Effluent and Waste Disposal

Semi-Annual Report

July 1 - December 31, 1983

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 Unit 3 is presently subject to limits on radioactive waste releases that are set forth in sections 2.4 and 3.4 of Appendix B to Docket # 50-286 entitled "Environmental Technical Specification Requirements for Once-Through Cooling" (T.S.). The percentages of technical specification limits reported in Table 1A are the percent of one half of the quarterly limits specified in the ETSR.

2. Maximum Permissible Concentrations

a. Fission and Activation Gases

The quarterly limits for those specifications stated in the ETSR have been used to calculate the percent of technical specification limit. The K, L, M, N values for vent release points are based on the isotopic concentrations reported in Table 1C and on the individual isotopic K, L, M, N values in Table 2.4-5 of the ETSR. The percent of permissible discharges reported for IP-3 are based on assuming that IP-3 can use only 50% of the T.S. limits measured in Curies/ second and detailed in Memorandum of Understanding between NYPA and Con Edison.

b&c. Iodines & Particulates

The quarterly limits for iodine-131 and particulates with half-lives greater than 8 days in section 2.4.2.b.3 of the ETSR have been used as the maximum permissible concentration for the purpose of calculating the percent of technical specification limit. Again only one half of the permissible limit is used for IP-3 as stated in 2(a) above.

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d. Liquid Effluents

All liquid discharges from Indian Point are made through a common discharge canal with a minimum of 100,000 gpm dilution water. The isotopic content, excluding tritium and dissolved noble gas, of continuous and batch mode discharges from the site for the third and fourth calendar quarters have been added and a weighted average fraction of MPC has been calculated for this isotopic mixture as described in 10 CFR 20. The percent of applicable limit reported is the percent of MPC concentration of the time averaged diluted concentration for the calendar quarter.

The tritium limit has been established in the same manner as the other isotopes in liquid effluents.

Since there is no limit stated for dissolved noble gases in 10 CFR 20, we have established a limit of 2.55×10^{-3} uCi/cc based on a dose calculation that has been provided to USNRC inspectors.

3. Average Energy

The average energy (E) of the radionuclide mixture in releases of fission and activation gases was as follows:

3rd Quarter:	$\bar{E}_\gamma$ = 2.23E-3 MeV/dis	$\bar{E}_\beta$ = 2.28E-1 MeV/dis
4th Quarter:	$\bar{E}_\gamma$ = 2.23E-3 MeV/dis	$\bar{E}_\beta$ = 2.28E-1 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 2.4-2 of the ETSR. In the case of isolated tanks (batch release) the total activity discharged is based on an isotopic analysis of each batch and the volume of gas in the batch corrected to standard temperature and pressure.

Vapor containment purge and pressure relief discharges have been treated as batch releases. At least one complete isotopic concentration analysis of containment air is performed per month and this is applied to a gross analysis of the ventilation air performed prior to 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 radionuclide composition of these discharges.

The continuous 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 continuous discharges.

b&c Iodines and Particulates

Indine-131 and particulate releases are quantified by collecting a continuous sample of ventilation air on a potassium-iodide impregnated activated charcoal cartridge and a glass-fiber filter paper. These samples are changed weekly as required in Table 2.4-2 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 amount of activity discharged.

For other iodine isotopes the ratio of each isotope to iodine-131 is determined for a monthly 24-hour sample. These ratios are then used, along with the total monthly discharge of iodine-131, to calculate the amount of these other isotopes discharged in this monthly period.

d. Liquid Effluents

A proportional composite sample of each batch discharge taken and an isotopic analysis is performed in compliance with requirements specified in Table 2.4-1 of the ESTR. This isotopic concentration data is combined with information on volume discharged to determine the amount of each isotope discharged in this period.

Samples of continuous discharges have been taken and analyzed in compliance with Table 2.4-1 of the ETSR. This concentration data is combined with the volume discharged to calculate the total activity discharged.

5. Batch Releases

a. Liquid

	1983 3rd Quarter	1983 4th Quarter
Number of Batch Releases	20	29
Total Time Period Batch Releases (Min.)	4.12E+3	5.67E+3
Maximum " " " " " "	6.01E+2	4.10E+2
Average " " " " " "	2.06E+2	1.96E+2
Minimum " " " " " "	1.11E+2	1.02E+2
Average Stream Flow (cfs)	16,312	50,939

b. Gaseous

Number of Batch Releases	4	6.
Total Time Period Batch Releases (Min.)	3.45E+2	1.97E+2
Maximum " " " " " "	2.70E+2	5.20E+1
Average " " " " " "	8.63E+1	3.28E+1
Minimum " " " " " "	1.00E0	2.5E+1

6. Abnormal Releases

a. Liquid
None

b. Gaseous
None

Indian Point 3

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

B. GASEOUS EFFLUENTS
THIRD AND FOURTH
QUARTERS, 1983

TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1983)

GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3	QUARTER 4	EST. TOTAL ERROR %
A. Fission & Activation Gases				
1. Total release	Ci	1.94E-2	1.82E-2	2.5E+1
2. Average release rate for period	uCi/sec	2.44E-3	2.24E-3	
3. Percent of technical specification limit.	%	1.23E-4	1.15E-4	
B. Iodines				
1. Total iodine -131	Ci	7.46E-6	<1.47E-6	2.5E+1
2. Average release rate for period	uCi/sec	9.38E-7	<1.85E-7	
3. Percent of technical specification limit.	%	9.80E-4	2.43E-3	
C. Particulates				
1. Particulates with half-lives 8 days	Ci	1.03E-5	2.56E-5	2.5E+1
2. Average release rate for period	uCi/sec	1.30E-6	3.22E-6	
3. Percent of technical specification limit	%	9.80E-4	2.43E-3	
4. Gross alpha radioactivity	Ci	<2.06E-8	<1.46E-8	
D. Tritium				
1. Total release	Ci	3.38E-1	2.63E-1	2.5E+1
2. Average release rate for period	uCi/sec	4.25E-2	3.31E-2	
3. Percent of technical specification limit	%	NA	NA	

TABLE 1C
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1983)
GASEOUS EFFLUENTS-GROUND RELEASES

Nuclides Released	Unit	CONTINUOUS MODE 3rd Quarter	CONTINUOUS MODE 4th Quarter	BATCH MODE 3rd Quarter	BATCH MODE 4th Quarter
1. Fission Gases					
Krypton (Kr) 85	Ci			1.94E-02	1.82E-02
Krypton (Kr) 85m	Ci				
Krypton (Kr) 87	Ci				
Krypton (Kr) 88	Ci				
Xenon (Xe) 133	Ci				
Xenon (Xe) 133m	Ci				
Xenon (Xe) 135	Ci				
Xenon (Xe) 135m	Ci				
Xenon (Xe) 138	Ci				
Xenon (Xe) 131m	Ci				
Unidentified	Ci				
TOTAL FOR PERIOD	Ci			1.94E-02	1.82E-02
2. Iodines					
iodine (I) 131	Ci	7.46E-06	< 1.47E-6		
iodine (I) 133	Ci				
Iodine (I) 135					
TOTAL FOR PERIOD	Ci	7.46E-06	< 1.47E-6		

TABLE 1C -PAGE 2
EFFLUENT AND WAS[illegible]DISPOSAL SEMIANNUAL REPORT (19[illegible]
GASEOUS EFFLUENTS-GROUND RELEASES

Nuclides Released	Unit	CONTINUOUS MODE 3rd Quarter	CONTINUOUS MODE 4th Quarter	BATCH MODE 3rd Quarter	BATCH MODE 4th Quarter
3. Particulates					
Antimony (Sb) 125	Ci				
Barium-Lanthanum 140	Ci		4.89E-07		
Cadmium (Cd) 109	Ci	1.21E-06			
Cerium (Ce) 139	Ci	3.63E-09	2.18E-08		
Cerium (Ce) 141	Ci	4.92E-08	2.21E-07		
Cerium (Ce) 144	Ci	9.17E-08			
Cesium (Cs) 134	Ci				
Cesium (Cs) 137	Ci		1.67E-06		
Cobalt (Co) 57	Ci				
Cobalt (Co) 58	Ci				
Cobalt (Co) 60	Ci	8.57E-07	3.58E-06		
Iodine (I) 131	Ci				
Iron (Fe) 55	Ci	3.65E-07	1.91E-05		
Manganese (Mn) 54	Ci				
Mercury (Hg) 203	Ci				
Neptunium (Np) 239	Ci	1.79E-07			
Nickel (Ni) 63	Ci				
Strontium (Sr) 85	Ci		5.19E-07		
Strontium (Sr) 89	Ci				
Strontium (Sr) 90	Ci	4.95E-8			
Tin (Sn) 113	Ci				
Chromium (Cr) 51	Ci				
others					

Indian Point 3

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

C. LIQUID EFFLUENTS
THIRD AND FOURTH
QUARTERS, 1983

TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1983)

LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNIT	QUARTER 3	QUARTER 4	EST. TOTAL ERROR %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	1.95E-1	8.92E-2	2.5E+1
2. Average diluted concentration during period	uCi/ml	8.63E-10	7.29E-10	
3. Percent of applicable limit	%	7.91E-4	9.0E-4	
B. Tritium				
1. Total release	Ci	4.85E0	4.87E0	2.5E+1
2. Average diluted concentration during period	uCi/ml	2.15E-8	3.96E-8	
3. Percent of applicable limit	%	7.15E-4	1.32E-3	
C. Dissolved and entrained gases				
1. Total release	Ci	9.65E-3		2.5E+1
2. Average diluted concentration during period	uCi/ml	4.27E-11		
3. percent of applicable limit	%	2.75E-6		
D. Gross alpha radioactivity				
1. Total release	Ci	<4.52E-5	<6.94E-5	2.5E+1
E. Volume of waste release (prior to dilution)	liters	8.54E+5	9.95E+5	1.0E+1
F. Volume of dilution water used during period	liters	2.26E+11	1.23E+11	1.0E+1

TABLE 2B

LIQUID EFFLUENT [illegible]D WASTE DISPOSAL SEMI-ANNUAL R[illegible]RT

NUCLIDES	UNIT	Continuous Mode 3rd QUARTER	Continuous Mode 4th QUARTER	Batch Mode 3rd QUARTER	Batch Mode 4th QUARTER
Antimony (Sb) 122	Ci				2.23E-4
Antimony (Sb) 124	Ci				
Antimony (Sb) 125	Ci			1.05E-3	1.75E-3
Barium/Lanthanum 140	Ci				8.28E-6
Barium (Ba) 133	Ci				
Cadmium (Cd) 109	Ci				3.81E-5
Cerium (Ce) 139	Ci				1.45E-6
Cerium (Ce) 141	Ci				5.12E-6
Cerium (Ce) 144	Ci				9.99E-6
Cesium (Cs) 134	Ci			1.41E-4	1.22E-3
Cesium (Cs) 136	Ci				
Cesium (Cs) 137	Ci			6.42E-4	1.96E-3
Cesium (Cs) 138	Ci				
Chromium (Cr) 51	Ci				4.80E-5
Cobalt (Co) 57	Ci			3.82E-5	3.99E-5
Cobalt (Co) 58	Ci			2.89E-3	1.80E-4
Cobalt (Co) 60	Ci			1.70E-2	2.02E-2
Iodine (I) 131	Ci				
Iodine (I) 132	Ci				
Iodine (I) 133	Ci				
Iodine (I) 134	Ci				
Iodine (I) 135	Ci				
Iron (Fe) 55	Ci			1.45E-1	6.07E-2
Iron (Fe) 59	Ci				
Mercury (Hg) 203	Ci				1.46E-6
Neptunium (Np) 239	Ci				
Manganese (Mn) 54	Ci			5.12E-5	4.35E-4
Manganese (Mn) 56	Ci				

Table 2B

NUCLIDES			UNIT	Continuous Mode 3rd QUARTER	Continuous Mode 4th QUARTER	Batch Mode 3rd QUARTER	Batch Mode 4th QUARTER
Molybdenum	(Mo)	99	Ci				
Nickel	(Ni)	63	Ci			2.84E-2	2.02E-3
Nickel	(Ni)	65	Ci				
Niobium	(Nb)	94	Ci				
Niobium	(Nb)	95	Ci				1.18E-4
Niobium	(Nb)	97	Ci			1.47E-5	6.63E-5
Phosphorus	(P)	32	Ci				
Radium	(Ra)	226	Ci				
Rubidium	(Rb)	88	Ci				
Rhodium	(Rh)	106	Ci				
Ruthenium	(Ru)	103	Ci				
Silver	(Ag)	110m	Ci				7.02E-4
Sodium	(Na)	24	Ci				
Strontium	(Sr)	85	Ci			8.71E-6	1.14E-5
Strontium	(Sr)	89	Ci				
Strontium	(Sr)	90	Ci				
Strontium	(Sr)	91	Ci				
Strontium	(Sr)	92	Ci				
Technetium	(Tc)	99m	Ci				
Tin	(Sn)	113	Ci				
Tungsten	(W)	187	Ci				
Yttrium	(Y)	88	Ci				
Yttrium	(Y)	91m	Ci				2.57E-6
Yttrium	(Y)	92	Ci				
Zinc	(Zn)	65	Ci				
Zirconium/Niobium		95	Ci				
Zirconium	(Zr)	97	Ci				
TOTAL FOR PERIOD			Ci			1.95E-1	8.97E-2

Table 2B

NUCLIDES			UNIT	Continuous Mode 3rd QUARTER	Continuous Mode 4th QUARTER	Batch Mode 3rd Quarter	Batch Mode 4th QUARTER
Xenon	Xe	133	Ci			9.65E-3	
Xenon	Xe	135	Ci				

Indian Point 3

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

D. SOLID WASTE
THIRD AND FOURTH
QUARTERS, 1983

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1983)

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

July 1 - December 31, 1983

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

1. Type of Waste	Unit	6-month Period	Est. Total Error,%
a. Spent resins, filter sludges, evaporator bottoms, etc.	m^3 Ci	1.33 E+1 1.47 E+1	5.0 E+1
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	6.70 E+1 2.20 E+0	5.0 E+1
c. Irradiated components, control rods, etc.	m^3 Ci	E E	E
d. Other (describe) Filter cartridges	m^3 Ci	4.81 E+0 8.72 E+0	5.0 E+1

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

a.	Co-60	%	3.3 E+1
	Cs-137	%	3.0 E+0
	Fe-55	%	6.5 E+1
		%	E
b.	Co-60	%	3.2 E+1
	Cs-137	%	5.0 E+0
	Fe-55	%	6.3 E+1
		%	E
d.	Co-58	%	1.0 E+0
	Co-60	%	9.5 E+1
	Cs-137	%	1.0 E+0
	Mn-54	%	3.0 E+0

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
8	Truck	Barnwell, S. Carolina
1	Truck	Richland, Washington

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination
None		

Indian Point 3

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

E. RADIOLOGIAL IMPACT ON MAN
THIRD AND FOURTH
QUARTERS, 1983

RADIOLOGICAL IMPACT EVALUATION

Doses from noble gas immersion, inhalation, ground deposition, and vegetation ingestion were evaluated for the nearest residence likely to be occupied in the critical sector for each pathway and were combined to provide a conservative determination of the maximum individual offsite radiation dose from these pathways. Doses were also evaluated for an individual ingesting milk and meat from a cow located about 8.9 miles to the ESE. In all cases, these evaluations were performed using the models presented in Regulatory Guide 1.109. Noble gas releases were considered to be either batch or continuous, while all iodine and particulate release were considered to be continuous. Batch releases were evaluated using actual meteorological conditions existing during the release period. Continuous releases were evaluated using average meteorological conditions based on the six month release period. Estimates of relative deposition per unit area were obtained from the numerical approximation presented in the NRC computer program XOQDOQ for ground releases. Values of atmospheric dispersion factors (X/Q) were computed using the Sagendorf straight line air flow model, assuming a ground level release, and the subroutine POLYN (from XOQDOQ) for computing standard deviations in the horizontal direction (σ_y) and vertical direction (σ_z).

Integrated doses for the population within 50 miles of Indian Point from gaseous effluents were computed based on population data contained in the Indian Point Unit No. 3 FSAR. The GASPAR computer code used to perform these calculations incorporates the models and parameters presented in Regulatory Guide 1.109.

Dose calculations for liquid pathways to individuals and population are computed for a year. The LADTAP computer program that is utilized for these calculations incorporated the calculational model and parameters that are presented in Regulatory Guide 1.109.

The fish, invertebrate, algae, drinking, shoreline, swimming, and boating pathways are calculated for the adult, teenager, child and infant. These calculations are performed for reasons such as estimating the population water consumption dose, the population recreation dose, and cost-benefit analysis.

Gaseous releases of Carbon-14 were calculated based on a release rate of 9.5 Ci/GW(e) - yr, as determined by measurements performed specifically for Indian Point Unit 3. These releases were apportioned as 92% continuous releases and 8% batch releases. The total measured release rate is slightly higher than the 8.0 Ci/yr assumed by NUREG-0017, "Calculation of Release of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors".

INDIAN POINT NO. 3

RADIOLOGICAL IMPACT ON MAN
(Reference Regulatory Guide 1.21)

A. Maximum Individual Dose

	Total Body (mRem)	Skin (mRem)	Thyroid (mRem)	Bone mRem)
1. Gaseous Pathways				
a. Noble Gas Immersion				
- Batch Releases	4.3 E-5	4.6 E-3	N/A	N/A
- Continuous Releases	0	0	N/A	N/A
b. Inhalation (i)	5.0 E-3	N/A	5.2 E-3	2.4 E-2
c. Ground Deposition	4.9 E-3	5.7 E-3	N/A	N/A
d. Milk Ingestion (i)	1.6 E-3	N/A	1.6 E-3	7.4 E-3
e. Meat Ingestion (c)	2.4 E-4	N/A	2.4 E-4	1.2 E-3
f. Vegetable Ingestion (c)	2.2 E-2	N/A	2.2 E-2	1.1 E-1

2. Liquid Pathways

See LADTAP Printout - Attached

Critical Age Group

(c) = child
(i) = infant

B. Population

(1) Pathways (Gaseous)

	Total Body (man-rem)	Thyroid (man-thyroid rem)
(a) Noble Gas Immersion		
(i) Batch Release	2.1 E-6	N/A
(ii) Continuous Release	0.0	N/A
(b) Inhalation	5.1 E-3	5.0 E-4
(c) Ground Deposition	8.6 E-4	N/A
(d) Totals (all pathways)	6.7 E-3	6.7 E-4

(2) Pathways (Liquid)

(a) All — See attached "LADTAP" printout Attachment 1

C. Average Doses to Individuals (mRem)

(1) Pathways

(a) Liquid-Total Body 7.6 E-6

(b) Gaseous-Total Body 3.5 E-7

LADTAP - TP-3 1983 SECOND HALF

DISCHARGE=7.75E+02 CFS SOURCE TERM MULTIPLIER=1.00E+00

50-MILE POPULATION=1.92E+07 FRACTION --- ADULT= .66
TEENAGER= .14
CHILD= .20

FRESHWATER SITE

* * * AS LOW AS REASONABLY ACHIEVABLE * * *

A D U L T D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		6.28E-03	6.31E-03	4.44E-03	1.21E-10	1.96E-03	7.82E-04	1.21E-03
INVERTEBRATE		3.23E-03	2.23E-03	5.98E-04	2.88E-10	1.09E-04	1.02E-03	2.42E-03
DRINKING		1.01E-05	2.60E-06	1.59E-06	1.08E-11	3.41E-07	5.80E-07	4.08E-06
SHORELINE	3.69E-04	3.14E-04	3.14E-04	3.14E-04	3.14E-04	3.14E-04	3.14E-04	3.14E-04
SWIMMING	0.00E+00	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06
BOATING	0.00E+00	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06
TOTAL	3.69E-04	9.83E-03	8.86E-03	5.35E-03	3.20E-04	2.39E-03	2.12E-03	3.95E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	5.0	25.00
INVERTEBRATE	5.0	5.0	25.00
DRINKING	730.0	500.0	112.00
SHORELINE	50.0	5.0	1.00
SWIMMING	50.0	5.0	1.00
BOATING	100.0	5.0	1.00

SHOREWIDTH FACTOR= .2

T E E N A G E R D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		6.59E-03	6.51E-03	2.59E-03	1.17E-10	2.01E-03	9.35E-04	8.68E-04
INVERTEBRATE		3.37E-03	2.36E-03	6.09E-04	2.78E-10	1.08E-04	1.24E-03	1.77E-03
DRINKING		9.67E-06	2.49E-06	1.20E-06	9.87E-12	3.20E-07	6.46E-07	2.66E-06
SHORELINE	4.95E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04	4.21E-04
SWIMMING	0.00E+00	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06	5.47E-06
BOATING	0.00E+00	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06
TOTAL	4.95E-04	1.04E-02	9.30E-03	3.63E-03	4.29E-04	2.54E-03	2.60E-03	3.07E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	5.0	25.00
INVERTEBRATE	3.8	5.0	25.00
DRINKING	510.0	500.0	112.00
SHORELINE	67.0	5.0	1.00
SWIMMING	100.0	5.0	1.00
BOATING	100.0	5.0	1.00

SHOREWIDTH FACTOR= .2

C H I L D D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.38E-03	5.77E-03	1.17E-03	1.29E-10	1.70E-03	7.53E-04	3.17E-04
INVERTEBRATE		4.58E-03	2.33E-03	7.69E-04	3.18E-10	8.54E-05	1.12E-03	6.84E-04
DRINKING		2.93E-05	5.40E-06	2.61E-06	2.76E-11	6.30E-07	1.28E-06	2.21E-06
SHORELINE	1.03E-04	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05	8.80E-05
SWIMMING	0.00E+00	1.37E-06	1.37E-06	1.37E-06	1.37E-06	1.37E-06	1.37E-06	1.37E-06
BOATING	0.00E+00	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06	2.74E-06
TOTAL	1.03E-04	1.31E-02	8.20E-03	2.03E-03	9.21E-05	1.88E-03	1.97E-03	1.09E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	6.9	5.0	25.00
INVERTEBRATE	1.7	5.0	25.00
DRINKING	510.0	500.0	112.00
SHORELINE	14.0	5.0	1.00
SWIMMING	25.0	5.0	1.00
BOATING	100.0	5.0	1.00

SHOREWIDTH FACTOR= .2

I N F A N T D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.59E-04	7.82E-04	8.43E-05	1.86E-11	1.94E-04	9.20E-05	2.11E-05
INVERTEBRATE		3.25E-04	2.09E-04	5.95E-05	3.73E-11	7.51E-06	8.43E-05	3.74E-05
DRINKING		2.29E-05	5.71E-06	2.24E-06	4.13E-11	6.42E-07	1.14E-06	1.30E-06
SHORELINE	2.22E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05	1.88E-05
BOATING	0.00E+00	1.37E-08	1.37E-08	1.37E-08	1.37E-08	1.37E-08	1.37E-08	1.37E-08
TOTAL	2.22E-05	1.23E-03	1.02E-03	1.65E-04	1.89E-05	2.21E-04	1.96E-04	7.86E-05

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	.5	5.0	25.00
INVERTEBRATE	.1	5.0	25.00
DRINKING	330.0	500.0	112.00
SHORELINE	3.0	5.0	1.00
BOATING	.5	5.0	1.00

SHOREWIDTH FACTOR= .2

* * * SELECTED LOCATION * * *

LOCATION IS DOWNSTREAM

ADULT DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		6.08E-03	4.51E-03	3.17E-03	8.60E-11	1.40E-03	5.59E-04	8.60E-04
INVERTEBRATE		2.31E-03	1.59E-03	4.27E-04	2.05E-10	7.79E-05	7.25E-04	1.73E-03
DRINKING		7.25E-04	1.86E-04	1.14E-04	7.78E-10	2.44E-05	4.15E-05	2.92E-04
SHORELINE	2.64E-04	2.24E-04	2.24E-04	2.24E-04	2.24E-04	2.24E-04	2.24E-04	2.24E-04
SWIMMING	0.00E+00	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06
BOATING	0.00E+00	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06
TOTAL	2.64E-04	7.74E-03	6.51E-03	3.94E-03	2.28E-04	1.73E-03	1.55E-03	3.11E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	7.0	31.00
INVERTEBRATE	5.0	7.0	31.00
DRINKING	730.0	7.0	19.00
SHORELINE	50.0	7.0	7.00
SWIMMING	50.0	7.0	7.00
BOATING	100.0	7.0	7.00

SHOREWIDTH FACTOR= .2

LOCATION IS DOWNSTREAM

TEENAGER DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		4.70E-03	4.65E-03	1.85E-03	8.32E-11	1.43E-03	6.68E-04	6.19E-04
INVERTEBRATE		2.40E-03	1.68E-03	4.35E-04	1.98E-10	7.73E-05	8.84E-04	1.26E-03
DRINKING		6.91E-04	1.79E-04	8.57E-05	7.07E-10	2.29E-05	4.63E-05	1.91E-04
SHORELINE	3.53E-04	3.01E-04	3.01E-04	3.01E-04	3.01E-04	3.01E-04	3.01E-04	3.01E-04
SWIMMING	0.00E+00	3.91E-06	3.91E-06	3.91E-06	3.91E-06	3.91E-06	3.91E-06	3.91E-06
BOATING	0.00E+00	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06
TOTAL	3.53E-04	8.11E-03	6.82E-03	2.68E-03	3.06E-04	1.84E-03	1.90E-03	2.38E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	15.0	7.0	31.00
INVERTEBRATE	3.8	7.0	31.00
DRINKING	510.0	7.0	19.00
SHORELINE	67.0	7.0	7.00
SWIMMING	100.0	7.0	7.00
BOATING	100.0	7.0	7.00

SHOREWIDTH FACTOR= .2

LOCATION IS DOWNSTREAM

C H I L D D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		5.99E-03	4.12E-03	8.33E-04	9.17E-11	1.22E-03	5.38E-04	2.26E-04
INVERTEBRATE		3.27E-03	1.66E-03	5.49E-04	2.26E-10	6.10E-05	8.02E-04	4.88E-04
DRINKING		2.09E-03	3.86E-04	1.87E-04	1.98E-09	4.51E-05	9.20E-05	1.59E-04
SHORELINE	7.39E-05	6.28E-05	6.28E-05	6.28E-05	6.28E-05	6.28E-05	6.28E-05	6.28E-05
SWIMMING	0.00E+00	9.77E-07	9.77E-07	9.77E-07	9.77E-07	9.77E-07	9.77E-07	9.77E-07
BOATING	0.00E+00	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06	1.95E-06
TOTAL	7.39E-05	1.14E-02	6.24E-03	1.63E-03	6.58E-05	1.39E-03	1.50E-03	9.39E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	6.9	7.0	31.00
INVERTEBRATE	1.7	7.0	31.00
DRINKING	510.0	7.0	19.00
SHORELINE	14.0	7.0	7.00
SWIMMING	25.0	7.0	7.00
BOATING	100.0	7.0	7.00

SHOREWIDTH FACTOR= .2

LOCATION IS DOWNSTREAM

I N F A N T D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		6.14E-04	5.58E-04	6.02E-05	1.33E-11	1.39E-04	6.57E-05	1.50E-05
INVERTEBRATE		2.32E-04	1.49E-04	4.25E-05	2.65E-11	5.36E-06	6.02E-05	2.67E-05
DRINKING		1.64E-03	4.09E-04	1.60E-04	2.96E-09	4.60E-05	8.15E-05	9.29E-05
SHORELINE	1.58E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05
BOATING	0.00E+00	9.77E-09	9.77E-09	9.77E-09	9.77E-09	9.77E-09	9.77E-09	9.77E-09
TOTAL	1.58E-05	2.50E-03	1.13E-03	2.77E-04	1.35E-05	2.04E-04	2.21E-04	1.48E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	.5	7.0	31.00
INVERTEBRATE	.1	7.0	31.00
DRINKING	330.0	7.0	19.00
SHORELINE	3.0	7.0	7.00
BOATING	.5	7.0	7.00

SHOREWIDTH FACTOR= .2

* * * FISH CONSUMPTION POPULATION DOSES * * *

MAN-REM

!!!!!!!!!!!SPORT HARVEST!!!!!!!!!!!

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	ADULT	7.24E+04	1.52E-02	1.52E-02	1.07E-02	2.32E-10	4.71E-03	1.88E-03	2.66E-03
FISH	TEENAGER	1.16E+04	3.34E-03	3.29E-03	1.31E-03	4.72E-11	1.01E-03	4.72E-04	4.03E-04
FISH	CHILD	7.00E+03	5.95E-03	4.09E-03	8.25E-04	7.34E-11	1.21E-03	5.33E-04	2.07E-04
FISH	TOTAL	9.10E+04	2.44E-02	2.26E-02	1.28E-02	3.52E-10	6.93E-03	2.89E-03	3.27E-03

LOCATION	DILUTION	CATCH	TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR	POPULATION=1.59E+04
DOWNSTREAM	7.00E+00	9.10E+04	3.36E+02	

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) ADULT=6.90E+00 TEEN=5.20E+00 CHILD=2.20E+00

* * * FISH CONSUMPTION POPULATION DOSES * * *

MAN-REM

!!!!!!!!!!COMMERCIAL HARVEST!!!!!!!!!!

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	ADULT	8.74E+07	6.44E-02	6.44E-02	4.53E-02	8.91E-10	2.00E-02	7.98E-03	1.09E-02
FISH	TEENAGER	1.40E+07	1.42E-02	1.40E-02	5.56E-03	1.81E-10	4.30E-03	2.00E-03	1.65E-03
FISH	CHILD	8.45E+06	2.53E-02	1.73E-02	3.50E-03	2.84E-10	5.12E-03	2.26E-03	8.47E-04
FISH	TOTAL	1.10E+08	1.04E-01	9.57E-02	5.43E-02	1.36E-09	2.94E-02	1.22E-02	1.34E-02

LOCATION	DILUTION	CATCH	TIME(HR)=INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR	POPULATION=1.92E+07
DOWNSTREAM	7.00E+00	1.55E+05	4.80E+02	

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) ADULT=6.90E+00 TEEN=5.20E+00 CHILD=2.20E+00

!!!!!!!!!!!!NEPA DOSES!!!!!!!!!!!!

NOTE--TOTAL NEPA DOSE INCLUDES SPORT CATCH

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	ADULT	1.96E+05	4.09E-02	4.10E-02	2.88E-02	5.89E-10	1.27E-02	5.08E-03	7.03E-03
FISH	TEENAGER	3.13E+04	9.01E-03	8.88E-03	3.54E-03	1.20E-10	2.74E-03	1.27E-03	1.06E-03
FISH	CHILD	1.89E+04	1.61E-02	1.10E-02	2.23E-03	1.87E-10	3.25E-03	1.44E-03	5.46E-04
FISH	TOTAL	2.46E+05	6.60E-02	6.09E-02	3.46E-02	8.96E-10	1.87E-02	7.79E-03	8.64E-03

* * * INVERTEBRATE CONSUMPTION POPULATION DOSES * * *

MAN-REM

!!!!!!!!!!!!SPORT HARVEST!!!!!!!!!!!!

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVERTEBRATE	ADULT	7.94E+03	3.57E-03	2.46E-03	6.60E-04	2.54E-10	1.19E-04	1.12E-03	2.66E-03
INVERTEBRATE	TEENAGER	1.26E+03	7.80E-04	5.44E-04	1.41E-04	5.15E-11	2.47E-05	2.86E-04	4.06E-04
INVERTEBRATE	CHILD	7.94E+02	1.49E-03	7.56E-04	2.50E-04	8.34E-11	2.74E-05	3.65E-04	2.21E-04
INVERTEBRATE	TOTAL	1.00E+04	5.84E-03	3.76E-03	1.05E-03	3.89E-10	1.71E-04	1.77E-03	3.29E-03

LOCATION	DILUTION	CATCH	TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR	POPULATION
DOWNSTREAM	7.00E+00	1.00E+04	3.36E+02	1.20E+04

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) ADULT=1.00E+00 TEEN=7.50E-01 CHILD=3.30E-01

* * * INVERTEBRATE CONSUMPTION POPULATION DOSES * * *

MAN-REM

!!!!!!!!!!!COMMERCIAL HARVEST!!!!!!!!!!!

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVERTEBRATE	ADULT	1.27E+07	2.47E-03	1.70E-03	4.56E-04	1.59E-10	8.16E-05	7.75E-04	1.83E-03
INVERTEBRATE	TEENAGER	2.02E+06	5.39E-04	3.75E-04	9.72E-05	3.23E-11	1.69E-05	1.98E-04	2.80E-04
INVERTEBRATE	CHILD	1.27E+06	1.03E-03	5.22E-04	1.72E-04	5.25E-11	1.88E-05	2.52E-04	1.52E-04
INVERTEBRATE	TOTAL	1.60E+07	4.04E-03	2.59E-03	7.26E-04	2.44E-10	1.17E-04	1.23E-03	2.26E-03

LOCATION	DILUTION	CATCH	TIME(HR)=INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR	POPULATION=1.92E+07
DOWNSTREAM	7.00E+00	1.00E+03	4.80E+02	

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) ADULT=1.00E+00 TEEN=7.50E-01 CHILD=3.30E-01

!!!!!!!!!!!NEPA DOSES!!!!!!!!!!!

NOTE--TOTAL NEPA DOSE INCLUDES SPORT CATCH

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVERTEBRATE	ADULT	8.74E+03	3.93E-03	2.70E-03	7.26E-04	2.77E-10	1.31E-04	1.23E-03	2.92E-03
INVERTEBRATE	TEENAGER	1.39E+03	8.58E-04	5.98E-04	1.55E-04	5.61E-11	2.71E-05	3.15E-04	4.47E-04
INVERTEBRATE	CHILD	8.74E+02	1.64E-03	8.31E-04	2.75E-04	9.09E-11	3.01E-05	4.01E-04	2.43E-04
INVERTEBRATE	TOTAL	1.10E+04	6.43E-03	4.13E-03	1.16E-03	4.24E-10	1.88E-04	1.95E-03	3.61E-03

* * * POPULATION WATER CONSUMPTION DOSES * * *

||||||||||HYDROSPHERE TRITIUM DOSE||||||||||

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI

* * * RECREATION POPULATION DOSES * * *

LOCATION- DOWNSTREAM

DILUTION= .70E+01 TRANSIT TIME= .40E+01 HR SWF= .2

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	8.76E-02	7.45E-02	7.45E-02

LOCATION- DOWNSTREAM

DILUTION= .70E+01 TRANSIT TIME= .40E+01 HR

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.00E+00	6.49E-04	6.49E-04

LOCATION- DOWNSTREAM

DILUTION= .70E+01 TRANSIT TIME= .40E+01 HR

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.00E+00	3.24E-04	3.24E-04

* * * DOSE TO BIOTA * * *

MRADS PER YEAR

DOWNSTREAM DILUTION= 7.00E+00 TRANSIT TIME= 0.00E+00 HR

	INTERNAL	EXTERNAL	TOTAL
FISH	1.24E-02	1.97E-01	2.09E-01
INVERTEBRATE	3.47E-02	3.93E-01	4.28E-01
ALGAE	1.80E-02	3.42E-04	1.83E-02
MUSKRAT	1.07E-01	1.31E-01	2.38E-01
RACCOON	3.16E-02	9.83E-02	1.30E-01
HERON	3.07E-01	1.31E-01	4.38E-01
DUCK	9.95E-02	1.97E-01	2.96E-01

* * * COST-BENEFIT ANALYSIS * * *

NUCLIDE	RELEASE CI/YR	MAN-REM DOSE TOTAL BODY	MAN-REM DOSE THYROID	MAN-REM PER CURIE TOTAL BODY	MAN-REM PER CURIE THYROID
51SB 125	2.80E-03	5.84E-04	5.84E-04	2.09E-01	2.08E-01
56BA 140	8.28E-06	3.45E-08	2.85E-08	4.17E-03	3.45E-03
58CE 141	5.12E-06	8.41E-09	8.40E-09	1.64E-03	1.64E-03
58CE 144	9.99E-06	6.53E-08	6.41E-08	6.53E-03	6.42E-03
55CS 134	1.36E-03	3.05E-02	8.31E-04	2.24E+01	6.11E-01
55CS 137	2.60E-03	3.61E-02	2.37E-03	1.39E+01	9.11E-01
24CR 51	4.80E-05	3.07E-08	2.96E-08	6.39E-04	6.17E-04
27CO 57	7.81E-05	1.50E-06	1.35E-06	1.92E-02	1.73E-02
27CO 58	3.05E-03	1.49E-04	1.21E-04	4.89E-02	3.95E-02
27CO 60	3.72E-02	7.21E-02	7.09E-02	1.94E+00	1.91E+00
26FE 55	2.06E-01	2.44E-03	4.51E-08	1.18E-02	2.19E-07
25MN 54	4.86E-04	2.35E-04	5.17E-05	4.84E-01	1.27E-01
28NI 63	3.04E-02	1.72E-03	0.00E+00	5.66E-02	0.00E+00
41NB 95	1.18E-04	2.21E-06	1.67E-06	1.87E-02	1.42E-02
41NB 97	8.10E-05	3.34E-08	3.34E-08	4.12E-04	4.12E-04
47AG 110M	7.02E-04	2.25E-04	2.25E-04	3.21E-01	3.20E-01
39Y 91M	2.57E-06	9.14E-13	9.14E-13	3.56E-07	3.56E-07
TOTAL		1.44E-01	7.51E-02		

Indian Point 3

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

F. METEOROLOGICAL DATA
THIRD AND FOURTH
QUARTERS, 1983

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	11.	110.	11.	0.	0.	0.	132.
NNE	6.	46.	3.	0.	0.	0.	55.
NE	3.	4.	0.	0.	0.	0.	7.
ENE	5.	2.	0.	0.	0.	0.	7.
E	8.	0.	0.	0.	0.	0.	8.
ESE	7.	0.	0.	0.	0.	0.	7.
SE	13.	3.	0.	0.	0.	0.	16.
SSE	35.	20.	0.	0.	0.	0.	55.
S	37.	56.	1.	0.	0.	0.	94.
SSW	5.	27.	8.	0.	0.	0.	40.
SW	2.	11.	1.	0.	0.	0.	14.
WSW	4.	13.	0.	0.	0.	0.	17.
W	6.	9.	0.	0.	0.	0.	15.
WNW	2.	12.	0.	0.	0.	0.	14.
NW	1.	12.	0.	0.	0.	0.	13.
NNW	2.	18.	1.	0.	0.	0.	21.
TOTAL	147.	343.	25.	0.	0.	0.	515.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	4.	17.	3.	0.	0.	0.	24.
NNE	2.	27.	2.	0.	0.	0.	31.
NE	3.	3.	1.	0.	0.	0.	7.
ENE	4.	0.	0.	0.	0.	0.	4.
E	2.	0.	0.	0.	0.	0.	2.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	4.	0.	0.	0.	0.	0.	4.
SSE	2.	2.	0.	0.	0.	0.	4.
S	0.	5.	0.	0.	0.	0.	5.
SSW	2.	2.	1.	0.	0.	0.	5.
SW	0.	2.	1.	0.	0.	0.	3.
WSW	1.	1.	0.	0.	0.	0.	2.
W	1.	1.	0.	0.	0.	0.	2.
WNW	1.	2.	0.	0.	0.	0.	3.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
TOTAL	29.	62.	8.	0.	0.	0.	99.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	5.	14.	2.	0.	0.	0.	21.
NNE	9.	13.	2.	0.	0.	0.	24.
NE	6.	3.	0.	0.	0.	0.	9.
ENE	2.	2.	0.	0.	0.	0.	4.
E	6.	0.	0.	0.	0.	0.	6.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	2.	1.	0.	0.	0.	0.	3.
SSE	2.	4.	0.	0.	0.	0.	6.
S	2.	5.	0.	0.	0.	0.	7.
SSW	2.	7.	0.	0.	0.	0.	9.
SW	1.	2.	0.	0.	0.	0.	3.
WSW	0.	0.	0.	0.	0.	0.	0.
W	0.	1.	0.	0.	0.	0.	1.
WNW	0.	1.	0.	0.	0.	0.	1.
NW	0.	2.	0.	0.	0.	0.	2.
NNW	0.	3.	0.	0.	0.	0.	3.
TOTAL	39.	58.	4.	0.	0.	0.	101.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	8.	57.	13.	0.	0.	0.	78.
NNE	19.	84.	38.	0.	0.	0.	141.
NE	17.	14.	1.	0.	0.	0.	32.
ENE	26.	3.	0.	0.	0.	0.	29.
E	17.	0.	0.	0.	0.	0.	17.
ESE	8.	1.	0.	0.	0.	0.	9.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	4.	4.	0.	0.	0.	0.	8.
S	6.	16.	0.	0.	0.	0.	22.
SSW	1.	25.	2.	0.	0.	0.	28.
SW	1.	2.	0.	0.	0.	0.	3.
WSW	1.	4.	0.	0.	0.	0.	5.
W	2.	2.	0.	0.	0.	0.	4.
WNW	2.	3.	0.	0.	0.	0.	5.
NW	0.	1.	0.	0.	0.	0.	1.
NNW	1.	6.	0.	0.	0.	0.	7.
TOTAL	115.	222.	54.	0.	0.	0.	391.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	14.	28.	1.	0.	0.	0.	43.
NNE	53.	63.	2.	0.	0.	0.	118.
NE	99.	38.	0.	0.	0.	0.	137.
ENE	79.	3.	0.	0.	0.	0.	82.
E	65.	1.	0.	0.	0.	0.	66.
ESE	22.	0.	0.	0.	0.	0.	22.
SE	16.	1.	0.	0.	0.	0.	17.
SSE	22.	2.	0.	0.	0.	0.	24.
S	18.	32.	0.	0.	0.	0.	50.
SSW	7.	28.	0.	0.	0.	0.	35.
SW	2.	0.	0.	0.	0.	0.	2.
WSW	3.	1.	0.	0.	0.	0.	4.
W	4.	10.	0.	0.	0.	0.	14.
WNW	2.	4.	0.	0.	0.	0.	6.
NW	1.	0.	0.	0.	0.	0.	1.
NNW	4.	1.	1.	0.	0.	0.	6.
TOTAL	411.	212.	4.	0.	0.	0.	627.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	3.	0.	0.	0.	0.	0.	3.
NNE	64.	25.	0.	0.	0.	0.	89.
NE	107.	60.	0.	0.	0.	0.	167.
ENE	55.	1.	0.	0.	0.	0.	56.
E	31.	0.	0.	0.	0.	0.	31.
ESE	9.	0.	0.	0.	0.	0.	9.
SE	8.	0.	0.	0.	0.	0.	8.
SSE	6.	0.	0.	0.	0.	0.	6.
S	4.	1.	0.	0.	0.	0.	5.
SSW	2.	1.	0.	0.	0.	0.	3.
SW	0.	1.	0.	0.	0.	0.	1.
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	291.	89.	0.	0.	0.	0.	380.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA JUL-SEP 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	1.	0.	0.	0.	0.	0.	1.
NNE	9.	1.	0.	0.	0.	0.	10.
NE	14.	4.	0.	0.	0.	0.	18.
ENE	4.	0.	0.	0.	0.	0.	4.
E	1.	0.	0.	0.	0.	0.	1.
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.	1.	0.	0.	0.	0.	1.
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	29.	6.	0.	0.	0.	0.	35.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	1.	25.	8.	0.	0.	0.	34.
NNE	0.	5.	0.	0.	0.	0.	5.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	1.	0.	0.	0.	0.	0.	1.
E	0.	0.	0.	0.	0.	0.	0.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	9.	2.	0.	0.	0.	0.	11.
SSE	11.	4.	0.	0.	0.	0.	15.
S	9.	13.	1.	0.	0.	0.	23.
SSW	4.	6.	3.	0.	0.	0.	13.
SW	0.	3.	0.	0.	0.	0.	3.
WSW	1.	8.	0.	0.	0.	0.	9.
W	1.	17.	3.	0.	0.	0.	21.
WNW	1.	11.	4.	0.	0.	0.	16.
NW	1.	10.	4.	0.	0.	0.	15.
NNW	2.	7.	5.	0.	0.	0.	14.
TOTAL	43.	111.	28.	0.	0.	0.	182.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	5.	13.	3.	0.	0.	0.	21.
NNE	3.	12.	1.	0.	0.	0.	16.
NE	2.	2.	0.	0.	0.	0.	4.
ENE	1.	1.	0.	0.	0.	0.	2.
E	0.	0.	0.	0.	0.	0.	0.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	3.	0.	0.	0.	0.	0.	3.
SSE	1.	1.	0.	0.	0.	0.	2.
S	2.	1.	0.	0.	0.	0.	3.
SSW	1.	1.	0.	0.	0.	0.	2.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	2.	0.	0.	0.	0.	2.
W	0.	4.	3.	0.	0.	0.	7.
WNW	0.	10.	3.	0.	0.	0.	13.
NW	1.	4.	0.	0.	0.	0.	5.
NNW	1.	6.	1.	0.	0.	0.	8.
TOTAL	23.	57.	11.	0.	0.	0.	91.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	2.	10.	3.	0.	0.	0.	15.
NNE	2.	11.	2.	0.	0.	0.	15.
NE	0.	7.	0.	0.	0.	0.	7.
ENE	0.	1.	0.	0.	0.	0.	1.
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.	0.	0.	0.	0.	0.	3.
S	2.	0.	1.	0.	0.	0.	3.
SSW	2.	1.	0.	0.	0.	0.	3.
SW	2.	0.	0.	0.	0.	0.	2.
WSW	0.	0.	1.	0.	0.	0.	1.
W	1.	4.	1.	0.	0.	0.	6.
WNW	0.	9.	1.	0.	0.	0.	10.
NW	3.	4.	4.	1.	0.	0.	12.
NNW	0.	2.	1.	0.	0.	0.	3.
TOTAL	19.	49.	14.	1.	0.	0.	83.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1993
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	14.	52.	16.	2.	0.	0.	84.
NNE	33.	128.	45.	3.	0.	0.	209.
NE	59.	40.	2.	0.	0.	0.	101.
ENE	29.	24.	0.	0.	0.	0.	53.
E	24.	8.	0.	0.	0.	0.	32.
ESE	9.	1.	0.	0.	0.	0.	10.
SE	13.	0.	0.	0.	0.	0.	13.
SSE	12.	2.	0.	0.	0.	0.	14.
S	13.	15.	2.	0.	0.	0.	30.
SSW	2.	20.	3.	0.	0.	0.	25.
SW	2.	12.	0.	0.	0.	0.	14.
WSW	4.	10.	1.	2.	0.	0.	17.
W	6.	40.	8.	1.	0.	0.	55.
WNW	10.	57.	18.	0.	0.	0.	85.
NW	4.	41.	25.	4.	0.	0.	74.
NNW	6.	53.	12.	0.	0.	0.	71.
TOTAL	240.	503.	132.	12.	0.	0.	887.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	19.	30.	1.	0.	0.	0.	50.
NNE	41.	49.	19.	3.	0.	0.	112.
NE	104.	40.	0.	0.	0.	0.	144.
ENE	69.	5.	0.	0.	0.	0.	74.
E	46.	1.	0.	0.	0.	0.	47.
ESE	27.	0.	0.	0.	0.	0.	27.
SE	29.	2.	0.	0.	0.	0.	31.
SSE	26.	5.	0.	0.	0.	0.	31.
S	31.	39.	0.	0.	0.	0.	70.
SSW	4.	14.	2.	0.	0.	0.	20.
SW	4.	5.	1.	0.	0.	0.	10.
WSW	4.	3.	0.	0.	0.	0.	7.
W	18.	12.	1.	0.	0.	0.	31.
WNW	7.	16.	3.	0.	0.	0.	26.
NW	0.	9.	0.	0.	0.	0.	9.
NNW	2.	10.	0.	0.	0.	0.	12.
TOTAL	431.	240.	27.	3.	0.	0.	701.

CALM 2.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	0.	1.	0.	0.	0.	0.	1.
NNE	24.	11.	0.	0.	0.	0.	35.
NE	88.	26.	0.	0.	0.	0.	114.
ENE	26.	1.	0.	0.	0.	0.	27.
E	20.	0.	0.	0.	0.	0.	20.
ESE	10.	0.	0.	0.	0.	0.	10.
SE	5.	0.	0.	0.	0.	0.	5.
SSE	1.	1.	0.	0.	0.	0.	2.
S	5.	0.	0.	0.	0.	0.	5.
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	182.	40.	0.	0.	0.	0.	222.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

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

IP DATA OCT-DEC 1983
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

WIND DIRECTION	WIND SPEED (MPH) 01-03	04-07	08-12	13-18	19-24	>24	TOTAL
N	0.	1.	0.	0.	0.	0.	1.
NNE	8.	0.	0.	0.	0.	0.	8.
NE	24.	2.	0.	0.	0.	0.	26.
ENE	2.	0.	0.	0.	0.	0.	2.
E	1.	0.	0.	0.	0.	0.	1.
ESE	1.	0.	0.	0.	0.	0.	1.
SE	0.	0.	0.	0.	0.	0.	0.
SSE	0.	0.	0.	0.	0.	0.	0.
S	0.	1.	0.	0.	0.	0.	1.
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	36.	4.	0.	0.	0.	0.	40.

CALM 0.

TOTAL HOURS IN MONTH = 2208

TOTAL DATA HOURS=TOTAL+CALM

Indian Point Unit 3

OFF SITE DOSE CALCULATION
MANUAL

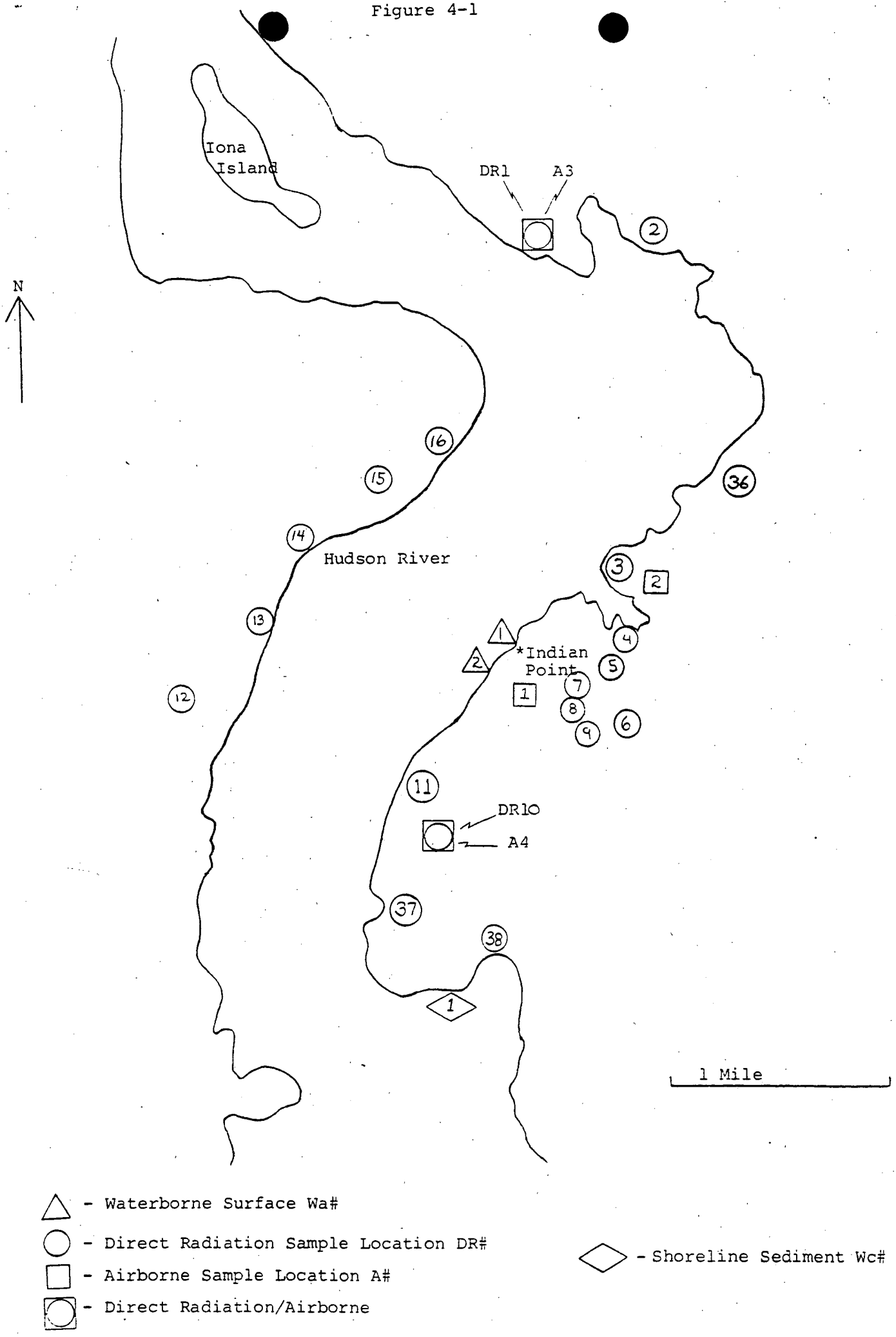
CHANGES TO SECTION 4.0

4.0 SAMPLE LOCATIONS

Figure 4.1 is a map which shows the location of environmental sampling points within 2.5 miles of the Indian Point Plant and Figure 4.2 is a map providing the same information for points at greater distances from the plant. Table 4.1 provides a description of environmental sample locations and the sample types collected at each of these locations.

The locations listed in Table 4.1 are the RETS designated locations only. The air sample locations were chosen considering the highest average annual D/Q sectors and the practicality of locating continuous air samples. There are backup sample locations not listed in Table 4.1 that may be maintained to provide the program with additional supporting information.

Radiological Environmental Monitoring - Sampling Stations
Figure 4-1



Radiological Environmental Monitoring - Sampling Stations
Figure 4-2

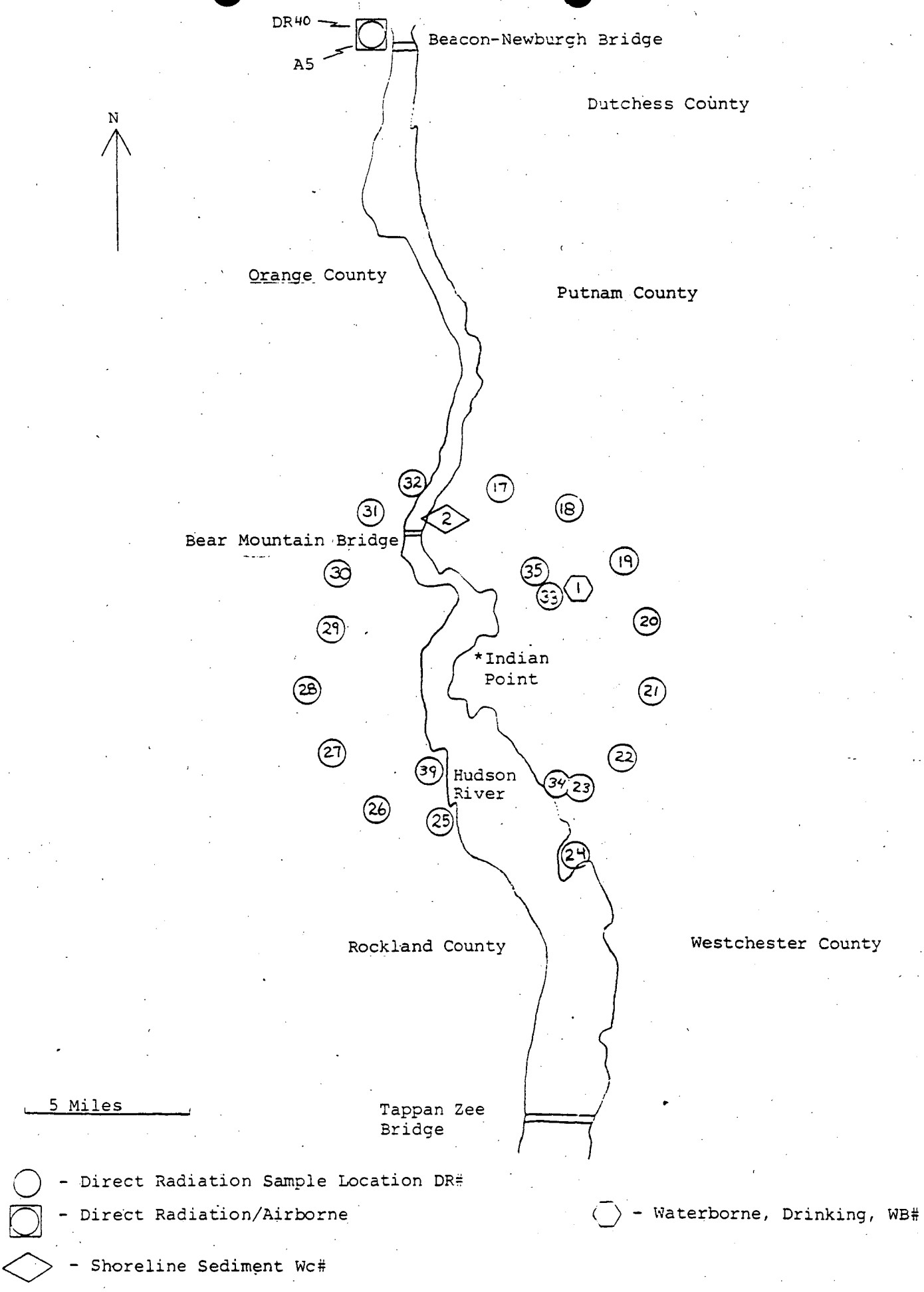


Table 4.1

Indian Point Station
Environmental Sampling Station Points

Exposure Pathway/Sample: Direct Radiation

RETS Sample Designation	Location	Distance
DR1	Cortlandt Sanitary Station	2 mi - N
DR2	Old Permart Ave.	2 mi - NNE
DR3	Charles Point	0.8 mi - NE
DR4	Lents Cove	0.5 mi - ENE
DR5	Broadway and Bleakley	0.4 mi - E
DR6	Sector Six Reuter Stokes Pole	0.5 mi - ESE
DR7	Water Meter House	0.3 mi - E
DR8	Service Center Building	0.4 mi - SSE
DR9	SE Corner	0.9 mi - SSE
DR10	NYU Tower	1 mi - SSW
DR11	White Beach	1 mi - SSW
DR12	Gays Hill Road South	1.5 mi - WSW
DR13	Gays Hill Road North	1 mi - W
DR14	Rt. 9W Pirates Cove	1 mi - WNW
DR15	Rt. 9W South of Ayers Road	1 mi - NW
DR16	Ayers Road	1 mi - NNW
DR17	Rt. 9D Garrison	5 mi - N
DR18	Gallows Hill Road	5 mi - NNE
DR19	Westbrook Drive	5 mi - NE
DR20	Pine Road - Cortlandt	5 mi - ENE
DR21	Croton Ave. - Cortlandt	5 mi - E
DR22	Colabaugh Pond Rd. Cortlandt	5 mi - ESE
DR23	Mt. Airy & Windsor Road	5 mi - SE
DR24	Croton Point	7.5 mi - SSE
DR25	Warren Ave. Haverstraw	5 mi - S
DR26	Railroad Ave. & 9W	5 mi - SSW
DR27	Willow Grove Road & Birch Drive	5 mi - SW
DR28	Palisades Parkway-NY/NJ Sign	5 mi - WSW
DR29	Palisades Parkway	4 mi - W
DR30	Anthony Wayne Park	4.5 mi - WNW
DR31	Palisades Pkwy Lake Welch Exit (South)	5 mi - NW
DR32	Rt. 9W Fort Montgomery	5 mi - NNW
DR33	Hamilton St.	3 mi - NNE
DR34	Furnace Dock	3.5 mi - SE
DR35	Highland Ave. & Sprout Brook	3 mi - NNE
DR36	Lower South & Bay Street	1.5 mi - NE
DR37	Verplanck-Broadway & Sixth St.	1.5 mi - SSW
DR38	Montrose Marina	1.5 mi - S
DR39	Grassy Point	3 mi - S
DR40	Roseton*	20 mi - N

Table 4.1 (Cont'd)

Exposure Pathway/Sample: Airborne

RETS Designation	Location	Distance
A1	Algonquin Gas Line	0.25 mi - SW
A2	Standard Brands	0.6 mi - NE
A3	Cortlandt Sanitary Station	2 mi - N
A4	NYU Tower	1 mi - SW
A5	*Roseton	20 mi - N

Exposure Pathway/Sample: Waterborne-Surface (Hudson River Water)

Wa1	Plant Inlet	N/A
Wa2	Discharge Canal	N/A

Exposure Pathway/Sample: Waterborne- Drinking

Wb1	Camp Field Reservoir	3.5 mi - NE

Exposure Pathway/Sample: Sediment from Shoreline

Wc1	White Beach	0.9 mi - SSW
Wc2	*Manitou Inlet	4.5 mi - N

*Control Station Location

Exposure Pathway/Sample: Milk

There are no milch animals within 8 km distance of Indian Point; therefore, no milk samples are taken.

Exposure Pathway/Sample: Ingestion-Fish and Invertebrates

The RETS designate two required sample locations labeled Ib1 and Ib2. The downstream Ib1 location and samples will be chosen where it is likely to be effected by plant discharge. Ib2 will be a location upstream that is not likely to be effected by plant discharge. The following fish species are considered acceptable sample species.

Striped Bass	Bluegill Sunfish
White Perch	Pumpkin Seed Sunfish
White Catfish	Blueback Herring
American Eel	Crabs

Table 4.1 (Cont'd)

Exposure Pathway/Sample: Ingestion-Food Products

RETS Designation	Location	Distance
Ic1	SW and SSW Sectors	0 - 1 mile
Ic2	N and NE Sectors	1 - 3 miles
Ic3	Rosetown (North)	20 miles