

Effluent and Waste Disposal

Semi-Annual Report

July 1, 1988 - December 31, 1988

Facility Indian Point 3

Licensee New York Power Authority

This information is provided in accordance with the requirements of Regulatory Guide 1.21. The numbered sections of this report reference corresponding sections of the subject Regulatory Guide, pages 1.21-10 to 12.

A. Supplemental Information

1. Regulatory Limits

Indian Point 3 is presently subject to limits on radioactive waste releases that are set forth in sections 2.3.1, 2.3.2, 2.3.3, 2.4.1, 2.4.2, 2.4.3 and 2.4.4 of Appendix B to Docket #50-286 entitled "Environmental Technical Specification Requirements Part II Radiological Environmental". The percentages of the technical specification limits reported in Tables 1A and 2A are the percent of the quarterly limits specified in the ETSR. If more than one limit applies to the release, the most restrictive limit is reported.

2. Maximum Permissible Concentration

a. Fission and Activation Gases

The quarterly dose resulting from release of fission and activation gases is calculated in accordance with the methodology stated in the Off Site Dose Calculation Manual (ODCM). The specific isotopes listed in Table 1C are used to determine the effective dose factors for the time period.

b&c. Iodines, Tritium and Particulates

The quarterly organ dose limit for Iodine 131, tritium and particulates with half-lives greater than eight days is calculated in accordance with the methodology stated in the ODCM.

d. Liquid Effluents

The quarterly dose limit for liquid isotopic releases is calculated in accordance with the methodology stated in the ODCM. The concentration limit for noble gases dissolved in liquid releases is calculated based upon a maximum permissible concentration of $2.00E-4$ uCi/ml as required by section 2.3.1.A of the ETSR.

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3. Average Energy

The average energies (\bar{E}) of the radionuclide mixture in releases of fission and activation gases were as follows:

3rd Quarter	$E_{\beta} = 1.48E-01$	Mev/dis	$E_{\gamma} = 6.07E-02$	Mev/dis
4th Quarter	$E_{\beta} = 1.42E-01$	Mev/dis	$E_{\gamma} = 5.95E-02$	Mev/dis

4. Measurements and Approximations of Total Radioactivity

a. Fission and Activation Gases

Analysis of effluent gases has been performed in compliance with the requirements of Table 3.4-1 of the ETSR. In the case of isolated tanks (batch release) the total activity discharged is based on an isotopic analysis of each batch with the volume of gas in the batch corrected to standard temperature and pressure.

Vapor containment purge discharges that are less than 150 hours/quarter in duration have been treated as batch releases and pressure relief discharges have been treated as continuous releases (> 500 hrs/year and as defined in NUREG 0133, Section 3.3). At least one complete isotopic concentration analysis of containment air is performed monthly. This analysis is used in conjunction with a process monitor to obtain the isotopic mixture and quantification of each pressure relief. Isotopic analyses for each vapor containment purge are taken prior to and during the purge. This information is combined with the volume of air in each discharge to calculate the quantity of activity released from these discharges.

The continuous building discharges are based on weekly samples of ventilation air for isotopic content. This information is combined with total air volume discharged and the process radiation monitor readings to determine the quantity of activity from continuous discharges.

b&c. Iodines and Particulates

Iodine-131 and particulate releases are quantified by collecting a continuous sample of ventilation air on a TEDA impregnated activated charcoal cartridge and a glass-fiber filter paper. These samples are changed weekly as required in Table 3.4-1 of the ETSR and the concentration of isotopes found by analysis of these samples is combined with the volume of air discharged during the sampling period to calculate the quantity of activity discharged.

For other iodine isotopes the concentration of each isotope is determined monthly on a 24-hour sample. The concentration of the isotopes found by analysis is combined with the volume of air discharged during the sampling period to calculate the quantity of activity discharged.

d. Liquid Effluents

A sample of each batch discharge is taken and an isotopic analysis is performed in compliance with requirements specified in Table 3.3-1 of the ETSR. This isotopic concentration data is combined with the information on volume discharged to determine the amount of each isotope discharged.

Proportional composite samples of continuous discharges are taken and analyzed in compliance with Table 3.3-1 of the ETSR. This concentration data is combined with the volume discharged to calculate the total activity discharged.

5. Batch Releases

a. Liquid

	<u>1988</u>	
	<u>3rd Quarter</u>	<u>4th Quarter</u>
Number of Batch Releases	44	91
Total Time Period Batch Releases (Min.)	6823.0	13835.0
Maximum " " " " " "	270.0	550.0
Average " " " " " "	155.1	152.0
Minimum " " " " " "	120.0	100.0
Average Stream Flow (cfs)	Note: *	Note: *

Note:*

This information is obtained from the Department of the Interior, U. S. Geological Survey for the Hudson River. Due to the delays in obtaining this data from the governmental agency, flows are submitted as they become available.

Year	Quarter	Flow (ft ³ /sec)
1985	Third	7,287
1985	Fourth	18,367
1986	First	29,567
1986	Second	22,867
1986	Third	10,457
1986	Fourth	21,700
1987	First	17,447
1987	Second	22,940
1987	Third	10,064

b. Gaseous

Number of Batch Releases	0	14
Total Time Period Batch Releases (Min.)	0	15500.0
Maximum " " " " "	0	5640.0
Average " " " " "	0	1107.1
Minimum " " " " "	0	120.0

6. Abnormal Releases

a. Liquid
None

b. Gaseous
None

7.0 Radiological Environmental Technical Specifications

The Radiological Environmental Technical Specifications require reporting of prolonged outage of effluent monitoring equipment (Sections 2.1.C and 2.2.B) and significant changes in the land use census, Radiological Environmental Monitoring Program or exceeding the total curie content limitations in outdoor tanks. (Sections 2.8.A, 2.8.B, 2.7.C and 2.3.4.B). During this reporting period, no reportable equipment outages occurred.

The RETS modified the content and format of the Sem-Annual Effluent Release Report (Section 5.3.3.1). A Section G "Offsite Dose Calculation Manual Changes", has been included. During this reporting period there were several changes to the Offsite Dose Calculation Manual. A major format change occurred during the last revision. The complete ODCM has been submitted as an attachment to this report. There were no changes in the Process Control Program.

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT
B. GASEOUS EFFLUENTS
THIRD AND FOURTH QUARTERS 1988

TABLE 1A
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1988)
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3rd	QUARTER 4th	EST. TOTAL Error %
A. Fission & Activation Gases				
1. Total Release	Curies	4.84E+01	7.73E+01	2.50E+01
2. Average release rate for period	uCi/sec	6.09E-00	9.73E-00	
3. Percent of technical specification limit.	%	5.28E-01	8.13E-01	
B. Iodines				
1. Total Iodine - 131	Ci	5.96E-05	2.61E-03	2.50E+01
2. Average release rate for period	uCi/sec	7.49E-06	3.28E-04	
3. Percent of technical specification limit.	%	1.49E-02	5.52E-01	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	2.77E-06	7.95E-06	2.50E+01
2. Average release rate for period	uCi/sec	3.48E-07	1.00E-06	
3. Percent of technical specification limit.	%	1.49E-02	5.52E-01	
4. Gross alpha radioactivity	Ci	<2.70E-07	<3.19E-07	
D. Tritium				
1. Total release	Ci	5.72E-01	3.89E-01	2.50E+01
2. Average release rate for period	uCi/sec	7.20E-02	4.90E-02	
3. Percent of technical specification limit.	%	1.49E-02	5.52E-01	

TABLE 1C
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1988)
GASEOUS EFFLUENTS-GROUND RELEASES

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
1. Fission Gases					
Krypton (Kr) 85m	Ci	2.55E-03	4.02E-03		1.21E-01
Krypton (Kr) 85	Ci	4.82E-02			3.78E-01
Krypton (Kr) 87	Ci	6.08E-05	2.68E-03		5.62E-02
Krypton (Kr) 88	Ci		4.61E-03		2.03E-01
Xenon (Xe) 131m	Ci	2.43E-01	8.08E-02		2.75E-01
Xenon (Xe) 133m	Ci	1.04E-01	5.13E-02		5.55E-01
Xenon (Xe) 133	Ci	4.46E+01	2.43E+01		4.95E+01
Xenon (Xe) 135m	Ci	1.42E-03	4.43E-03		5.55E-03
Xenon (Xe) 135	Ci	3.28E-00	4.84E-01		9.96E-01
Xenon (Xe) 138	Ci		3.30E-03		
Argon (Ar) 41	Ci	4.39E-02	4.14E-02		2.15E-01
TOTAL FOR PERIOD	Ci	4.84E+01	2.50E+01	0.00E-0	5.23E+01
2. Iodines					
Iodine (I) 131	Ci	5.96E-05	1.52E-03		1.09E-03
Iodine (I) 133	Ci		9.51E-08		3.90E-04
Iodine (I) 135	Ci				
TOTAL FOR PERIOD	Ci	5.96E-05	1.52E-03	0.00E-0	1.48E-03

TABLE 1C
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1988)
 GASEOUS EFFLUENTS - GROUND RELEASES

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
3. Particulates					
Antimony (Sb) 125	Ci				
Barium (Ba) 133	Ci				
Cadmium (Cd) 109	Ci				
Cerium (Ce) 139	Ci				
Cerium (Ce) 141	Ci				
Cerium (Ce) 144	Ci				
Cesium (Cs) 134	Ci				1.49E-06
Cesium (Cs) 137	Ci	2.15E-06		2.51E-07	
Cobalt (Co) 57	Ci				
Cobalt (Co) 58	Ci	6.19E-07		6.20E-06	
Cobalt (Co) 60	Ci				
Chromium (Cr) 51	Ci				
Iron (Fe) 55	Ci				
Niobium (Nb) 95	Ci				
Strontium (Sr) 89	Ci				
Strontium (Sr) 90	Ci				
Tin (Sn) 113	Ci				
TOTAL	Ci	2.77E-06	7.94E-06		

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

C. LIQUID EFFLUENTS
THIRD AND FOURTH
QUARTERS, 1988

TABLE 2A
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1988)
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	QUARTER 3rd	QUARTER 4th	EST. TOTAL ERROR %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	6.17E-02	1.58E-01	2.50E+01
2. Average diluted concentration during period	uCi/ml	1.50E-10	7.14E-10	
B. Tritium				
1. Total release	Ci	8.42E+01	1.38E+02	2.50E+01
2. Average diluted concentration during period	uCi/ml	2.05E-07	6.22E-07	
C. Dissolved and entrained gases				
1. Total release	Ci	1.75E-01	1.63E-00	2.50E+01
2. Average diluted concentration during period	uCi/ml	4.27E-10	7.39E-09	
D. Gross alpha radioactivity				
1. Total release	Ci	<5.98E-05	<1.77E-04	2.50E+01
E. Volume of waste released (prior to dilution)				
	liters	1.49E+06	3.92E+06	1.00E+01
F. Volume of dilution water used during period				
	liters	4.10E+11	2.21E+11	1.00E+01
G. Percent of liquid effluent limit				
	%	3.52E-01	6.91E-01	2.50E+01

TABLE 2B
LIQUID EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1988)

Nuclides Released	Unit	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
Antimony (Sb) 122	Ci				
Antimony (Sb) 124	Ci		1.46E-04	3.29E-04	3.03E-03
Antimony (Sb) 125	Ci		2.82E-04	1.34E-02	1.46E-02
Barium (Ba) 140	Ci				
Cadmium (Cd) 109	Ci				
Cerium (Ce) 139	Ci				
Cerium (Ce) 141	Ci				
Cerium (Ce) 144	Ci				
Cesium (Cs) 134	Ci		4.14E-03	9.93E-03	1.18E-03
Cesium (Cs) 136	Ci		1.20E-04		2.44E-05
Cesium (Cs) 137	Ci		3.07E-03	8.82E-03	1.30E-03
Chromium (Cr) 51	Ci		2.24E-04	1.82E-04	1.14E-02
Cobalt (Co) 57	Ci		1.21E-05		
Cobalt (Co) 58	Ci		6.19E-03	1.29E-03	2.24E-02
Cobalt (Co) 60	Ci		2.04E-04	1.24E-03	4.95E-03
Iodine (I) 131	Ci		2.46E-02	1.65E-05	2.54E-03
Iodine (I) 132	Ci		8.34E-06		
Iodine (I) 133	Ci		1.88E-04	4.46E-06	4.71E-05
Iodine (I) 135	Ci				
Iron (Fe) 55	Ci			2.48E-02	4.59E-02
Iron (Fe) 59	Ci		4.80E-05	1.46E-04	3.13E-03
Lanthanum(La) 140	Ci				4.02E-04
Mercury (Hg) 203	Ci				

TABLE 2B

LIQUID EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1988)

Nuclides	Unit	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
Manganese (Mn) 54	Ci		1.89E-04	2.34E-04	4.67E-04
Molybdenum(Mo) 99	Ci				
Nickel (Ni) 63	Ci		6.67E-05	6.37E-04	2.13E-03
Copper (Cu) 64	Ci				
Niobium (Nb) 95	Ci				5.67E-04
Rubidium (Rb) 88	Ci				
Ruthenium (Ru) 103	Ci				
Ruthenium (Ru) 105	Ci				
Ruthenium (Ru) 106	Ci				
Silver (Ag)110m	Ci			6.54E-04	4.09E-03
Sodium (Na) 24	Ci		5.93E-05		1.32E-05
Strontium (Sr) 85	Ci				5.79E-05
Strontium (Sr) 89	Ci		3.92E-06		9.80E-07
Strontium (Sr) 90	Ci				
Technetium(Tc) 99m	Ci			3.96E-06	1.02E-04
Tin (Sn) 113	Ci				3.02E-05
Tungsten (W) 187	Ci				
Yttrium (Y) 91m	Ci				1.22E-06
Yttrium (Y) 92	Ci				
Zinc (Zn) 65	Ci				
Zirconium (Zr) 95	Ci				1.52E-04
TOTAL FOR PERIOD		0.00E-00	3.96E-02	6.17E-02	1.18E-01

TABLE 2B

LIQUID EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1988)

Nuclides	Unit	CONTINUOUS MODE		BATCH MODE	
		3rd Quarter	4th Quarter	3rd Quarter	4th Quarter
Argon	(Ar) 41 Ci		1.52E-05		1.63E-04
Xenon	(Xe) 131m Ci			6.84E-04	3.35E-02
Xenon	(Xe) 133 Ci		1.47E-03	1.67E-01	1.56E-00
Xenon	(Xe) 133m Ci			1.86E-03	1.52E-02
Xenon	(Xe) 135 Ci		3.49E-05	5.37E-03	1.22E-02
Krypton	(Kr) 85m Ci				7.51E-06
Krypton	(Kr) 85 Ci				1.32E-02
Krypton	(Kr) 88 Ci				
Xenon	(Xe) 135m Ci		8.33E-05		3.04E-05
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TOTAL DISSOLVED AND ENTRAINED GASES	Ci	0.00E-00	1.60E-03	1.75E-01	1.63E-00

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

D. SOLID WASTE
THIRD AND FOURTH
QUARTERS, 1988

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT

July 1 - December 31, 1988

SOLID WASTE SHIPMENTS

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (Not irradiated fuel)

1. Type of Waste	Unit	6 Month Period			Est. Total Error, %
		Class A	Class B	Class C	
a. Spent resins, filter	m ³	0	8.95E+0	0	
sludges, etc.	Ci	0	4.23E+1	0	25
b. Dry compressible, contam.	m ³	3.00E+0	0	0	
equipment for burial	Ci	1.55E+0	0	0	25
c. Irradiated Components	m ³	0	0	0	
	Ci	0	0	0	N/A
d. Other: Dry compressible, contaminated equip. for volume reduction at offsite facility	m ³	1.08E+2	0	0	
	Ci	1.03E+0	0	0	25

2. Estimate of major nuclide composition (by type of waste)

NUCLIDE	UNIT	a. Resin	b. Dry Waste	d. Vol. Red
		CLASS B	CLASS A	CLASS A
Cr-51	%	1.5	0	0
Mn-54	%	1.4	0	0
Fe-55	%	26	59	59
Co-58	%	14	5	5
Co-60	%	11	28	28
Ni-63	%	5.9	5	5
Cs-134	%	20	0	0
Cs-137	%	18	2	2

Percentage of nuclides and total activities are based on a combination of direct measurements and scaling for non-gamma emitting nuclides.

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transport</u>	<u>Destination</u>
3	Truck	Barnwell, SC
5	Truck	SEG, Oak Ridge TN: for volume reduction.

4. Containers Shipped

<u>Container</u>	<u>Class A</u>		<u>Class B</u>		<u>Class C</u>	
	<u>Number</u>	<u>Solid Media</u>	<u>Number</u>	<u>Solid Media</u>	<u>Number</u>	<u>Solid Media</u>
<u>For Burial:</u>						
Poly HIC	0	N/A	2	none	0	N/A
Drums	14	none	0	N/A	0	N/A
<hr/>						
<u>For Volume Reduction:</u>						
Drums	195	none	0	N/A	0	N/A
Crates	19	none	0	N/A	0	N/A
Pres. Vessels	2	none	0	N/A	0	N/A
Tanks	2	none	0	N/A	0	N/A

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

E. RADIOLOGICAL IMPACT ON MAN

JANUARY - DECEMBER
1988

RADIOLOGICAL IMPACT ON MAN

The radiological impact on man is determined by conservatively calculating doses to a hypothetically maximum individual offsite based on plant effluents. These calculations are divided into 3 categories:

- Noble Gases
- Particulates and Iodine
- Liquid Releases (fish and invertebrate consumption)

An annual average dispersion factor is used in the calculations, the details of which are presented in the Offsite Dose Calculation Manual.

The computer code used to perform dose calculations incorporates the models and parameters presented in the Indian Point 3 ODCM which utilizes the assumptions in Regulatory Guide 1.109 and NUREG 0133.

Dose calculations from liquid pathways to individuals for the fish and invertebrate consumption pathways are computed using the methodology and parameters in the Indian Point 3 ODCM which incorporates the calculational models that are present in Regulatory Guide 1.109 and NUREG 0133.

Carbon 14 release concentration and resulting dose has been estimated using data generated at Indian Point 3 from August 1980 to June 1982 after a study conducted by the New York State Department of Health. These estimates are consistent with NUREG 0017, Rev. 1. The maximum dose from Carbon 14 releases has been calculated using the maximum dependable gross electrical capacity of Indian Point 3 which is 1000 MW maintained for the entire year. The resultant dose to the maximum exposed individual (child) from gaseous releases is 0.68 mRem to the critical organ (bone) and 0.14 mRem to the total body. These values are based upon site specific assumptions. The resultant dose to the maximum exposed individual from liquid releases is 0.012 mRem to the critical organ and 0.0025 mRem to the total body.

Indian Point 3
 Radiological Impact on Man
 January - December 1988
 (Reference: Indian Point 3 RETS, Section 5.3.3)

Maximum Exposed Individual Doses in mrem

	<u>Total Body</u>	<u>Skin</u>	<u>Bone</u>	<u>Liver</u>	<u>Thyroid</u>	<u>Kidney</u>	<u>Lung</u>	<u>GI-LLI</u>
<u>A. Gaseous Pathway</u>								
A.1 Noble Gases *	3.24E-02	1.52E-01						
A.1 Radioiodines,**	1.38E-03		1.64E-04	1.48E-03	5.52E-02	1.50E-03	1.31E-03	1.31E-03
Particulates, and Tritium								
<u>B. Liquid Pathway***</u>								
B.1 All Releases	2.10E-02		4.42E-02	4.40E-02	3.83E-02	6.81E-03	1.64E-02	5.30E-02
TOTALS	5.48E-02	1.52E-01	4.43E-02	4.55E-02	9.34E-02	8.31E-03	1.77E-02	5.43E-02

- * Site Boundary, 350 meters, SW sector
- ** Infant, 8.1 km, SSW sector
- *** Adult, 1.4 km, SW sector

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

F. METEOROLOGICAL DATA
JANAURY - DECEMBER
1988

INDIAN POINT JAN-MAR 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	0.	10.	3.	0.	0.	0.	13.
NNE	1.	1.	0.	0.	0.	0.	2.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	0.	13.	8.	0.	0.	0.	21.
S	0.	3.	3.	0.	0.	0.	6.
SSW	0.	0.	1.	1.	0.	0.	2.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	6.	0.	0.	0.	0.	6.
WNW	0.	13.	8.	0.	0.	0.	21.
NNW	0.	31.	33.	0.	0.	0.	64.
NNW	0.	13.	3.	0.	0.	0.	16.
TOTAL	1.	90.	59.	1.	0.	0.	151.

No hours of missing data for Jan-Mar data.

CALM 0.

INDIAN POINT JAN-MAR 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS B

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	1.	10.	0.	0.	0.	0.	11.
NNE	0.	1.	0.	0.	0.	0.	1.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	1.	1.	0.	0.	0.	0.	2.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	1.	3.	2.	0.	0.	0.	6.
S	0.	5.	3.	1.	0.	0.	9.
SSW	1.	2.	0.	0.	0.	0.	3.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	5.	4.	0.	0.	0.	9.
WNW	1.	6.	3.	0.	0.	0.	10.
NW	0.	15.	11.	0.	0.	0.	26.
NNW	1.	7.	2.	0.	0.	0.	10.
TOTAL	6.	55.	25.	1.	0.	0.	87.
CALM	0.						

INDIAN POINT JAN-MAR 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS C

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	2.	14.	0.	0.	0.	0.	16.
NNE	1.	2.	0.	0.	0.	0.	3.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	3.	8.	2.	0.	0.	0.	13.
S	2.	7.	6.	0.	0.	0.	15.
SSW	1.	5.	2.	0.	0.	0.	8.
SW	1.	0.	0.	0.	0.	0.	1.
WSW	0.	1.	1.	0.	0.	0.	2.
W	1.	5.	5.	0.	0.	0.	11.
WNW	0.	13.	3.	0.	0.	0.	16.
NW	2.	17.	7.	0.	0.	0.	26.
NNW	0.	3.	1.	0.	0.	0.	4.
TOTAL	15.	75.	27.	0.	0.	0.	117.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	33.	8.	9.	3.	0.	0.	53.
NNE	53.	12.	5.	0.	0.	0.	70.
NE	59.	7.	0.	0.	0.	0.	66.
ENE	16.	0.	0.	0.	0.	0.	16.
E	15.	0.	0.	0.	0.	0.	15.
ESE	8.	1.	0.	0.	0.	0.	9.
SE	17.	0.	0.	0.	0.	0.	17.
SSE	28.	25.	4.	0.	0.	0.	57.
S	35.	55.	11.	2.	0.	0.	103.
SSW	34.	10.	0.	0.	0.	0.	44.
SW	21.	5.	0.	0.	0.	0.	26.
WSW	17.	6.	1.	0.	0.	0.	24.
W	15.	9.	1.	0.	0.	0.	25.
WNW	13.	15.	0.	0.	0.	0.	28.
NN	15.	18.	0.	0.	0.	0.	33.
NNW	16.	10.	3.	0.	0.	0.	29.
TOTAL	395.	181.	34.	5.	0.	0.	615.

INDIAN POINT JAN-MAR 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS F

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	33.	0.	0.	0.	0.	0.	33.
NNE	74.	13.	0.	0.	0.	0.	87.
NE	44.	12.	0.	0.	0.	0.	56.
ENE	7.	1.	0.	0.	0.	0.	8.
E	3.	0.	0.	0.	0.	0.	3.
ESE	6.	0.	0.	0.	0.	0.	6.
SE	3.	0.	0.	0.	0.	0.	3.
SSE	9.	0.	0.	0.	0.	0.	9.
S	7.	3.	0.	0.	0.	0.	10.
SSW	5.	0.	0.	0.	0.	0.	5.
SW	5.	0.	0.	0.	0.	0.	5.
WSW	3.	0.	0.	0.	0.	0.	3.
W	2.	0.	0.	0.	0.	0.	2.
WNW	1.	0.	0.	0.	0.	0.	1.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	5.	0.	0.	0.	0.	0.	5.
TOTAL	207.	29.	0.	0.	0.	0.	236.
CALM	8.						

INDIAN POINT JAN-MAR 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	3.	0.	0.	0.	0.	0.	3.
NNE	13.	5.	0.	0.	0.	0.	18.
NE	3.	9.	0.	0.	0.	0.	12.
ENE	1.	0.	0.	0.	0.	0.	1.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.
S	1.	0.	0.	0.	0.	0.	1.
SSW	1.	0.	0.	0.	0.	0.	1.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	2.	0.	0.	0.	0.	0.	2.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
TOTAL	24.	14.	0.	0.	0.	0.	38.

CALM 1.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	1.	21.	12.	1.	0.	0.	35.
NNE	0.	2.	1.	0.	0.	0.	3.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	1.	0.	0.	0.	0.	1.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	0.	14.	16.	0.	0.	0.	30.
S	0.	0.	4.	0.	0.	0.	4.
SSW	0.	2.	0.	0.	0.	0.	2.
SW	0.	1.	0.	0.	0.	0.	1.
WSW	0.	3.	0.	0.	0.	0.	3.
W	2.	6.	0.	0.	0.	0.	8.
WNW	4.	4.	1.	0.	0.	0.	9.
NW	5.	12.	16.	0.	0.	0.	33.
NNW	7.	16.	9.	0.	0.	0.	32.
TOTAL	19.	82.	59.	1.	0.	0.	161.

No hours of missing data for Apr-Jun period.

INDIAN POINT APR-JUNE 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS D

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	33.	119.	34.	6.	0.	0.	192.
NNE	36.	114.	32.	0.	0.	0.	182.
NE	40.	19.	0.	0.	0.	0.	59.
ENE	28.	4.	0.	0.	0.	0.	32.
E	11.	1.	0.	0.	0.	0.	12.
ESE	16.	0.	0.	0.	0.	0.	16.
SE	29.	4.	0.	0.	0.	0.	33.
SSE	42.	61.	9.	0.	0.	0.	112.
S	23.	76.	24.	0.	0.	0.	123.
SSW	13.	17.	2.	0.	0.	0.	32.
SW	8.	3.	0.	0.	0.	0.	11.
WSW	11.	5.	0.	0.	0.	0.	16.
W	15.	13.	1.	0.	0.	0.	29.
WNW	7.	25.	17.	0.	0.	0.	49.
NW	7.	31.	10.	0.	0.	0.	48.
NNW	12.	51.	17.	0.	0.	0.	80.
TOTAL	331.	543.	146.	6.	0.	0.	1026.
CALM	8.						

INDIAN POINT APR-JUNE 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	13.	13.	5.	0.	0.	0.	31.
NNE	66.	31.	2.	0.	0.	0.	99.
NE	52.	15.	0.	0.	0.	0.	67.
ENE	36.	0.	0.	0.	0.	0.	36.
E	19.	1.	0.	0.	0.	0.	20.
ESE	26.	0.	0.	0.	0.	0.	26.
SE	22.	0.	0.	0.	0.	0.	22.
SSE	29.	12.	1.	0.	0.	0.	42.
S	29.	33.	2.	0.	0.	0.	64.
SSW	20.	12.	5.	0.	0.	0.	37.
SW	11.	2.	0.	0.	0.	0.	13.
WSW	7.	0.	0.	0.	0.	0.	7.
W	4.	2.	0.	0.	0.	0.	6.
WNW	3.	4.	1.	0.	0.	0.	8.
NW	10.	8.	0.	0.	0.	0.	18.
NNW	6.	10.	3.	0.	0.	0.	19.
TOTAL	353.	143.	19.	0.	0.	0.	515.
CALM	46.						

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	6.	1.	0.	0.	0.	0.	7.
NNE	42.	1.	0.	0.	0.	0.	43.
NE	34.	12.	0.	0.	0.	0.	46.
ENE	14.	0.	0.	0.	0.	0.	14.
E	7.	0.	0.	0.	0.	0.	7.
ESE	8.	0.	0.	0.	0.	0.	8.
SE	3.	0.	0.	0.	0.	0.	3.
SSE	3.	0.	0.	0.	0.	0.	3.
S	4.	1.	0.	0.	0.	0.	5.
SSW	1.	0.	0.	0.	0.	0.	1.
SW	3.	0.	0.	0.	0.	0.	3.
WSW	1.	0.	0.	0.	0.	0.	1.
W	0.	0.	0.	0.	0.	0.	0.
WNW	3.	0.	0.	0.	0.	0.	3.
NW	0.	1.	0.	0.	0.	0.	1.
NNW	2.	1.	0.	0.	0.	0.	3.
TOTAL	131.	17.	0.	0.	0.	0.	148.
CALM	19.						

INDIAN POINT APR-JUNE 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	1.	0.	0.	0.	0.	0.	1.
NNE	19.	0.	0.	0.	0.	0.	19.
NE	5.	2.	1.	0.	0.	0.	8.
ENE	1.	0.	0.	0.	0.	0.	1.
E	0.	0.	0.	0.	0.	0.	0.
ESE	4.	0.	0.	0.	0.	0.	4.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	2.	0.	0.	0.	0.	0.	2.
S	0.	0.	0.	0.	0.	0.	0.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
TOTAL	32.	2.	1.	0.	0.	0.	35.
CALM	9.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	1.	20.	4.	0.	0.	0.	25.
NNE	1.	4.	1.	0.	0.	0.	6.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	1.	0.	0.	0.	0.	0.	1.
SSE	3.	32.	0.	0.	0.	0.	35.
S	1.	19.	2.	0.	0.	0.	22.
SSW	0.	2.	1.	0.	0.	0.	3.
SW	0.	2.	0.	0.	0.	0.	2.
WSW	1.	0.	2.	0.	0.	0.	3.
W	4.	5.	0.	0.	0.	0.	9.
WNW	2.	12.	0.	0.	0.	0.	14.
NW	2.	13.	0.	0.	0.	0.	15.
NNW	5.	20.	0.	0.	0.	0.	25.
TOTAL	21.	129.	10.	0.	0.	0.	160.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	7.	12.	0.	0.	0.	0.	19.
NNE	3.	3.	0.	0.	0.	0.	6.
NE	1.	1.	0.	0.	0.	0.	2.
ENE	1.	0.	0.	0.	0.	0.	1.
E	0.	1.	0.	0.	0.	0.	1.
ESE	1.	0.	0.	0.	0.	0.	1.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	5.	19.	1.	0.	0.	0.	25.
S	3.	21.	10.	0.	0.	0.	34.
SSW	0.	4.	2.	0.	0.	0.	6.
SW	1.	2.	0.	0.	0.	0.	3.
WSW	2.	1.	1.	0.	0.	0.	4.
W	5.	1.	0.	0.	0.	0.	6.
WNW	1.	2.	0.	0.	0.	0.	3.
NW	3.	2.	0.	0.	0.	0.	5.
NNW	2.	2.	0.	0.	0.	0.	4.
TOTAL	37.	71.	14.	0.	0.	0.	122.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	8.	22.	0.	0.	0.	0.	30.
NNE	4.	6.	1.	0.	0.	0.	11.
NE	1.	0.	0.	0.	0.	0.	1.
ENE	1.	0.	0.	0.	0.	0.	1.
E	0.	0.	0.	0.	0.	0.	0.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	4.	0.	0.	0.	0.	0.	4.
SSE	8.	7.	1.	0.	0.	0.	16.
S	12.	36.	2.	0.	0.	0.	50.
SSW	2.	8.	1.	0.	0.	0.	11.
SW	2.	1.	0.	0.	0.	0.	3.
WSW	3.	1.	0.	0.	0.	0.	4.
W	1.	2.	0.	0.	0.	0.	3.
WNW	2.	1.	0.	0.	0.	0.	3.
NW	0.	2.	1.	0.	0.	0.	3.
NNW	3.	2.	0.	0.	0.	0.	5.
TOTAL	54.	88.	6.	0.	0.	0.	148.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	38.	53.	2.	0.	0.	0.	93.
NNE	20.	41.	10.	0.	0.	0.	71.
NE	31.	17.	0.	0.	0.	0.	48.
ENE	17.	0.	0.	0.	0.	0.	17.
E	11.	0.	0.	0.	0.	0.	11.
ESE	13.	1.	0.	0.	0.	0.	14.
SE	16.	0.	0.	0.	0.	0.	16.
SSE	38.	48.	3.	0.	0.	0.	89.
S	54.	117.	11.	0.	0.	0.	182.
SSW	16.	31.	6.	0.	0.	0.	53.
SW	8.	2.	0.	0.	0.	0.	10.
WSW	8.	2.	0.	0.	0.	0.	10.
W	3.	5.	0.	0.	0.	0.	8.
WNW	3.	12.	1.	0.	0.	0.	16.
NW	4.	7.	0.	0.	0.	0.	11.
NNW	9.	19.	0.	0.	0.	0.	28.
TOTAL	289.	355.	33.	0.	0.	0.	677.

CALM 2.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	36.	22.	3.	0.	0.	0.	61.
NNE	112.	25.	0.	0.	0.	0.	137.
NE	123.	37.	0.	0.	0.	0.	160.
ENE	39.	3.	0.	0.	0.	0.	42.
E	23.	0.	0.	0.	0.	0.	23.
ESE	28.	1.	0.	0.	0.	0.	29.
SE	37.	1.	1.	0.	0.	0.	39.
SSE	40.	19.	0.	0.	0.	0.	59.
S	67.	66.	5.	0.	1.	0.	139.
SSW	34.	28.	3.	0.	0.	0.	65.
SW	10.	1.	0.	0.	0.	0.	11.
WSW	6.	1.	0.	0.	0.	0.	7.
W	10.	1.	2.	0.	0.	0.	13.
WNW	12.	6.	0.	0.	0.	0.	18.
NW	18.	5.	0.	0.	0.	0.	23.
NNW	13.	14.	0.	0.	0.	0.	27.
TOTAL	608.	230.	14.	0.	1.	0.	853.

CALM 43.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

WIND
DIRECTION

WIND SPEED (MPH)

NW	1.	0.	0.	0.	0.	0.	4.
NNW	4.	0.	0.	0.	0.	0.	4.
TOTAL	155.	27.	0.	0.	0.	0.	182.
CALM	18.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT JULY-SEPT 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	0.	0.	0.	0.	0.	0.	0.
NNE	1.	0.	0.	0.	0.	0.	1.
NE	1.	0.	0.	0.	0.	0.	1.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	1.	0.	0.	0.	0.	0.	1.
S	0.	0.	0.	0.	0.	0.	0.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
TOTAL	3.	0.	0.	0.	0.	0.	3.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	0.	11.	5.	0.	0.	0.	16.
NNE	0.	0.	0.	0.	0.	0.	0.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	1.	5.	2.	0.	0.	0.	8.
S	0.	2.	1.	0.	0.	0.	3.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	0.	3.	0.	0.	0.	0.	3.
WSW	0.	2.	0.	0.	0.	0.	2.
W	0.	9.	2.	0.	0.	0.	11.
WNW	0.	11.	3.	0.	0.	0.	14.
NW	2.	19.	5.	0.	0.	0.	26.
NHW	0.	9.	2.	0.	0.	0.	11.
TOTAL	3.	71.	20.	0.	0.	0.	94.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	1.	11.	0.	0.	0.	0.	12.
NNE	0.	1.	0.	0.	0.	0.	1.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	1.	8.	0.	0.	0.	0.	9.
S	0.	4.	4.	0.	0.	0.	8.
SSW	0.	5.	0.	0.	0.	0.	5.
SW	0.	2.	0.	0.	0.	0.	2.
WSW	0.	1.	0.	0.	0.	0.	1.
W	0.	6.	2.	0.	0.	0.	8.
WNW	0.	6.	0.	0.	0.	0.	6.
NW	0.	7.	8.	0.	0.	0.	15.
NNW	1.	6.	2.	0.	0.	0.	9.
TOTAL	3.	57.	16.	0.	0.	0.	76.
CALM	0.						

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	2.	11.	3.	0.	0.	0.	16.
NNE	1.	10.	0.	0.	0.	0.	11.
NE	1.	3.	0.	0.	0.	0.	4.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	1.	0.	0.	0.	0.	0.	1.
SSE	1.	11.	2.	0.	0.	0.	14.
S	0.	4.	7.	0.	0.	0.	11.
SSW	0.	6.	0.	0.	0.	0.	6.
SW	0.	4.	0.	0.	0.	0.	4.
WSW	2.	1.	0.	0.	0.	0.	3.
W	0.	5.	2.	0.	0.	0.	7.
WNW	1.	9.	1.	0.	0.	0.	11.
NW	2.	9.	5.	0.	0.	0.	16.
NNW	0.	4.	2.	0.	0.	0.	6.
TOTAL	11.	77.	22.	0.	0.	0.	110.

CALM 0.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	17.	50.	41.	1.	0.	0.	109.
NNE	20.	99.	14.	0.	0.	0.	133.
NE	19.	41.	2.	0.	0.	0.	62.
ENE	8.	5.	0.	0.	0.	0.	13.
E	10.	2.	0.	0.	0.	0.	12.
ESE	8.	4.	0.	0.	0.	0.	12.
SE	8.	3.	0.	0.	0.	0.	11.
SSE	11.	16.	6.	0.	0.	0.	33.
S	14.	53.	19.	1.	0.	0.	87.
SSW	14.	33.	6.	0.	0.	0.	53.
SW	4.	15.	1.	0.	0.	0.	20.
WSW	7.	26.	1.	0.	0.	0.	34.
W	6.	84.	10.	0.	0.	0.	100.
WNW	8.	57.	28.	0.	0.	0.	93.
NW	2.	48.	54.	4.	0.	0.	108.
NNW	5.	56.	20.	0.	0.	0.	81.
TOTAL	161.	592.	202.	6.	0.	0.	961.

CALM 2.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	29.	6.	1.	0.	0.	0.	36.
NNE	77.	21.	0.	0.	0.	0.	98.
NE	71.	33.	1.	0.	0.	0.	105.
ENE	22.	0.	0.	0.	0.	0.	22.
E	15.	2.	0.	0.	0.	0.	17.
ESE	18.	0.	0.	0.	0.	0.	18.
SE	14.	2.	0.	0.	0.	0.	16.
SSE	35.	32.	0.	0.	0.	0.	67.
S	24.	76.	11.	0.	0.	0.	111.
SSW	30.	27.	0.	0.	0.	0.	57.
SW	15.	5.	0.	0.	0.	0.	20.
WSW	16.	7.	3.	0.	0.	0.	26.
W	14.	19.	1.	0.	0.	0.	34.
WNW	11.	23.	2.	0.	0.	0.	36.
NW	7.	28.	1.	1.	0.	0.	37.
NNW	8.	10.	0.	0.	0.	0.	18.
TOTAL	406.	291.	20.	1.	0.	0.	718.

CALM 10.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
 10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
 PASQUILL CLASS F

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	15.	0.	0.	0.	0.	0.	15.
NNE	84.	10.	0.	0.	0.	0.	94.
NE	36.	14.	0.	0.	0.	0.	50.
ENE	10.	1.	0.	0.	0.	0.	11.
E	2.	0.	0.	0.	0.	0.	2.
ESE	1.	0.	0.	0.	0.	0.	1.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	3.	1.	0.	0.	0.	0.	4.
S	8.	6.	0.	0.	0.	0.	14.
SSW	1.	0.	0.	0.	0.	0.	1.
SW	3.	0.	0.	0.	0.	0.	3.
WSW	3.	0.	0.	0.	0.	0.	3.
W	1.	0.	1.	0.	0.	0.	2.
WNW	1.	0.	0.	0.	0.	0.	1.
NW	3.	0.	0.	0.	0.	0.	3.
NNW	1.	0.	0.	0.	0.	0.	1.
TOTAL	172.	32.	1.	0.	0.	0.	205.

CALM 0.

*****NRC FORMAT FOR NUREG 1.21*****

INDIAN POINT OCT-DEC 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH)						TOTAL
	01-03	04-07	08-12	13-18	19-24	>24	
N	7.	0.	0.	0.	0.	0.	7.
NNE	15.	4.	0.	0.	0.	0.	19.
NE	2.	3.	0.	0.	0.	0.	5.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.
S	0.	0.	0.	0.	0.	0.	0.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	1.	0.	0.	0.	0.	0.	1.
TOTAL	25.	7.	0.	0.	0.	0.	32.
CALM	0.						

Indian Point 3
EFFLUENT AND WASTE DISPOSAL
SEMI-ANNUAL REPORT

G. OFFSITE DOSE CALCULATION MANUAL CHANGES
THIRD AND FOURTH
QUARTERS, 1988

ODCM CHANGES SINCE JULY 1988

NOTE: "No Impact" is to be interpreted as meaning no impact relative to offsite dose assessment or setpoint determination.

1. Description:

A note has been added to Table 4.1 which indicate that radiochemical separation and analysis is not required for I-131 vegetation samples: as long as the required RETS LLD is met using gamma spectroscopy on the sample.

Justification:

This is a clarification of our interpretation of RETS Section 2.7 requirement to perform "Gamma Isotopic and I-131 Analyses".

Impact:

No Impact

2. Description:

Sections 2.1.17 and 3.1.15 have been added to address the methodology used by Indian Point 3 to account for Carbon 14 releases in our calculations for radiological impact on man.

Justification:

Studies performed by the New York State Department of Health form the basis of our method of accounting for C-14 releases, the results of the study are indicated in the above referenced sections.

Impact:

This change results in a more accurate assessment and reporting of the radiological impact on man in the Radioactive Effluent Release Report.

3. Description:

Sections 3.1.2, 3.1.16, 3.3.3.2, 3.3.4.3, and 3.5.5 have been changed to give better guidance on the use of the short term meteorological dispersion factor and better define short and long term releases.

Justification:

NUREG 0133 allows batch releases to be treated as long term releases (average annual dispersion) if the licensee demonstrates that these batch releases total more than 150 hours/quarter or more than 500 hours/year in duration or are random both in time of day and duration.

The ODCM did not give adequate guidelines on this matter and this change clarifies the appropriate use of the short term meteorological dispersion factor.

Impact:

No Impact

4. Description:

Sections 2.4.3 and 2.5.3 now include dose conversion and bioaccumulation factors for Antimony. Table 2-1 is also effected.

Justification:

Bioaccumulation and dose factor data is not found in R.G. 1.109 for antimony. Three sources were used to get the required information; IAEA Report No. 57 for bioaccumulation factors, NUREG 0172 and ICRP2 reports for dose conversion factors. Sb-124 and Sb-125 were specifically listed by organ in terms of mrem/pCi ingested. There was no data given for Sb-122, therefore, organ specific dose factors were calculated using data obtained from ICRP2 and NUREG 0172.

Impact:

More accurate dose assessment for liquid effluents. No set point impact.

5. Description:

Sections 2.2.4, 3.4.1, table 1-1, figure 2-1 and figure 3-1 have been updated to indicate that plant process radiation monitors are available and will be utilized as indicated in these sections for liquid and gaseous effluent monitoring.

Justification:

This change better describes our monitoring capability.

Impact:

No impact.

6. Description:

Section 2.3.3 was changed to indicate that liquid effluent concentrations are averaged as per 10CFR20.106a.

Justification:

Eliminates a possible mis-interpretation by making section 2.3.3 consistent with section 2.1.14 which remains unchanged.

Impact:

No impact.

7. Description:

Section 2.1.12 has been modified by adding the words "to the river" to clarify that only the portion of steam generator blowdown going to the river is to be included in the release calculations (as opposed to the entire blowdown from the generator).

Justification:

A recent plant modification added the capability for recovery of blowdown water and energy, the change to section 2.1.12 is a result of this modification.

Impact:

Maintains accuracy in effluent release data and therefore dose assessment calculations.

8. Description:

Section 3.4.1.2 was changed to indicate that a standard isotopic mixture of gases may be used (replacing "is" used) to determine an acceptable noble gas instantaneous release rate. Additional clarification was given to wording of Section 1.2.1.

Justification:

The "standard" mix discussed in 3.4.1.2 was used in determining the reference permissible discharge rates found in section 1.2.1. The above change is a clarification which allows the use of actual effluent sample data in determining permissible release rates. This change makes section 3.4.1.2 consistent with 1.2.1.

Impact:

Maintains accuracy in dose assessment calculations.

9. Description:

Plant Vent effluent radiation monitor R-27 has been added to figure 3-1.

Justification:

More accurately represents the IP3 effluent monitoring system capability.

Impact:

No impact.

10. Description:

Appendix 3-A page 2 of 7 section A.i.d, $2.93E4$ uCi/sec was changed to $1.63E4$ uCi/sec.

Justification:

Correction of a typographical error.

Impact:

None.

11. Description:

Section 2.4.3 and 2.5 and Table 2-1 have been changed to include the most recent site specific bioaccumulation factor data for the Cesium isotopes. Specifically, the Revision 4 value has been increased from 150 to 224.

Justification:

The change resulted from studies by New York University over the course of 12 years on the indigenous fish species in the Hudson River. This represents an update of the earlier work upon which the original 150 value was based.

The report "Radioecological Studies of the Hudson River Progress Report", New York University Medical Center, 1986-1987 has been added as a reference to the list of references on page v of the ODCM.

Impact:

Slightly higher doses will be calculated for the fish ingestion pathway specifically as related to radiocesium ingestion.

12. Description

A sentence was added to section 2.4.2 to more clearly indicate that the dilution flow (fk) and the duration of release (dtk) must agree.

Justification

This is a clarification of the method used by Indian Point 3 to calculate the dose resulting from liquid radioactive releases.

Impact

No impact.

13. Description

Section 3.1.8 which describes the authorization process needed to perform radioactive gaseous releases in excess of the annual release rate has been rewritten.

Justification:

This section has been rewritten to provide more concise direction as to who is allowed to authorize the use of the quarterly and instantaneous noble gas release rates.

Impact

No impact.

14. Description

Section 2.1.18 has been added to address monitoring of the condensate polisher regenerant waste tanks for activity. These tanks will be monitored in accordance with the direction set forth in NRC IE Bulletin 80-10. If the system becomes contaminated then these releases will be made in accordance with the requirements of the RETS.

Justification

This release point is normally non-radioactive release point and requires a primary to secondary leak of sufficient magnitude to allow detectable carry over from the steam generators to become radioactive. A recent safety evaluation was performed in accordance with the NRC IE Bulletin to allow use of the system as radioactive in this event. This section clearly defines when the increased monitoring is required.

Impact

This change enhances the monitoring program for effluent releases and thus provides more complete assessment of liquid releases and subsequent radiological impact on man.

15. Description

Section 3.4.2.2 has been expanded to allow use of the noble gas release rates to limit radio-iodine and particulate releases provided the vapor containment activity for these isotopes does not exceed IE-7 uCi/cc.

Justification

A study was recently performed by Indian Point 3 staff to determine if the iodine and particulate releases would become more limiting than noble gas releases during periods when extensive decay occurs. The skin dose from noble gas exposure not the organ dose from the Iodines and particulates dose are more limiting in this case. This is due to the longer lived noble gases (Xe 131m and Kr 85) which have half lives greater than Iodine 131. The Iodine release rate resulting from a containment purge is still controlled at less than the instantaneous release rate. The actual release rate would be further reduced due to the filtration apparatus which is installed in the Plant Vent.

Impact

Applying a concentration limit to Iodine 131 and particulates with half lives greater than eight days further defines when control of noble gas releases are inadequate to restrict the instantaneous dose to a critical organ when making radioactive gaseous releases.

50-286

INDIAN POINT

PASNY

Effluent & Waste Disposal Semi-Annual Report

Rec'd w/ltr dtd 02/28/89...8903200268

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