavy equipment operations during the outage. System was returned to service at the end of the outage. Modifications are currently being considered for permanent fixture.
Reactor/Radwaste Vent effluent flow device	Nov. 15, 1990	Jan. 11, 1991	
Reactor/Radwaste Vent, Noble Gas Monitor	Nov. 15, 1990	Jan. 11, 1991	

TABLE 4
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
EXPLANATION OF INSTRUMENTATION INOPERABILITY

JULY - DECEMBER 1990

Instrument	Date of Instrument Inoperability	Date Returned to Service	Cause of Inoperability Corrective Actions
Reactor/Radwaste Vent, Iodine Sampler	Nov. 15, 1990	Jan. 11, 1991	
Reactor/Radwaste Vent, Particulate Sampler	Nov. 15, 1990	Jan. 11, 1991	

To comply with technical specifications for gaseous effluents, 12 hour grab samples were analyzed for noble gases and flow rate was estimated every 4 hours. Iodine and particulates were analyzed from a cartridge on the auxiliary sampling station.

Liquid Radwaste Effluent Radiation Monitor	Nov. 1987	Oct. 19, 1990	The monitor became inoperable due to continuous alarming from a contaminated detector. Applicable ODCM and procedure changes have been made to permit increasing the alarm setpoint thereby eliminating the cause of failure.

To comply with technical specifications for liquid radwaste discharge, two samples for each discharge were taken for dual analysis and verification during the period of inoperability.

TABLE 4
(Continued)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
EXPLANATION OF INSTRUMENTATION INOPERABILITY

JULY - DECEMBER 1990

Instrument	Date of Instrument Inoperability	Date Returned to Service	Cause of Inoperability Corrective Actions
Main Stack Sample Flow	Sept. 30, 1990	Jan. 17, 1991	Mass flow sensors in the system's main velocity probe failed. During replacement, the temperature switch on the system's sample line heat trace was damaged. A modification was required to return the system to service since replacement parts were unavailable.
Main Stack Effluent Flow	Sept. 30, 1990	Jan. 17, 1991	
Main Stack Noble Gas	Sept. 30, 1990	Jan. 17, 1991	
Main Stack Particulate and Iodine	Sept. 30, 1990	Jan. 17, 1991	

TABLE 5

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
REVISIONS TO THE OFFSITE DOSE CALCULATION MANUAL

JULY - DECEMBER 1990

The Nine Mile Point Unit 2 Offsite Dose Calculation Manual (ODCM) for gaseous and liquid effluents, as described in ODCM Rev. 5, was not revised during the July - December 1990 reporting period.

TABLE 6

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
REVISIONS TO THE PROCESS CONTROL PROGRAM

JULY - DECEMBER 1990

During the reporting period of July - December there were no revisions to the Process Control Program (PCP).

TABLE 7

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL
UPDATE OF JANUARY-JUNE 1990 DATA USING
ACTUAL JUNE RESULTS FROM THE OFFSITE VENDOR 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	2.01E+01	1.40E+02	5.0E+01
	2. Average release rate for period	uCi/sec	2.59E+00	1.80E+01	
	3. Percent of Technical[1] Specification Limit	%			
B.	Iodines				
	1. Total iodine-131	Ci	8.95E-04	3.10E-03	5.0E+01
	2. Average release rate for period	uCi/sec	1.15E-04	2.95E-04	
	3. Percent of Technical[1] Specification Limit	%			
C.	Particulates				
	1. Particulates with half-lives $\geq$8 days	Ci	9.48E-04	1.17E-03	5.0E+01
	2. Average release rate for period	uCi/sec	1.22E-04	1.49E-04	
	3. Percent of Technical[1] Specification Limit	%			
	4. Gross alpha radio-activity	Ci	5.27E-06	1.31E-05	
D.	Tritium				
	1. Total release	Ci	2.53E+00	4.84E+00	2.5E+01
	2. Average release rate for period	uCi/sec	3.25E-01	6.16E-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 #2
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES
ELEVATED AND GROUND LEVEL
UPDATE OF JANUARY-JUNE 1990 DATA USING
ACTUAL JUNE RESULTS FROM THE OFFSITE VENDOR FOR
STRONTIUM, TRITIUM AND IRON-55

JANUARY - JUNE 1990

	UNIT	1st QUARTER	2nd QUARTER
E. Percent of Technical Specification Limits[1]			
Fission and Activation Gases:			
1. Percent of Quarterly Gamma Air Dose Limit	%	1.80E-01	1.22E+00
2. Percent of Quarterly Beta Air Dose Limit	%	1.30E-03	1.19E-02
3. Percent of Annual Gamma Air Dose Limit to Date	%	9.01E-02	6.98E-01
4. Percent of Annual Beta Air Dose Limit to Date	%	6.50E-04	6.60E-03
5. Percent of Whole Body Dose Rate Limit	%	6.98E-03	4.66E-02
6. Percent of Skin Dose Rate Limit	%	1.36E-03	9.10E-03
Tritium, Iodines and Particulates (with half-lives greater than 8 days):			
1. Percent of Quarterly Dose Limit	%	4.76E-03	2.84E-02
2. Percent of Annual Dose Limit to Date	%	2.38E-03	1.66E-02
3. Percent of Organ Dose Rate Limit	%	1.94E-04	1.16E-03

[1] No Fe-55 or Sr-90 was detected during the last month of the second quarter. There are no changes to the second quarter dose due to the addition of Sr-89 to the calculations.

TABLE 7 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
GASEOUS EFFLUENTS-ELEVATED (STACK)
UPDATE OF JANUARY - JUNE 1990 DATA USING
ACTUAL JUNE RESULTS FROM THE OFFSITE VENDOR FOR
STRONTIUM, TRITIUM AND IRON-55
JANUARY - JUNE 1990

Nuclides Released[1]	Unit	CONTINUOUS MODE 1st Quarter	CONTINUOUS MODE 2nd Quarter	BATCH MODE 1st Quarter	BATCH MODE 2nd Quarter
1. Fission Gases					
Argon-41	Ci	6.55E+00	5.25E+00	**	**
Krypton-85m	Ci	2.25E+00	2.53E+00	**	**
Krypton-87	Ci	**	2.08E+00	**	**
Krypton-88	Ci	4.86E+00	6.56E+01	**	**
Xenon-133	Ci	1.09E-05	1.57E-06	**	**
Xenon-135	Ci	**	8.65E-01	**	**
Xenon-135m	Ci	3.82E-01	3.38E+00	2.44E-01	**
Xenon-137	Ci	2.90E+00	3.91E+01	**	**
Xenon-138	Ci	1.95E+00	2.11E+01	9.12E-01	**
2. Iodines					
Iodine-131	Ci	4.93E-05	3.22E-04	**	**
Iodine-133	Ci	8.46E-04	2.78E-03	**	**
Iodine-135	Ci	**	**	**	**
3. Particulates					
Strontium-89	Ci	4.06E-05	9.70E-05	**	**
Strontium-90	Ci	**	**	**	**
Strontium-91	Ci	**	**	**	**
Cesium-134	Ci	**	**	**	**
Cesium-137	Ci	**	**	**	**
Cobalt-60	Ci	3.61E-06	2.42E-06	**	**
Cobalt-58	Ci	**	**	**	**
Manganese-54	Ci	8.60E-07	6.80E-07	**	**
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	**	2.94E-05	**	**
Zinc-65	Ci	**	2.20E-06	**	**
Iron-55	Ci	3.22E-05	**	**	**
Molybdenum-99	Ci	4.10E-06	2.33E-05	**	**
4. Tritium	Ci	1.22E+00	3.50E+00	1.07E-02	5.39E-02

[1] Concentrations less than lower limits of detection required by Technical Specifications; i.e., 1.00E-04 uCi/ml for noble gases, 1.00E-12 uCi/ml for iodines, and 1.00E-11 uCi/ml for particulate are indicated with a double asterisk.

TABLE 8

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES
UPDATE OF JANUARY - JUNE 1990 DATA USING ACTUAL JUNE RESULTS
FROM THE OFFSITE VENDOR FOR STRONTIUM, TRITIUM AND IRON-55
JANUARY - JUNE 1990

	Unit	1st Quarter	2nd Quarter	Est. Total Error, %
A. Fission and activation products[1]				
1. Total release (not including tritium, gases, alpha)	Ci	2.29E-02	2.72E-03	2.50E+1
2. Average diluted concentration during reporting period	uCi/ml	1.83E-09	2.98E-10	
3. Percent of applicable limit	%	2.60E-03	1.54E-04	
B. Tritium				
1. Total release	Ci	1.47E+00	7.54E-01	2.50E+1
2. Average diluted concentration during reporting period	uCi/ml	1.18E-07	8.27E-08	
3. Percent of applicable limit	%	3.92E-03	2.76E-03	
C. Dissolved and entrained gases				
1. Total release	Ci	6.98E-05	1.52E-04	5.00E+1
2. Average diluted concentration during reporting period	uCi/ml	5.58E-12	1.67E-11	
3. Percent of applicable limit	%	2.79E-06	8.32E-06	
D. Gross alpha radioactivity				
1. Total release	Ci	**	**	-------
E. Volumes				
1. Prior to dilution	liters	1.95E+06	2.69E+05	2.50E+1
2. Volume of dilution water used during release period	liters	4.05E+08	4.07E+07	2.50E+1
3. Volume of dilution water available during reporting period	liters	1.25E+10	9.11E+09	2.50E+1

[1] Concentrations less than the lower limit of detection required by Technical Specifications; i.e., 1.00E-05 uCi/ml for dissolved and entrained Noble Gases, and 1.00E-07 uCi/ml for gross alpha radioactivity, are indicated with a double asterisk.

TABLE 8 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES
UPDATE OF JANUARY - JUNE 1990 DATA USING ACTUAL JUNE RESULTS
FROM THE OFFSITE VENDOR FOR STRONTIUM, TRITIUM AND IRON-55
JANUARY - JUNE 1990

	Unit	1st Quarter	2nd Quarter
F. Percent of Technical Specification Limits			
1. Percent of Quarterly Whole Body Dose Limit	%	7.50E-01	3.31E-02
2. Percent of Quarterly Organ Dose Limit	%	5.01E-01	2.17E-02
3. Percent of Annual Whole Body Dose Limit to Date	%	3.75E-01	3.92E-01
4. Percent of Annual Organ Dose Limit to Date	%	2.50E-01	2.61E-01
5. Percent of 10CFR20 Concentration Limit	%	6.52E-03	2.93E-03
6. Percent of Dissolved or Entrained Noble Gas Limit	%	2.79E-06	8.32E-05

TABLE 8 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT
NINE MILE POINT NUCLEAR STATION #2
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES
UPDATE OF JANUARY - JUNE 1990 DATA USING ACTUAL JUNE RESULTS
FROM THE OFFSITE VENDOR FOR STRONTIUM, TRITIUM AND IRON-55
JANUARY - JUNE 1990

	Unit	CONTINUOUS MODE 1st Quarter	CONTINUOUS MODE 2nd Quarter	BATCH MODE 1st Quarter	BATCH MODE 2nd Quarter
Nuclides Released[1]					
Strontium-89	Ci	**	**	**	**
Strontium-90	Ci	**	**	**	**
Cesium-134	Ci	**	**	**	**
Cesium-137	Ci	**	**	**	**
Iodine-131	Ci	**	**	**	**
Cobalt-58	Ci	**	**	1.87E-03	**
Cobalt-60	Ci	**	**	4.78E-03	2.59E-04
Iron-59	Ci	**	**	6.49E-04	**
Zinc-65	CI	**	**	1.01E-02	3.47E-04
Manganese-54	Ci	**	**	2.99E-03	8.51E-05
Chromium-51	Ci	**	**	2.47E-03	2.03E-03
Zirconium/niobium-95	Ci	**	**	**	**
Molybdenum-99	Ci	**	**	1.01E-05	**
Technetium-99m	Ci	**	**	9.84E-06	**
Barium/lanthanum-140	Ci	**	**	**	**
Cerium-141	Ci	**	**	**	**
Hydrogen-3	Ci	**	**	1.47E+00	7.54E-01
Sodium-24	Ci	**	**	**	**
Iron-55	Ci	**	**	**	5.11E-03
Manganese-56	Ci	**	**	**	**
Nickel-65	Ci	**	**	**	**
Arsenic-76	Ci	**	**	**	**
Iodine-133	Ci	**	**	**	**
Tungsten-187	Ci	**	**	**	**
Xenon-133	Ci	**	**	**	1.05E-04
Xenon-135	Ci	**	**	6.98E-05	4.65E-05

[1] Concentrations less than the lower limit of detection required by Technical Specifications; i.e., 5.00E-07 uCi/ml for gamma emitting nuclides, 1.00E-05 uCi/ml for dissolved and entrained noble gases and tritium, 5.00E-08 uCi/ml for Sr89 and Sr90 and 1.00E-06 uCi/ml for Fe55, are indicated with a double asterisk.

ATTACHMENT 1

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
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 NMP2 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 NMP2 stack and vent were evaluated for the inhalation pathway.

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 1 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
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 NMP2 stack and vent release concentration, times the average NMP2 stack and vent 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:

NMP2 Stack:

- Unit 2 average stack flowrate = 36.1 m^3/sec
- X/Q value = 9.6E-07 (annual 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)
- I-131 = 4.51E-01 pCi/m^3
- I-133 = 4.15E+00 pCi/m^3
- I-135 = 6.30E-01 pCi/m^3
- Mn-54 = 4.78E-03 pCi/m^3
- Co-60 = 2.86E-02 pCi/m^3
- Cr-51 = 4.45E-02 pCi/m^3
- Zn-65 = 1.11E-01 pCi/m^3
- Mo-99 = 3.73E-02 pCi/m^3
- Ba-140 = 6.67E-03 pCi/m^3
- H-3 = 6.03E+03 pCi/m^3

- Unit 2 average vent flowrate = 102 m^3/sec
- X/Q value = 2.8E-06 (annual 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)
- Co-58 = 1.76E-02 pCi/m^3
- Cr-51 = 6.09E-01 pCi/m^3
- Co-60 = 1.26E-01 pCi/m^3
- Mn-54 = 7.49E-02 pCi/m^3
- Zn-65 = 2.63E-01 pCi/m^3
- Mo-99 = 4.65E-02 pCi/m^3
- I-131 = 4.40E-04 pCi/m^3
- I-133 = 5.43E-03 pCi/m^3
- Fe-59 = 2.09E-02 pCi/m^3
- Se-75 = 6.80E-02 pCi/m^3
- Fe-55 = 1.41E-01 pCi/m^3
- H-3 = 7.36E+03 pCi/m^3

ATTACHMENT 1 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES
INSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

The inhalation dose to a member of the public as a result of activities inside the site boundary is 9.73E-04 mRem to the thyroid (maximum organ dose) and 9.55-04 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.

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.

ATTACHMENT 1 (Cont'd)

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
DOSES TO MEMBERS OF THE PUBLIC DUE TO THEIR ACTIVITIES
INSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

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 3.42E-01 mRem to the whole body and 9.73E-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 NMP2. However, a portion of these doses for the direct radiation pathway are attributable to the NMP1 facility.

ATTACHMENT 2

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
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 NMP2 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.

SEMI-ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (1990)
NINE MILE POINT NUCLEAR STATION #2
RADIATION DOSES TO THE LIKELY MOST EXPOSED MEMBER OF THE PUBLIC
OUTSIDE THE SITE BOUNDARY

JANUARY - DECEMBER 1990

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 #2
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.