EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

3rd & 4th Quarter 1984

FACILITY: Indian Point Station (Units 1 and 2)

LICENSEE: Consolidated Edison Company of New York, Inc.

This information is provided per 10CFR 50.36a (a) (2) with the guidance of Regulatory Guide 1.21 Rev. 1. The numbered sections of this part of the report reference corresponding sections of the subject Regulatory Guide, pages 1.21-10 through 12. The New York Power Authority has chosen to issue a separate semi-annual report. This Semi-Annual Effluent and Waste Disposal Report for Indian Point Units 1 and 2 covers discharges for the third and fourth quarters of 1984.

A. Supplemental Information

1. Regulatory Limits

Indian Point Units 1 and 2 are presently subject to specifications on radioactive waste releases that are set forth in Sections 3.9 and 4.10 of Appendix A to Facility Operating Licenses DPR-5 and DPR-26 entitled "Technical Specifications and Bases". The "percent of applicable limit" reported in Table 2A of this document, is the applicable calendar quarterly dose limit specified in the Technical Specifications.

2. Maximum Permissible Concentrations

a. Fission and Activation Gases

The quarterly dose limits stated in the Technical Specifications (TS) and the calculated potential doses have been used to calculate the percent of technical specification limit.

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b&c. Iodines and Particulates

The applicable calendar quarterly dose limits for Iodine-131 and particulates with half-lives greater than 8 days in Section 3.9.B.4.a(i) of the TS have been used as the maximum permissible concentrations for the purpose of calculating the percent of technical specification limit in Table 1A of this document.

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 for each calendar quarter has been added, and a weighted average fraction of MPC has been calculated for this isotopic mixture. The percent of applicable limit reported in Table 2A of this document is the percent of MPC concentration of the time averaged diluted concentration for each calendar quarter.

The first and second quarter continuous releases are for Units 1 and 2 only. The batch releases discharged through the common site liquid waste processing facility have been apportioned according to the volume transferred from the respective units to that processing facility.

The tritium limit has been established in the same manner as the other isotopes in liquid effluents. A derived MPC of 2×10^{-4} uCi/ml for dissolved noble gases has been conservatively adopted for the swimming pathway.

3. Average Energy

The average energy (E) of the radionuclide mixture in releases of fission and activation gases for the third quarter was .0199 Mev/Dis. for $\bar{E}_\gamma$ and .174 Mev/Dis. for $\bar{E}_\beta$. The corresponding values for the fourth quarter were .0348 Mev/Dis. and .152 Mev/Dis., respectively.

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 4.10-3 of the Technical Specifications. In the case of isolated tanks (batch releases) the total activity discharged is based on an isotopic analysis of each batch and the volume of gas in that batch corrected to standard temperature and pressure.

Vapor containment ventilation discharges have been generally treated as batch releases. At least one complete isotopic concentration analysis of containment air is performed per month and this is applied to gross analysis of the ventilation air performed prior to each discharge. 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 the isotopic content determined from weekly samples of ventilation air. This information is combined with total air volume discharged by this route. The accumulation of batch and containment ventilation releases is then used to determine total discharges.

b&c. Iodines and Particulates

Iodine-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 obtained as required by Table 4.10-3 of the Technical Specifications, 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 by a monthly 24 hour composite sample. This ensures the proper identification of the short-lived I-133 & I-135 isotopes.

d. Liquid Effluents

A proportional composite sample of each batch discharge is taken and an isotopic analysis is performed in compliance with requirements specified in Table 4.10-1 of the Technical Specifications. This isotopic concentration data is combined with information of volume discharged to determine the amount of each isotope discharged in the period.

Samples of continuous discharges have been taken and analyzed in compliance with Table 4.10-1 of the Technical Specifications. This concentration data is combined with the volume discharged to calculate the total activity discharged.

5. BATCH RELEASES

	1984	
a. Liquid	3rd Qtr.	4th Qtr.
Number of Batch Releases	30	45
Total Time Period Batch Release (Min)	6,236	4,343
Maximum Time Period Batch Release (Min)	583	215
Average Time Period Batch Release (Min)	208	97
Minimum Time Period Batch Release	60	15
Average Stream Flow (cfs)	32,950	37,050
b. Gaseous		
Number of Batch Release	25	90
Total Time Period Batch Release (Min)	392,661	33,390
Maximum Time Period Batch Release (Min)	10,080	12,685
Average Time Period Batch Release (Min)	15,706	371
Minimum Time Period Batch Release	45	34

6. ABNORMAL RELEASES

a. Liquid - None

b. Gaseous - None

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B - GASEOUS EFFLUENTS

SECOND HALF - 1984

TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

GASEOUS EFFLUENTS–SUMMATION OF ALL RELEASES

	Unit	Quarter 3rd	Quarter 4th	Est. Total Error, %
A. Fission & activation gases				
1. Total release	Ci	2.13 E-1	3.27 E 2	5.0 E 1
2. Average release rate for period	μCi/sec	2.69 E-2	4.11 E 1	
3. Percent of Technical specification limit	%	N.A.	N.A.	
B. Iodines				
1. Total iodine-131	Ci	<3.7 E-4	<4.4 E-4	5.0 E 1
2. Average release rate for period	μCi/sec	4.7 E-5	5.5 E-5	
3. Percent of technical specification limit	%	N.A.	N.A.	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	1.48 E-4	1.43 E-1	5.0 E 1
2. Average release rate for period	μCi/sec	1.86 E-5	1.80 E-2	
3. Percent of technical specification limit	%	N.A.	N.A.	
4. Gross alpha radioactivity	Ci	<2.4 E-7	<2.8 E-7	
D. Tritium				
1. Total release	Ci	5.94 E-1	1.54 E 0	5.0 E 1
2. Average release rate for period	μCi/sec	7.47 E-2	1.94 E-1	
3. Percent of technical specification limit	%	N.A.	N.A.	

TABLE 1B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

GASEOUS EFFLUENTS—ELEVATED RELEASE

Nuclides Released	Unit	CONTINUOUS MODE Quarter 3rd	CONTINUOUS MODE Quarter 4th	BATCH MODE Quarter 3rd	BATCH MODE Quarter 4th
1. Fission gases					
krypton-85	Ci	E	8.06 E-2	. E	. E
krypton-85m	Ci	. E	. E	. E	. E
krypton-87	Ci	. E	. E	. E	. E
krypton-88	Ci	. E	. E	. E	. E
xenon-133	Ci	. E	1.61 E 1	. E	. E
xenón-135	Ci	. E	6.18 E 0	. E	. E
xenon-135m	Ci	. E	. E	. E	. E
xenon-138	Ci	. E	. E	. E	E
Others (specify)	Ci	. E	. E	. E	E
TRITIUM (H3)	Ci	6 . 75 E-2	3 . 83 E-2	. E	. E
	Ci	. E	. E	. E	. E
unidentified	Ci	. E	. E	. E	. E
Total for period	Ci	6.75 E-2	2 . 24 E 1	. E	. E
2. Iodines					
iodine-131	Ci	∠3 . 0 E-4	∠4 . 4 E-4	. E	. E
iodine-133	Ci	∠4 . 5 E-4	∠6 . 7 E-4	. E	. E
iodine-135	Ci	∠1 . 5 E-3	∠2 . 2 E-3	. E	. E
Total for period	Ci	∠1 . 5 E-3	∠2.2 E-3	. E	. E
3. Particulates					
strontium-89	Ci	. E	. E	E	. E
strontium-90	Ci	. E	. E	. E	. E
cesium-134	Ci	6 . 05 E-6	9. 11 E-6	. E	. E
cesium-137	Ci	2 . 83 E-5	6. 21 E-5	. E	. E
barium-lanthanum-140	Ci	. E	. E	. E	. E
IRON-55	Ci	1 . 48 E-6	5. 79 E-7	. E	. E
COBALT-58	Ci	. E	. E	. E	. E
COBALT-60	Ci	3 . 52 E-5	6. 68 E-5	. E	. E
NICKEL-63	Ci	. E	9. 84 E-7	. E	. E

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

GASEOUS EFFLUENTS–GROUND-LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE Quarter 3rd	CONTINUOUS MODE Quarter 4th	BATCH MODE Quarter 3rd	BATCH MODE Quarter 4th
1. Fission gases					
krypton-85	Ci	. E	. E	7.76 E -2	1.50 E 0
krypton-85m	Ci	. E	. E	. E	. E
krypton-87	Ci	. E	. E	. E	. E
krypton-88	Ci	. E	. E	. E	. E
xenon-133	Ci	. E	. E	1.36 E -1	3.00 E 2
xenon-135	Ci	. E	. E	. E	. E
xenon-135m	Ci	. E	. E	. E	. E
xenon-138	Ci	. E	. E	. E	. E
Tritium - (H3)	Ci	5.26 E -1	1.50 E 0	. E	. E
	Ci	. E	. E	. E	. E
	Ci	. E	. E	. E	. E
unidentified	Ci	. E	. E	. E	. E
Total for period	Ci	5.26 E -1	1.50 E 0	2.13 E -1	3.04 E 2
2. Iodines					
iodine-131	Ci	<3.7 E -4	<4.2 E -5	. E	. E
iodine-133	Ci	<5.6 E -4	<1.9 E -5	. E	. E
iodine-135	Ci	<1.9 E -3	<6.6 E -6	. E	. E
Total for period	Ci	<1.9 E -3	<4.2 E -5	. E	. E
3. Particulates					
strontium-89	Ci	. E	. E	E	. E
strontium-90	Ci	. E	. E	. E	. E
cesium-134	Ci	1.21 E -5	1.09 E -5	. E	. E
cesium-137	Ci	3.38 E -5	5.87 E -5	. E	. E
barium-lanthanum-140	Ci	. E	. E	. E	. E
COBALT-58	Ci	. E	5.06 E -6	. E	. E
COBALT-60	Ci	2.98 E -5	6.19 E -5	. E	. E
IRON-55	Ci	1.03 E -6	2.26 E -6	. E	. E
	Ci	. E	. E	. E	. E

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C - LIQUID EFFLUENTS

SECOND HALF - 1984

TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

LIQUID EFFLUENTS–SUMMATION OF ALL RELEASES

	Unit	Quarter 3rd	Quarter 4th	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	1.90 E -1	2.89 E -1	2.50 E-1
2. Average diluted concentration during period	μCi/ml	2.72 E -8	1.72 E -9	
3. Percent of applicable limit	%	1.22 E -1	1.11 E	
B. Tritium				
1. Total release	Ci	3.04 E 1	7.03 E 1	2.50 E 1
2. Average diluted concentration during period	μCi/ml	4.30 E-6	4.00 E -7	
3. Percent of applicable limit	%	1.44 E-1	3.78 E -1	
C. Dissolved and entrained gases				
1. Total release	Ci	1.82 E-4	3.90 E-2	2.50 E 1
2. Average diluted concentration during period	μCi/ml	2.60 E-11	2.32 E-10	
3. Percent of applicable limit	%	1.29 E-5	1.16 E-4	
D. Gross alpha radioactivity				
1. Total release	Ci	<4.0 E-5	<9.6 E-5	2.5 E +1
E. Volume of waste released (prior to dilution)	liters	8.15 E 5	3.13 E 7	1.0 E 1
F. Volume of dilution water used during period	liters	2.24 E+10	4.14 E+11	1.0 E 1

TABLE 2B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE Quarter 3rd	CONTINUOUS MODE Quarter 4th	BATCH MODE Quarter 3rd	BATCH MODE Quarter 4th
strontium-89	Ci	. E	. E-	. E	. E
strontium-90	Ci	. E	. E	7 . 40 E -5	1.99 E-5
cesium-134	Ci	. E	2 . 30 E -2	2 . 25 E -3	4.64 E-4
cesium-137	Ci	. E	3 . 35 E -2	5 . 29 E -3	1.63 E-3
iodine-131	Ci	. E	. E	1 . 15 E -3	3.28 E-2
cobalt-58	Ci	. E	. E	3 . 84 E -2	1.84 E-2
cobalt-60	Ci	. E	3 . 07 E -2	4 . 33 E -2	1.64 E-2
iron-59	Ci	. E	. E	. E	2.77 E-4
zinc-65	Ci	. E	. E	. E	. E
manganese-54	Ci	. E	. E	. E	6.63 E-5
chromium-51	Ci	. E	. E	1 . 96 E -4	7.50 E-4
zirconium-niobium-95	Ci	. E	. E	. E	2 . 69 E -4
molybdenum-99	Ci	. E	. E	. E	. E
technetium-99m	Ci	. E	. E	. E	. E
barium-lanthanum-140	Ci	. E	. E	. E	. E
cerium-141	Ci	. E	. E	. E	. E
IRON-55	Ci	. E	1. 69 E-1	3 . 76 E -2	2 . 71 E-2
NICKEL-63	Ci	. E	. E	1 . 33 E -2	1 . 74 E-4
IODINE-133	Ci	. E	. E	. E	1 . 77 E-4
COBALT-57	Ci	. E	. E	3 . 52 E-5	. E
ANTIMONY-125	Ci	. E	. E	1 . 25 E-2	1 . 62 E -2
TRITIUM	Ci	. E	. E	3 . 04 E-1	7 . 03 E 1
ANTIMONY-124				3 .64 E-2	7 . 56 E-4
Total for period (above)	Ci	. E	2. 56 E-1	4 . 94 E -1	7.06 E+1
xenon-133	Ci	. E	. E	1 . 82 E -4	3 .90 E -2
xenon-135	Ci	. E	. F	. E	4 .06 E -5

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D - SOLID WASTE

SECOND HALF - 1984

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1984)

SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

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	1.89 E 2 2.01 E 3	1.00 E 2
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	6.74 E 2 1.31 E 1	1 00 2 1.00 E 2
c. Irradiated components, control rods, etc.	m^3 Ci	. E . E	. E
d. Other (describe)	m^3 Ci	. E . E	. E

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

a) CS137	%	3.9 E+1
CS134	%	1.4 E+1
CO60	%	1.9 E+1
CO58	%	0.7 E+1
FE55	%	1.0 E+1
NI63	%	0.9 E+1
b) CO60	%	4.5 E+1
CS137	%	0.7 E+1
NI63	%	3.4 E+1
FE55	%	0.6 E+1
	%	. E
	%	. E

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
59	Truck	Barnwell, SC
9	Truck	Richland, WA

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination

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E - RADIOLOGICAL IMPACT ON MAN

SECOND HALF - 1984

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. For the purpose of analysis, noble gas releases from containment pressure reliefs and purges were treated as a continuous release, because of the large number of such releases. Other releases (e.g., gas decay tank releases) were considered as batch and 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 linear interpolation of 1970 - 2010 population data contained in the Indian Point Unit No. 3 FSAR.

Dose calculations for liquid pathways to individuals and populations 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.

NUREG-0017, "Calculation of Release of Radioactive Materials in Gaseous and Liquid effluents from Pressurized Water Reactors," assumes an annual release of 8.0Ci/yr of Carbon-14. Therefore, to be consistent with NUREG-0017, a release of 4.0 Curies of Carbon-14 was assumed for the six month period in addition to the radioactive materials measured in Indian Point gaseous effluents.

Indian Point Units 1 & 2

RADIOLOGICAL IMPACT ON MAN

(Reference Regulatory Guide 1.21, page 12)

A. Maximum Individual Doses

(1) Pathways (Gaseous)	Total Body mRem	Skin mRem	Thyroid mRem	Bone mRem
(a) Noble Gas Immersion				
(i) Batch Releases	0.33E-01	0.84E-01	N/A	N/A
(ii) Continuous Releases	0.27E-02	0.66E-02	N/A	N/A
(b) Inhalation*	0.67E-02	N/A	0.67E-02	0.31E-01
(c) Ground Deposition	0.28E-02	0.33E-02	N/A	N/A
(d) Milk Ingestion*	0.40E-01	N/A	0.40E-01	0.18E+00
(e) Meat Ingestion**	0.60E-02	N/A	0.60E-02	0.30E-01
(f) Vegetable Ingestion**	0.51E+00	N/A	0.51E+00	0.25E+01

(2) Pathways (Liquid)

(a) All — See Attached "LADTAP" printout Attachment I

* Infants are critical age group

** Children are critical age group

NA = Not Applicable

B. Population

(1) Pathways(Gaseous)

	Total Body (man-rem)	Thyroid (man-thyroid rem)
(a) Noble Gas Immersion		
(i) Batch Release	.772 E+00	N/A
(ii) Continuous Release	.134 E+00	N/A
(b) Inhalation	.247 E+00	.245 E+00
(c) Ground Deposition	.066 E+00	N/A
(d) Totals	1.22 E+00	

(2) Pathways(Liquid)

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

C. Average Doses to Individuals

(1) Pathways

(a) Liquid-Total Body — 1.20E-04 mRem

(b) Gaseous-Total Body — 6.16E-05 mRem

N/A = Not Applicable

* * * AS LOW AS REASONABLY ACHIEVABLE * * *

CATEGORY I DOSES

DOSE (MREM PER YEAR INTAKE)

ATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
ISH		1.26E-01	1.77E-01	1.26E-01	9.48E-03	5.63E-02	2.66E-02	1.03E-02
VERTEBRATE		1.87E-02	5.38E-02	1.54E-02	7.72E-04	7.22E-04	5.96E-02	2.27E-02
LGAE		2.79E-08	5.28E-08	2.47E-08	1.19E-08	6.81E-09	8.89E-08	4.32E-08
RINKING		1.54E-12	1.48E-12	1.12E-12	2.83E-12	8.07E-13	1.41E-12	1.20E-12
HORELINE	1.96E-03	1.67E-03	1.67E-03	1.67E-03	1.67E-03	1.67E-03	1.67E-03	1.67E-03
IMMING	0.0	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
OATING	0.0	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
OTAL	1.96E-03	1.46E-01	2.33E-01	1.44E-01	1.20E-02	5.88E-02	8.79E-02	3.47E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
ISH	21.0	5.0	25.00
VERTEBRATE	5.0	5.0	25.00
LGAE	0.0	5.0	25.00
RINKING	0.0	500.0	112.00
HORELINE	50.0	5.0	1.00
IMMING	50.0	5.0	1.00
OATING	100.0	5.0	1.00

SHOREWIDTH FACTOR=0.2

CATEGORY II DOSES

DOSE (MREM PER YEAR INTAKE)

ATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
ISH		1.21E-01	1.76E-01	7.08E-02	8.37E-03	4.29E-02	2.76E-02	7.08E-03
VERTEBRATE		1.45E-02	4.14E-02	1.15E-02	6.75E-04	5.49E-04	4.54E-02	1.70E-02
LGAE		3.24E-08	5.92E-08	2.10E-08	1.39E-08	6.81E-09	9.01E-08	4.24E-08
RINKING		1.64E-12	1.48E-12	9.14E-13	3.05E-12	8.07E-13	1.29E-12	1.02E-12
HORELINE	2.62E-03	2.23E-03	2.23E-03	2.23E-03	2.23E-03	2.23E-03	2.23E-03	2.23E-03
IMMING	0.0	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05	4.00E-05
OATING	0.0	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
OTAL	2.62E-03	1.37E-01	2.20E-01	8.46E-02	1.13E-02	4.58E-02	7.53E-02	2.63E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
ISH	16.0	5.0	25.00
VERTEBRATE	3.8	5.0	25.00
LGAE	0.0	5.0	25.00
RINKING	0.0	500.0	112.00
HORELINE	67.0	5.0	1.00
WIMMING	100.0	5.0	1.00
OATING	100.0	5.0	1.00

SHOREWIDTH FACTOR=0.2

CATEGORY III DOSES

DOSE (MREM PER YEAR INTAKE)

ATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
ISH		1.33E-01	1.51E-01	2.75E-02	8.62E-03	1.85E-02	1.96E-02	2.85E-03
VERTEBRATE		7.56E-03	1.95E-02	5.30E-03	7.18E-04	2.46E-04	2.04E-02	7.50E-03
LGAE		6.33E-05	8.67E-05	2.13E-05	3.32E-05	6.81E-06	9.29E-05	4.19E-05
RINKING		2.26E-09	2.52E-09	1.44E-09	7.05E-09	8.07E-10	1.83E-09	1.48E-09
HORELINE	5.48E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04	4.67E-04
IMMING	0.0	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05	1.00E-05
ATING	0.0	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05	2.00E-05
OTAL	5.48E-04	1.41E-01	1.71E-01	3.33E-02	9.87E-03	1.93E-02	4.06E-02	1.09E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	6.9	5.0	25.00	
INVERTEBRATE	1.7	5.0	25.00	
ALGAE	0.0	5.0	25.00	
DRINKING	0.0	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	

CATEGORY IV DOSES

	DOSE (MREM PER YEAR INTAKE)							
PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.93E-02	2.50E-02	1.82E-03	1.50E-03	1.34E-03	3.12E-03	2.04E-04
INVERTEBRATE		5.45E-04	1.29E-03	3.22E-04	1.01E-04	1.44E-05	1.22E-03	4.39E-04
ALGAE		1.14E-07	1.58E-07	2.21E-08	8.00E-08	6.81E-09	1.01E-07	4.17E-08
DRINKING		3.29E-12	4.50E-12	2.01E-12	1.61E-11	8.07E-13	2.51E-12	1.98E-12
SHORELINE	1.17E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04	1.00E-04
SWIMMING	0.0	4.00E-12	4.00E-12	4.00E-12	4.00E-12	4.00E-12	4.00E-12	4.00E-12
BOATING	0.0	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07	1.00E-07
TOTAL	1.17E-04	2.00E-02	2.64E-02	2.24E-03	1.70E-03	1.46E-03	4.44E-03	7.44E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	0.5	5.0	25.00	
INVERTEBRATE	0.1	5.0	25.00	
ALGAE	0.0	5.0	25.00	
DRINKING	0.0	500.0	112.00	
SHORELINE	3.0	5.0	1.00	
SWIMMING	0.0	5.0	1.00	
BOATING	0.5	5.0	1.00	

* * * SELECTED LOCATION * * *

LOCATION IS DOWNSTREAM

CATEGORY I DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.99E-02	1.27E-01	9.03E-02	6.63E-03	4.02E-02	1.90E-02	7.34E-03
INVERTEBRATE		1.33E-02	3.84E-02	1.10E-02	5.40E-04	5.16E-04	4.26E-02	1.62E-02
ALGAE		1.93E-08	3.77E-08	1.76E-08	8.35E-09	4.87E-09	6.35E-08	3.03E-08
DRINKING		1.11E-10	1.06E-10	8.02E-11	2.64E-10	5.80E-11	1.01E-10	8.62E-11
SHORELINE	1.40E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03	1.19E-03
SWIMMING	0.0	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05
BOATING	0.0	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05
TOTAL	1.40E-03	1.04E-01	1.66E-01	1.03E-01	8.39E-03	4.20E-02	6.28E-02	2.48E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	7.0	31.00
INVERTEBRATE	5.0	7.0	31.00
ALGAE	0.0	7.0	31.00
DRINKING	0.0	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=0.2

LOCATION IS DOWNSTREAM

CATEGORY II DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.61E-02	1.26E-01	5.06E-02	5.85E-03	3.07E-02	1.97E-02	5.05E-03
INVERTEBRATE		1.04E-02	2.95E-02	8.22E-03	4.72E-04	3.92E-04	3.24E-02	1.21E-02
ALGAE		2.31E-08	4.23E-08	1.50E-08	9.70E-09	4.87E-09	6.43E-08	3.02E-08
DRINKING		1.17E-10	1.06E-10	6.56E-11	2.90E-10	5.80E-11	9.23E-11	7.37E-11
SHORELINE	1.87E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03	1.60E-03
SWIMMING	0.0	2.85E-05	2.85E-05	2.85E-05	2.85E-05	2.85E-05	2.85E-05	2.85E-05
BOATING	0.0	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05
TOTAL	1.87E-03	9.81E-02	1.57E-01	6.04E-02	7.96E-03	3.27E-02	5.38E-02	1.88E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	7.0	31.00
INVERTEBRATE	3.8	7.0	31.00
ALGAE	0.0	7.0	31.00
DRINKING	0.0	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=0.2

LOCATION IS DOWNSTREAM

CATEGORY III DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		9.49E-02	1.08E-01	1.96E-02	6.03E-03	1.32E-02	1.40E-02	2.03E-03
INVERTEBRATE		5.40E-03	1.39E-02	3.79E-03	5.02E-04	1.75E-04	1.46E-02	5.36E-03

LGAE		4.52E-05	6.19E-05	1.52E-05	2.32E-05	4.87E-06	6.63E-05	2.99E-05
DRINKING		1.62E-07	1.81E-07	1.03E-07	6.76E-07	5.80E-08	1.31E-07	1.06E-07
SHORELINE	3.91E-04	3.33E-04	3.33E-04	3.33E-04	3.33E-04	3.33E-04	3.33E-04	3.33E-04
SWIMMING	0.0	7.13E-06	7.13E-06	7.13E-06	7.13E-06	7.13E-06	7.13E-06	7.13E-06
BOATING	0.0	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05	1.43E-05
TOTAL	3.91E-04	1.01E-01	1.22E-01	2.38E-02	6.91E-03	1.38E-02	2.90E-02	7.77E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	6.9	7.0	31.00	
INVERTEBRATE	1.7	7.0	31.00	
ALGAE	0.0	7.0	31.00	
DRINKING	0.0	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	

LOCATION IS DOWNSTREAM

CATEGORY IV DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.38E-02	1.79E-02	1.30E-03	1.05E-03	9.58E-04	2.23E-03	1.46E-04
INVERTEBRATE		3.69E-04	9.24E-04	2.30E-04	7.07E-05	1.03E-05	8.70E-04	3.14E-04
ALGAE		8.12E-08	1.13E-07	1.58E-08	5.59E-08	4.87E-09	7.24E-08	2.97E-08
DRINKING		2.36E-10	3.23E-10	1.44E-10	1.57E-09	5.80E-11	1.79E-10	1.42E-10
SHORELINE	8.38E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05	7.15E-05
SWIMMING	0.0	2.85E-12	2.85E-12	2.85E-12	2.85E-12	2.85E-12	2.85E-12	2.85E-12
BOATING	0.0	7.13E-08	7.13E-08	7.13E-08	7.13E-08	7.13E-08	7.13E-08	7.13E-08
TOTAL	8.38E-05	1.43E-02	1.89E-02	1.60E-03	1.19E-03	1.04E-03	3.17E-03	5.31E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	0.5	7.0	31.00	
INVERTEBRATE	0.1	7.0	31.00	
ALGAE	0.0	7.0	31.00	
DRINKING	0.0	7.0	19.00	
SHORELINE	3.0	7.0	7.00	
SWIMMING	0.0	7.0	7.00	
BOATING	0.5	7.0	7.00	

* * * FISH CONSUMPTION POPULATION DOSES * * *
MAN-REM

_____SPORTFISH HARVEST_____

ATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			----------DOSE (MAN-REM)----------						
ISH	CATEGORY I	7.24E+04	3.04E-01	4.28E-01	3.05E-01	1.39E-02	1.36E-01	6.42E-02	2.43E-02
ISH	CATEGORY II	1.16E+04	6.11E-02	8.91E-02	3.59E-02	2.56E-03	2.17E-02	1.40E-02	3.52E-03
ISH	CATEGORY III	7.00E+03	9.45E-02	1.07E-01	1.95E-02	3.69E-03	1.31E-02	1.39E-02	1.99E-03
ISH	TOTAL	9.10E+04	4.60E-01	6.25E-01	3.60E-01	2.01E-02	1.71E-01	9.20E-02	2.98E-02

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

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

* * * FISH CONSUMPTION POPULATION DOSES * * *
MAN-REM

_____COMMERCIAL HARVEST_____

			DOSE (MAN-REM)						
ATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
ISH	CATEGORY I	9.02E+07	1.33E+00	1.88E+00	1.34E+00	4.72E-02	5.96E-01	2.81E-01	1.06E-01
ISH	CATEGORY II	1.44E+07	2.68E-01	3.90E-01	1.57E-01	8.71E-03	9.52E-02	6.12E-02	1.53E-02
ISH	CATEGORY III	8.71E+06	4.14E-01	4.69E-01	8.53E-02	1.25E-02	5.76E-02	6.09E-02	8.62E-03
ISH	TOTAL	1.13E+08	2.02E+00	2.74E+00	1.58E+00	6.85E-02	7.49E-01	4.03E-01	1.29E-01

DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=1.98E+07
7.00E+00 1.55E+05 2.40E+02

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

_____NEPA DOSES_____

OTE--TOATL NEPA DOSE MUST INCLUDE SPORT CATCH, DOSES BELOW ARE FOR COMMERCIAL CATCH ONLY

			DOSE (MAN-REM)						
ATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
ISH	CATEGORY I	1.23E+05	5.18E-01	7.29E-01	5.19E-01	1.83E-02	2.31E-01	1.09E-01	4.10E-02
ISH	CATEGORY II	1.97E+04	1.04E-01	1.52E-01	6.10E-02	3.38E-03	3.70E-02	2.38E-02	5.93E-03
ISH	CATEGORY III	1.19E+04	1.61E-01	1.82E-01	3.31E-02	4.87E-03	2.24E-02	2.36E-02	3.35E-03
ISH	TOTAL	1.55E+05	7.83E-01	1.06E+00	6.13E-01	2.66E-02	2.91E-01	1.57E-01	5.03E-02

* * * INVERTEBRATE CONSUMPTION POPULATION DOSES * * *
MAN-REM

_____SPORTFISH HARVEST_____

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
RIVER	CATEGORY I	7.94E+03	2.08E-02	5.97E-02	1.72E-02	5.29E-04	8.02E-04	6.62E-02	2.52E-02
RIVER	CATEGORY II	1.26E+03	3.39E-03	9.62E-03	2.68E-03	9.59E-05	1.28E-04	1.06E-02	3.94E-03
RIVER	CATEGORY III	7.94E+02	2.47E-03	6.37E-03	1.73E-03	1.43E-04	8.02E-05	6.67E-03	2.45E-03
RIVER	TOTAL	1.00E+04	2.66E-02	7.57E-02	2.16E-02	7.67E-04	1.01E-03	8.34E-02	3.16E-02

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

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_____

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	1.31E+07	1.48E-02	4.26E-02	1.22E-02	2.97E-04	5.72E-04	4.73E-02	1.60E-02
INVER	CATEGORY II	2.08E+06	2.42E-03	6.87E-03	1.91E-03	5.37E-05	9.10E-05	7.53E-03	2.81E-03
INVER	CATEGORY III	1.31E+06	1.77E-03	4.54E-03	1.24E-03	7.98E-05	5.72E-05	4.76E-03	1.75E-03
INVER	TOTAL	1.65E+07	1.90E-02	5.40E-02	1.54E-02	4.31E-04	7.20E-04	5.95E-02	2.25E-02

DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=1.98E+07
7.00E+00 1.00E+03 2.40E+02

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

_____NEPA DOSES_____

NOTE--TOATL NEPA DOSE MUST INCLUDE SPORT CATCH, DOSES BELOW ARE FOR COMMERCIAL CATCH ONLY

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	7.94E+02	2.07E-03	5.96E-03	1.71E-03	4.16E-05	8.00E-05	6.61E-03	2.51E-03
INVER	CATEGORY II	1.26E+02	3.38E-04	9.60E-04	2.67E-04	7.50E-06	1.27E-05	1.05E-03	3.93E-04
INVER	CATEGORY III	7.94E+01	2.47E-04	6.35E-04	1.73E-04	1.12E-05	8.00E-06	6.65E-04	2.44E-04
INVER	TOTAL	1.00E+03	2.66E-03	7.56E-03	2.15E-03	6.02E-05	1.01E-04	8.32E-03	3.15E-03

* * * POPULATION WATER CONSUMPTION DOSES * * *

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
DRINKING	CATEGORY I	2.44E+02	6.75E-08	6.60E-09	3.65E-09	1.33E-10	7.78E-10	3.47E-10	1.13E-09
DRINKING	CATEGORY II	3.64E+01	1.01E-08	1.07E-09	4.90E-10	1.57E-11	1.16E-10	6.52E-11	1.64E-10
DRINKING	CATEGORY III	5.20E+01	1.53E-08	2.13E-09	7.14E-10	4.30E-11	1.66E-10	1.74E-10	2.54E-10
DRINKING	TOTAL	3.33E+02	9.30E-08	9.80E-09	4.86E-09	1.92E-10	1.06E-09	5.86E-10	1.54E-09

POPULATION=1.00E+00 DILUTION=1.00E+02 TRANSIT TIME=1.00E+06 HR (INCLUDING 24 HR FOR TREATMENT FACILITY)

AVERAGE INDIVIDUAL CONSUMPTION (L/YR) ADULT=3.70E+02 TEEN=2.60E+02 CHILD=2.60E+02

-----CUMULATIVE TOTAL-----

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	CUMUL TOTAL	3.33E+02	9.30E-08	9.80E-09	4.86E-09	1.92E-10	1.06E-09	5.86E-10	1.54E-09

HYDROSPHERE TRITIUM DOSE

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
WATER	TOTAL	2.20E+00	9.83E-10	9.83E-10	9.83E-10	9.83E-10	9.83E-10	9.83E-10	9.83E-10

* * * RECREATION POPULATION DOSES * * *

PATHWAY	AGE GROUP	USAGE	DOSE(MAN-REM) SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	4.64E-01	3.95E-01	3.95E-01

LOCATION- DOWNSTREAM

DILUTION=0.70E+01 TRANSIT TIME=0.40E+01 HR SWF=0.2

PATHWAY	AGE GROUP	USAGE	DOSE(MAN-REM) SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.0	4.74E-03	4.74E-03

LOCATION- DOWNSTREAM

DILUTION=0.70E+01 TRANSIT TIME=0.40E+01 HR

PATHWAY	AGE GROUP	USAGE	DOSE(MAN-REM) SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.0	2.37E-03	2.37E-03

LOCATION- DOWNSTREAM

DILUTION=0.70E+01 TRANSIT TIME=0.40E+01 HR

* * DOSE TO BIOTA * * *

MRADS PER YEAR

LUTION= 7.00E+00 TRANSIT TIME= 4.00E+00 HR

	INTERNAL	EXTERNAL	TOTAL
ISH	2.50E-01	1.05E+00	1.30E+00
NVERTEBRATE	9.25E-02	2.09E+00	2.18E+00
LGAE	3.22E-01	2.50E-03	3.25E-01
USKRAT	3.08E+00	6.97E-01	3.78E+00
ACCOON	8.94E-01	5.22E-01	1.42E+00
ERON	8.61E+00	6.96E-01	9.30E+00
CK	2.90E+00	1.04E+00	3.94E+00

* * * 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
38SR 90	9.39E-05	1.14E-03	2.94E-10	1.21E+01	3.14E-06
55CS 134	2.57E-02	1.01E+00	2.67E-02	3.92E+01	1.04E+00
55CS 137	4.04E-02	9.73E-01	6.24E-02	2.41E+01	1.54E+00
53I 131	3.40E-02	4.04E-04	8.79E-02	1.19E-02	2.58E+00
27CO 58	5.68E-02	4.86E-03	3.84E-03	8.55E-02	6.76E-02
27CO 60	9.04E-02	2.98E-01	2.93E-01	3.30E+00	3.24E+00
26FE 59	2.77E-04	4.86E-05	1.48E-05	1.75E-01	5.33E-02
25MN 54	6.63E-05	4.83E-05	1.43E-05	7.28E-01	2.15E-01
24CR 51	9.46E-04	1.03E-06	9.96E-07	1.09E-03	1.05E-03
41NB 95	2.69E-04	9.75E-06	7.65E-06	3.63E-02	2.84E-02
26FE 55	2.34E-01	6.09E-02	8.69E-08	2.60E-01	3.72E-07
28NI 63	1.87E-01	1.42E-02	0.0	7.60E-02	0.0
53I 133	1.77E-04	9.21E-07	1.19E-06	5.20E-03	6.70E-03
27CO 57	3.52E-05	1.13E-06	1.03E-06	3.20E-02	2.93E-02
51SB 125	2.87E-02	1.00E-02	1.00E-02	3.49E-01	3.49E-01
1H 3	1.01E+02	2.15E-03	2.15E-03	2.13E-05	2.13E-05
51SB 124	3.72E-02	4.11E-03	4.10E-03	1.10E-01	1.10E-01
TOTAL		2.38E+00	4.90E-01		

Note on Age Group:

CATEGORY I (17 years old or older)

CATEGORY II (11 to 17 years old)

CATEGORY III (1 to 11 years old)

CATEGORY IV (0 to 1 year old)

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: A

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	24.	100.	7.	0.	0.	0.	141.
NNE	11.	19.	4.	0.	0.	0.	34.
NE	6.	5.	0.	0.	0.	0.	11.
ENE	2.	0.	0.	0.	0.	0.	2.
E	0.	0.	0.	0.	0.	0.	0.
ESE	5.	0.	0.	0.	0.	0.	5.
SE	10.	2.	0.	0.	0.	0.	12.
SSE	34.	10.	0.	0.	0.	0.	44.
S	32.	32.	0.	0.	0.	0.	64.
SSW	16.	17.	0.	0.	0.	0.	33.
SW	8.	11.	0.	0.	0.	0.	19.
WSW	5.	1.	0.	0.	0.	0.	6.
W	7.	7.	0.	0.	0.	0.	14.
WNW	3.	1.	0.	0.	0.	0.	4.
NW	5.	4.	0.	0.	0.	0.	9.
NNW	5.	8.	0.	0.	0.	0.	13.
VARIABLE							
Total	173.	227.	11.	0.	0.	0.	411.

Periods of calm (hours): 0.

Hours of missing data: Total missing hours during third quarter = 0

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: B

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	10.	22.	1.	0.	0.	0.	33.
NNE	5.	14.	1.	0.	0.	0.	20.
NE	3.	0.	0.	0.	0.	0.	3.
ENE	1.	1.	0.	0.	0.	0.	2.
E	3.	0.	0.	0.	0.	0.	3.
ESE	5.	0.	0.	0.	0.	0.	5.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	4.	1.	0.	0.	0.	0.	5.
S	6.	3.	0.	0.	0.	0.	9.
SSW	2.	7.	1.	0.	0.	0.	10.
SW	0.	1.	0.	0.	0.	0.	1.
WSW	1.	0.	0.	0.	0.	0.	1.
W	4.	0.	0.	0.	0.	0.	4.
WNW	4.	0.	0.	0.	0.	0.	4.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	2.	6.	0.	0.	0.	0.	8.
VARIABLE							
Total	52.	55.	3.	0.	0.	0.	110.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: C

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4.	15.	1.	0.	0.	0.	20.
NNE	8.	6.	0.	0.	0.	0.	14.
NE	9.	2.	0.	0.	0.	0.	11.
ENE	5.	0.	0.	0.	0.	0.	5.
E	3.	0.	0.	0.	0.	0.	3.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	4.	0.	0.	0.	0.	0.	4.
SSE	3.	0.	0.	0.	0.	0.	3.
S	5.	8.	0.	0.	0.	0.	13.
SSW	1.	5.	1.	0.	0.	0.	7.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	3.	0.	0.	0.	0.	0.	3.
WNW	1.	1.	0.	0.	0.	0.	2.
NW	1.	1.	0.	0.	0.	0.	2.
NNW	2.	1.	0.	0.	0.	0.	3.
VARIABLE							
Total	52.	39.	2.	0.	0.	0.	93.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: D

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	24.	90.	4.	0.	0.	0.	118.
NNE	47.	120.	14.	0.	0.	0.	181.
NE	51.	24.	0.	0.	0.	0.	75.
ENE	51.	2.	0.	0.	0.	0.	53.
E	30.	2.	0.	0.	0.	0.	32.
ESE	10.	0.	0.	0.	0.	0.	10.
SE	7.	0.	0.	0.	0.	0.	7.
SSE	13.	7.	0.	0.	0.	0.	20.
S	18.	29.	0.	0.	0.	0.	47.
SSW	9.	31.	6.	0.	0.	0.	46.
SW	5.	6.	0.	0.	0.	0.	11.
WSW	4.	1.	0.	0.	0.	0.	5.
W	5.	2.	0.	0.	0.	0.	7.
WNW	4.	1.	0.	0.	0.	0.	5.
NW	3.	0.	0.	0.	0.	0.	3.
NNW	3.	6.	0.	0.	0.	0.	9.
VARIABLE							
Total	284.	321.	24.	0.	0.	0.	629.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: E

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	23.	20.	0.	0.	0.	0.	43.
NNE	124.	54.	0.	0.	0.	0.	178.
NE	122.	34.	0.	0.	0.	0.	156.
ENE	96.	0.	0.	0.	0.	0.	96.
E	38.	0.	0.	0.	0.	0.	38.
ESE	19.	0.	0.	0.	0.	0.	19.
SE	24.	0.	0.	0.	0.	0.	24.
SSE	26.	3.	0.	0.	0.	0.	29.
S	41.	34.	0.	0.	0.	0.	75.
SSW	18.	15.	0.	0.	0.	0.	33.
SW	5.	0.	0.	0.	0.	0.	5.
WSW	2.	0.	0.	0.	0.	0.	2.
W	3.	3.	0.	0.	0.	0.	6.
WNW	2.	2.	0.	0.	0.	0.	4.
NW	2.	0.	0.	0.	0.	0.	2.
NNW	3.	2.	0.	0.	0.	0.	5.
VARIABLE							
Total	548.	167.	0.	0.	0.	0.	715.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: F

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	9.	1.	0.	0.	0.	0.	10.
NNE	65.	8.	0.	0.	0.	0.	73.
NE	81.	16.	0.	0.	0.	0.	97.
ENE	26.	0.	0.	0.	0.	0.	26.
E	11.	0.	0.	0.	0.	0.	11.
ESE	5.	0.	0.	0.	0.	0.	5.
SE	4.	0.	0.	0.	0.	0.	4.
SSE	4.	0.	0.	0.	0.	0.	4.
S	1.	2.	0.	0.	0.	0.	3.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	1.	0.	0.	0.	0.	0.	1.
WSW	2.	0.	0.	0.	0.	0.	2.
W	3.	0.	0.	0.	0.	0.	3.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
VARIABLE							
Total	212.	27.	0.	0.	0.	0.	239.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: JUL-SEP 1984

STABILITY CLASS: G

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.	0.	0.	0.	0.	0.	0.
NNE	4.	0.	0.	0.	0.	0.	4.
NE	5.	0.	0.	0.	0.	0.	5.
ENE	2.	0.	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	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	0.	0.	0.	0.	0.	0.	0.
VARIABLE							
Total	11.	0.	0.	0.	0.	0.	11.
Periods of calm (hours):		0					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: A

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0.	19.	9.	0.	0.	0.	28.
NNE	0.	0.	2.	0.	0.	0.	2.
NE	0.	0.	1.	0.	0.	0.	1.
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	9.	5.	0.	0.	0.	0.	14.
SSE	14.	8.	0.	0.	0.	0.	22.
S	12.	16.	0.	0.	0.	0.	28.
SSW	4.	12.	0.	0.	0.	0.	16.
SW	1.	1.	0.	0.	0.	0.	2.
WSW	0.	3.	0.	0.	0.	0.	3.
W	1.	4.	2.	0.	0.	0.	7.
WNW	0.	3.	2.	0.	0.	0.	5.
NW	0.	4.	6.	0.	0.	0.	10.
NNW	0.	9.	4.	0.	0.	0.	13.
VARIABLE							
Total	41.	85.	26.	0.	0.	0.	152.

Periods of calm (hours): 0.

Hours of missing data: Total hours missing during the fourth quarter = 36

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: B

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4.	7.	5.	1.	0.	0.	17.
NNE	2.	5.	2.	0.	0.	0.	9.
NE	0.	2.	0.	0.	0.	0.	2.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	1.	0.	0.	0.	0.	1.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	3.	0.	0.	0.	0.	0.	3.
SSE	5.	1.	0.	0.	0.	0.	6.
S	4.	2.	0.	0.	0.	0.	6.
SSW	2.	0.	0.	0.	0.	0.	2.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	0.	0.	0.	0.	0.	0.
W	1.	4.	0.	0.	0.	0.	5.
WNW	0.	5.	1.	0.	0.	0.	6.
NW	1.	5.	6.	0.	0.	0.	12.
NNW	0.	4.	2.	1.	0.	0.	7.
VARIABLE							
Total	22.	36.	16.	2.	0.	0.	76.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: C

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1.	7.	0.	0.	0.	0.	8.
NNE	0.	16.	2.	0.	0.	0.	18.
NE	1.	2.	1.	0.	0.	0.	4.
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	5.	1.	0.	0.	0.	0.	6.
SSE	0.	1.	0.	0.	0.	0.	1.
S	3.	2.	0.	0.	0.	0.	5.
SSW	2.	3.	1.	0.	0.	0.	6.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	1.	0.	0.	0.	0.	0.	1.
W	3.	3.	0.	0.	0.	0.	6.
WNW	0.	7.	2.	0.	0.	0.	9.
NW	0.	2.	3.	0.	1.	0.	6.
NNW	2.	8.	5.	0.	0.	0.	15.
VARIABLE							
Total	19.	53.	14.	0.	1.	0.	87.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: D

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	32.	92.	26.	0.	0.	0.	150.
NNE	28.	124.	57.	0.	0.	0.	209.
NE	38.	39.	0.	0.	0.	0.	77.
ENE	34.	3.	0.	0.	0.	0.	37.
E	18.	2.	0.	0.	0.	0.	20.
ESE	19.	2.	0.	0.	0.	0.	21.
SE	10.	7.	0.	0.	0.	0.	17.
SSE	10.	14.	0.	0.	0.	0.	24.
S	10.	28.	2.	0.	0.	0.	40.
SSW	6.	7.	2.	0.	0.	0.	15.
SW	1.	3.	1.	0.	0.	0.	5.
WSW	2.	2.	0.	0.	0.	0.	4.
W	6.	22.	2.	0.	0.	0.	30.
WNW	5.	54.	28.	5.	0.	0.	92.
NW	4.	34.	23.	2.	0.	0.	63.
NNW	6.	50.	39.	1.	0.	0.	96.
VARIABLE							
Total	229.	483.	180.	8.	0.	0.	900.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: E

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	30.	12.	0.	0.	0.	0.	42.
NNE	65.	32.	4.	0.	0.	0.	101.
NE	107.	42.	1.	0.	0.	0.	150.
ENE	71.	5.	0.	0.	0.	0.	76.
E	32.	1.	0.	0.	0.	0.	33.
ESE	29.	1.	1.	0.	0.	0.	31.
SE	32.	5.	0.	0.	0.	0.	37.
SSE	28.	12.	0.	0.	0.	0.	40.
S	34.	26.	1.	0.	0.	0.	61.
SSW	10.	6.	1.	0.	0.	0.	17.
SW	4.	3.	0.	0.	0.	0.	7.
WSW	3.	2.	0.	0.	0.	0.	5.
W	9.	13.	1.	0.	0.	0.	23.
WNW	11.	18.	1.	0.	0.	0.	30.
NW	4.	8.	1.	0.	0.	0.	13.
NNW	11.	12.	0.	0.	0.	0.	23.
VARIABLE							
Total	480.	198.	11.	0.	0.	0.	689.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: F

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	8.	1.	0.	0.	0.	0.	9.
NNE	44.	9.	0.	0.	0.	0.	53.
NE	71.	40.	0.	0.	0.	0.	111.
ENE	15.	1.	0.	0.	0.	0.	16.
E	14.	0.	0.	0.	0.	0.	14.
ESE	10.	1.	0.	0.	0.	0.	11.
SE	5.	1.	0.	0.	0.	0.	6.
SSE	1.	0.	0.	0.	0.	0.	1.
S	2.	1.	0.	0.	0.	0.	3.
SSW	2.	2.	0.	0.	0.	0.	4.
SW	2.	0.	0.	0.	0.	0.	2.
WSW	1.	0.	0.	0.	0.	0.	1.
W	1.	0.	0.	0.	0.	0.	1.
WNW	1.	0.	0.	0.	0.	0.	1.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	1.	0.	0.	0.	0.	0.	1.
VARIABLE							
Total	178.	56.	0.	0.	0.	0.	234.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: OCT-DEC 1984

STABILITY CLASS: G

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1.	0.	0.	0.	0.	0.	1.
NNE	14.	2.	0.	0.	0.	0.	16.
NE	7.	8.	0.	0.	0.	0.	15.
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	0.	0.	0.	0.	0.	0.	0.
SSW	1.	0.	0.	0.	0.	0.	1.
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.
VARIABLE							
Total	24.	10.	0.	0.	0.	0.	34.
Periods of calm (hours):		0.					
Hours of missing data:							

[a] In the table, record the total number of hours of each category of wind direction for each calendar quarter. Provide similar tables separately for each atmospheric stability class and elevation.

EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

F - REPORTABLE CHANGES

TO THE PROCESS CONTROL PROGRAM (PCP),

OFFSITE DOSE CALCULATION MANUAL (ODCM),

AND RADIOACTIVE WASTE SYSTEMS

SECOND HALF - 1984

Reportable Changes

A. Process Control Program

For the period reported there were no changes made to the Process Control Program.

B. Offsite Dose Calculation Manual

1) The original ODCM approved by the NRC in their letter dated June 6, 1984 used an extreme conservatism factor of .157 in the calculation of the Noble Gas release rate. Subsequently, a more appropriate conservatism value of .8 was used consistent with other sections of the ODCM.

2) The listing titled "Indian Point Station - Location of Sampling Station Points " and attendant maps identifying the sample location were revised to be consistent with the Radiological Effluent Technical Specifications (RETS) of Appendix A to DPR-26 and to reflect the Sample designation included in the RETS.

C. Radioactive Waste Systems

For the period reported there were no major changes made to any of the radioactive waste systems.

The changes described above have been reviewed and found acceptable by the Station Nuclear Safety Committee. The Committee concurs that the changes will not reduce the accuracy or reliability of dose calculation or set point determination.

K_{eff} = 1.29×10^{-5} [mrem-m^3/ uCi-sec] (Ground Release)

K_{eff} = 8.18×10^{-6} [mrem-m^3/ uCi-sec (Elevated* Release)

Either of these values, as appropriate, may be used in conjunction with the total noble gas release rate (Q_i) to verify that the instantaneous dose rate is within the allowable limits. To compensate for any unexpected variability in the radionuclide distribution, a conservatism factor of 0.81 is introduced into the calculation. The simplified equation is

EQUATION 2.2.1-1 $$DR_{TB} = \frac{K_{eff} \ (\overline{X/Q})}{0.81} \sum_i Q_i$$

To further simplify the determination the highest calculated annual long term historic relative concentration for any of the 16 sectors, at or beyond the exclusion area boundary (2.08×10^{-5} sec/m^3, from Table M-1) may be substituted into the equation. Also the dose limit of 250 mrem/yr** = 7.925×10^{-6} mrem/sec may be substituted for DR_{TB}. Making these substitutions yields a single cumulative (or gross) noble gas release rate limit. This value is

Noble gas release rate limit = 2.392×10^4 uCi/sec

As long as the noble gas release rates do not exceed this value (2.392×10^4 uCi/sec), no additional dose rate calculations are needed to verify compliance with Technical Specification 3.9.B.1.a(i).

* NOTE: Nuclide distributions for elevated releases were determined from releases through the plant stack as reported in Regulatory Guide 1.21 reports for the years 1979, 1980, and 1981. However, ODCM dose projection calculations are performed using ground release meteorology in accordance with Consolidated Edison's original Appendix I submittal, Docket Nos. 50-3, 50-247, and 50-286.

**This dose limit of 250 mrem/yr is based upon a regulatory limit of 500 mrem/yr/site and the fact that the Indian Point Site has 2 operating units.

2.2.2 Setpoint Determination

To comply with Technical Specification 3.9.B.2.a, the alarm/trip setpoints are established to ensure that the noble gas releases do not exceed the value of 2.392×10^4 uCi/sec, which conservatively corresponds to a total body dose rate of 250 mrem/yr. The method that follows establishes a procedure for determining setpoints. To allow for multiple sources of releases from different or common release points, the allowable operating setpoints will be administratively controlled to allocate a percentage of the total allowable release to each of the release sources.

a) Determine the maximum volume release rate potential for the release source under consideration.

b) Based upon that release rate [FT^3/MIN or other units of Vol/Time] determine the equivalent activity concentration in [uCi/CC] that would produce a release of 2.392×10^4 uCi/sec

c) Referring to the calibration curve [uCi/CC vs. CPM] for the Release Source's Gaseous Effluent Monitor, determine the CPM value (c) corresponding to the value of activity concentration determined in step b).

d) (C) represents the 100% setpoint assuming no other release sources at the site at the time. To obtain an operational setpoint value SP take (C) in [CPM] and multiply it by the allocated percentage fraction.

EQUATION 2.2.2-1

$$SP = (C)\ CPM \times \frac{\%\ \text{allocated for particular release}}{100\%}$$

The total body dose is more limiting than the calculated skin dose. (See Appendix 'C' for a detailed evaluation.) Therefore, the skin dose rate calculations are not required if the simplified dose rate calculation is used (i.e. using K_{eff} to determine release rate limits).

The calculational processes of the following section (2.2.3) are to be used if the actual releases of noble gases exceed the predetermined limit of 2.392×10^4 uCi/sec.

Under these conditions, a nuclide-by-nuclide evaluation is required to evaluate compliance with the dose rate limits of Technical Specification 3.9.B.1.a(i).

2.2.3 Total Body and Skin Nuclide Specific Dose Rate Calculations

The methods described herein need only be used if the actual releases exceed the value of 2.392×10^4 uCi/sec.

Total Body Dose Rate

EQUATION 2.2.3-1 $DR_{TB} = DR_{TBi} = K_i \ (\overline{X/Q}) \ Q_i$

where

DR_{TB} Dose rate to the Total Body from all noble gas gamma radiation [mrem/sec].

DR_{TBi} Dose rate to the Total Body from the ith nuclide noble gas gamma radiation [mrem/sec].

K_i The Total Body dose factor due to gamma emissions from noble gas radionuclide 'i', mrem-m^3/ uCi-sec.

$\overline{X/Q}$ Value of CHI over Q [Sec/m^3] for the most limiting sector at the exclusion area boundary.

Q_i Release rate of the ith nuclide in [uCi/Sec].

Total Skin Dose Rate

EQUATION 2.2.3-2 $DR_{SKIN} = DR_{SKIN} = [Li + 1.1 \ Mi] \ (\overline{X/Q}) \ Qi$

where

DR_{SKIN} Dose rate to skin from all noble gas beta and gamma radiation [mRem/sec].

INDIAN POINT STATION - ENVIRONMENTAL SAMPLING STATION POINTS

Sample Station Points	RETS Designations	Location/Distance		Sample Types
2	A2	Standard Brands,	0.7 mi - NNE	Air Particulate
2	A2	Standard Brands,	0.7 mi - NNE	Radioiodine
2	___	Standard Brands,	0.7 mi - NNE	Direct Gamma
3	DR8	Service Center -	SSE	Direct Gamma
4	A1	Algonquin Gas Line,	0.25mi - SW	Air Particulate
4	A1	Algonquin Gas Line,	0.25mi - SW	Radioiodine
5	A4	NYU Tower -	0.8 mi - SSW	Air Particulate
5	A4	NYU Tower -	0.8 mi - SSW	Radioiodine
5	DR10	NYU Tower -	0.8 mi - SSW	Direct Gamma
5	Ic1	NYU Tower -	0.8 mi - SSW	Broadleaf Vegeta
5	___	NYU Tower -	0.8 mi - SSW	Soil
6	Ic2	Camp Smith -	2.5 mi - NNE	Broadleaf Vegeta
6	___	Camp Smith -	2.5 mi - NNE	Soil
7	Wb1	Camp Field Reservoir	3.5 mi - NE	Drinking Water
9	Wa1	Inlet pipe to plant-onsite	NE	Hudson River Wat
10	Wa2	Discharge Canal, onsite	SW	Hudson River Wat
10	___	Discharge Canal, onsite	SW	*H.R. Bottom Sedi Silt
14	DR7	Water Meter House-onsite	SE	Direct Gamma
17	___	Off Verplanck,	1 mi - SSW	*H.R. Aquatic Veg tion
17	___	Off Verplanck,	1 mi - SSW	*H.R. Bottom Sedi Silt
17	___	Off Verplanck,	1 mi - SSW	*H.R. Shoreline S
20	DR38	Montrose Marina,	1.6 mi - S	Direct Gamma
22	___	Lovett,	1.5 mi - WSW	Air Particulate
22	___	Lovett,	1.5 mi - WSW	Radioiodine
**23	A5	Roseton,	20 mi - N	Air Particulate
**23	A5	Roseton,	20 mi - N	Radioiodine
**23	DR40	Roseton,	20 mi - N	Direct Gamma
**23	Ic3	Roseton,	20 mi - N	Broadleaf Vegeta
**23	___	Roseton,	20 mi - N	Fallout

INDIAN POINT STATION - ENVIRONMENTAL SAMPLING STATION POINTS

Sample Station Points	RETS Designations	Location/Distance		Sample Types
25	___	Where available near site		Fish & Invertebra
27	___	Croton Point,	6.4 mi - SSE	Air Particulate
27		Croton Point,	6.4 mi - SSE	Radioiodine
27	DR24	Croton Point,	6.4 mi - SSE	Direct Gamma
28	DR4	Lents Cove,	0.5 mi - ENE	Direct Gamma
28	___	Lents cove,	0.5 mi - ENE	*H.R. Bottom Sedim Silt
28	___	Lents Cove,	0.5 mi - ENE	*H.R. Shoreline So
29	DR39	Grassy Point,	3.3 mi - SSW	Direct Gamma
29	___	Grassy Point,	3.3 mi - SSW	Air Particulate
29	___	Grassy Point,	3.3 mi - SSW	Radioiodine
33	DR33	Hamilton St.	3 mi - NE	Direct Gamma
34	DR9	SE Corner onsite,	0.6 mi - S	Direct Gamma
35	DR5	Bleakley Ave & Broadway,	0.4 mi - E	Direct Gamma
38	DR34	Furnace Dock Substation,	3.5 mi - SE	Direct Gamma
44	___	Peekskill Gas Holder,	1.7 mi - NE	Air Particulate
44	___	Peekskill Gas Holder,	1.7 mi - NE	Radioiodine
44	___	Peekskill Gas Holder,	1.7 mi - NE	Fallout
**50	Wc2	Manitou inlet,	4.5 mi - NNW	*H.R. Shoreline
53	Wc1	White Beach,	0.9 mi - SW	*H.R. Shoreline
53	DR11	White Beach,	0.9 mi - SW	Direct Gamma
56	DR37	Verplanck,	1.3 mi - SSW	Direct Gamma
57	A3	Cortlandt Sanitation Garage,	2 mi - N	Air Particulate
57	A3	Cortlandt Sanitation Garage,	2 mi - N	Radioiodine
57	DR1	Cortlandt Sanitation Garage,	2 mi - N	Direct Gamma
58	DR17	Route 9D Garrison	5 mi - N	Direct Gamma
59	DR2	Old Pemart Ave	1.8 mi - NNE	Direct Gamma

INDIAN POINT STATION - ENVIRONMENTAL SAMPLING STATION POINTS

Sample Station Points	RETS Designations	Location/Distance		Sample Types
60	DR18	Gallows Hill Rd,	5 mi - NNE	Direct Gamma
61	DR36	Lower South St & Bay St,	1.3 mi - NE	Direct Gamma
62	DR19	Westbrook Drive,	5 mi - NE	Direct Gamma
64	DR20	Pine Rd. Cortlandt,	4.8 mi - ENE	Direct Gamma
66	DR21	Croton Ave Cortlandt,	5 mi - E	Direct Gamma
67	DR22	Colabaugh Pond Rd Cortlandt,	5 mi - ESE	Direct Gamma
69	DR23	Mt. Airy Rd &Windsor Rd,	5 mi - SE	Direct Gamma
71	DR25	Warren Ave Haverstraw,	4.8 mi - S	Direct Gamma
72	DR26	Railroad Ave & Rt 9W Haverstraw,	4.6 mi - SSW	Direct Gamma
73	DR27	Willow Grove Rd & Birch Dr,	5 mi - SW	Direct Gamma
74	DR12	Gays Hill Rd South,	1.5 mi - WSW	Direct Gamma
75	DR28	Palisades Pkwy South Lake Welch Exit,	5 mi - WSW	Direct Gamma
76	DR13	Gays Hill Rd North,	1.2 mi - W	Direct Gamma
77	DR29	Palisades Pkway South 1 mi from gas station,	4.2 mi - W	Direct Gamma
78	DR14	Rt 9W @ Pirates Cove Rest.,	1.2 mi - WNW	Direct Gamma
79	DR30	Anthony Wayne Park Ent North,	4.5 mi - WNW	Direct Gamma
80	DR15	Rt 9W South of Ayers Rd,	1 mi - NW	Direct Gamma
81	DR31	Palisades Pkway South,	4.7 mi - NW	Direct Gamma
82	DR16	Ayers Rd,	0.9 mi - NNW	Direct Gamma
83	DR32	Rt 9W Fort Montgomery,	4.8 mi - NNW	Direct Gamma

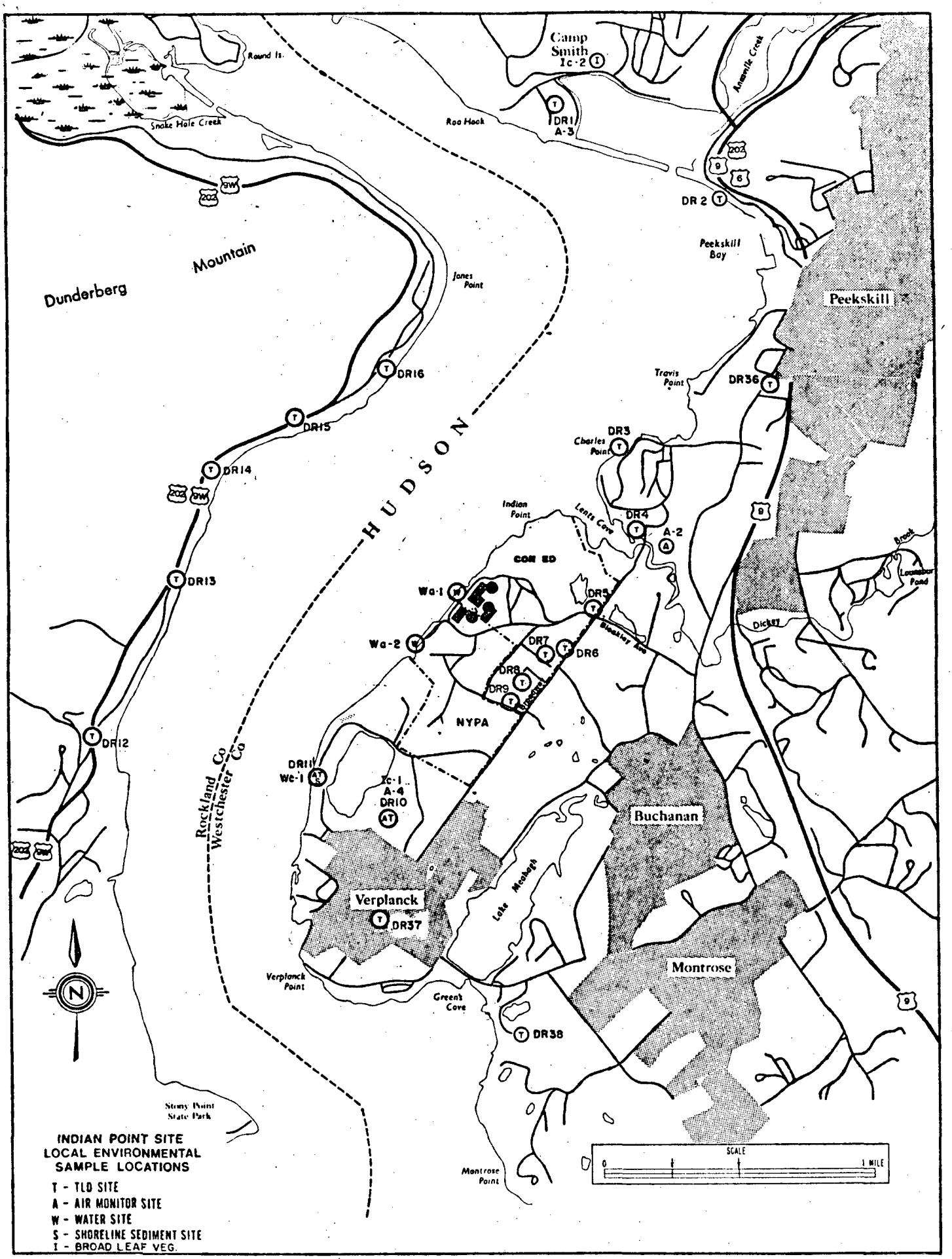
INDIAN POINT STATION - ENVIRONMENTAL SAMPLING STATION POINTS

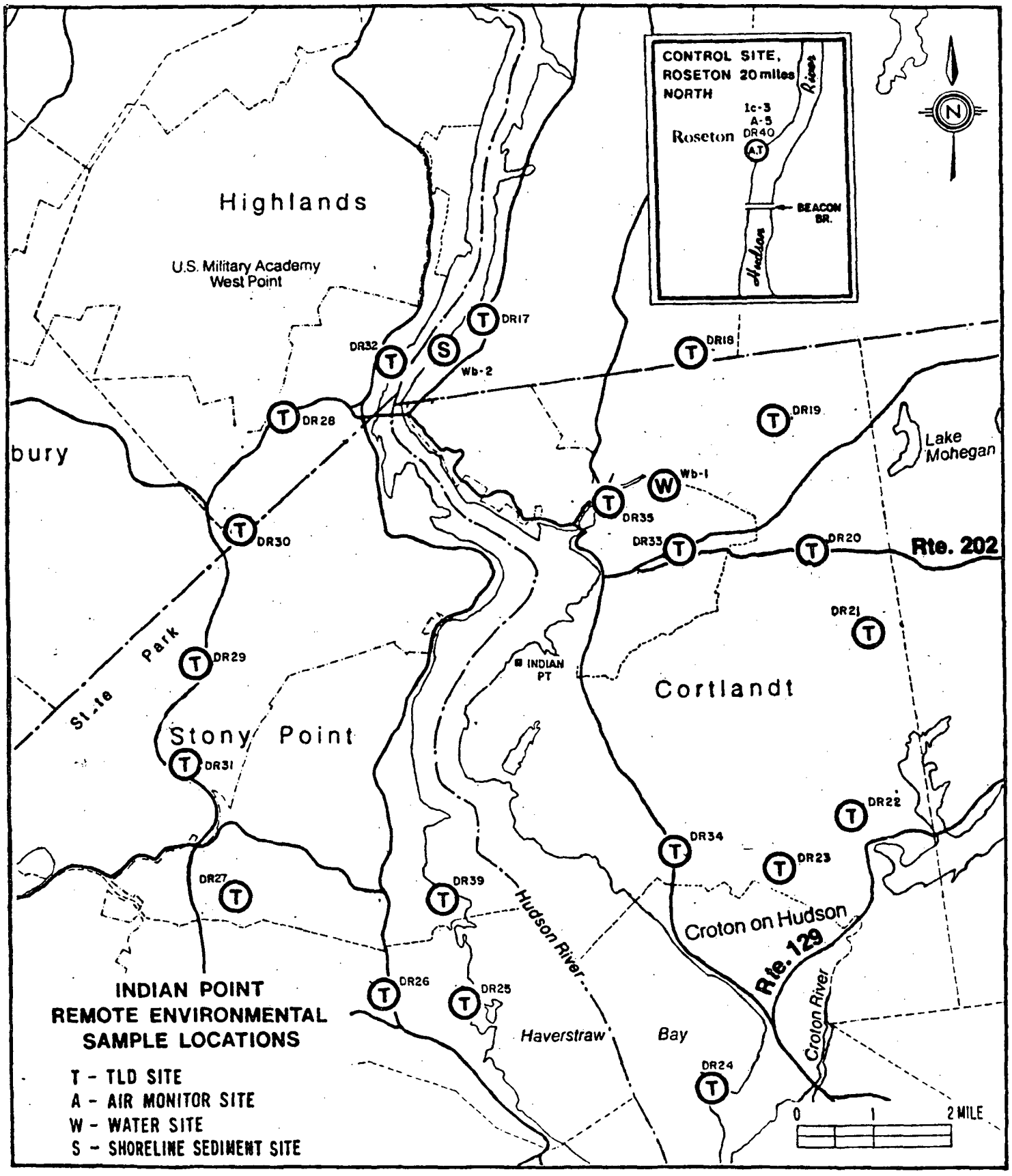
Sample Station Points	RETS Designations	Location/Distance		Sample Types
**84	___	Cold Spring,	10.8 mi - N	*H.R. Aquatic Vegetation
**84	___	Cold Spring,	10.8 mi - N	*H.R. Shoreline So
**84		Cold Spring,	10.8 mi - N	*H.R. Bottom Sedin Silt
85	___	Quality Control,		Drinking Water
88	DR6	Sector 6 Reuter Stokes Pole, Broadway, Buchanan	0.5 mi - ESE	Direct Gamma
89	DR35	Highland Ave & Sprout Brook Rd,	3 mi - NNE	Direct Gamma
90	DR3	Charles Point	0.8 mi - NE	Direct Gamma

* H.R. Denotes Hudson River

** Control Station

___ Denotes sampling being done in addition to minimum requirements specified in the RETS & ODCM.


Camp Smith
Ic-2
Round Is.
Snake Hole Creek
Roa Hook
DR1
A-3
Annsville Creek
202
9W
9
6
DR 2
Peekskill Bay
Peekskill
Dunderberg
Mountain
Jones Point
DR16
DR15
DR14
DR13
DR12
HUDSON
Travis Point
DR36
DR3
Charles Point
Indian Point
Lents Cove
DR4
A-2
CON ED
Wa-1
Wa-2
DR5
Blustery Ave
DR7
DR6
DR8
DR9
Dickey
Brook
Lounsbury Pond
NYPA
DR11
We-1
Ic-1
A-4
DR10
Rockland Co
Westchester Co
Buchanan
Verplanck
DR37
Lake Meahagh
Montrose
Verplanck Point
Green's Cove
DR38
Stony Point State Park
Montrose Point
N
SCALE
0
1 MILE
INDIAN POINT SITE
LOCAL ENVIRONMENTAL
SAMPLE LOCATIONS
T - TLD SITE
A - AIR MONITOR SITE
W - WATER SITE
S - SHORELINE SEDIMENT SITE
I - BROAD LEAF VEG.


CONTROL SITE, ROSETON 20 miles NORTH
Roseton
Ic-3
A-5
DR40
A,T
BEACON BR.
Hudson
Rivers
N
Highlands
U.S. Military Academy West Point
DR17
DR32
Wb-2
DR18
DR28
DR19
Lake Mohegan
bury
Wb-1
DR35
DR30
DR33
DR20
Rte. 202
DR21
State Park
DR29
INDIAN PT
Cortlandt
Stony Point
DR31
DR22
DR34
DR23
DR27
DR39
Hudson River
Croton on Hudson
Rte. 129
DR26
DR25
Croton River
Haverstraw Bay
DR24
0
1
2 MILE
INDIAN POINT
REMOTE ENVIRONMENTAL
SAMPLE LOCATIONS
T - TLD SITE
A - AIR MONITOR SITE
W - WATER SITE
S - SHORELINE SEDIMENT SITE

John D. O'Toole
[illegible]

[illegible] Edison Company of New York, Inc.
4 Irving Place, New York, NY 10003
Telephone (212) 460-[illegible]

March 13, 1985

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-3 and 50-247

Dr. Thomas E. Murley, Regional Administrator
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Dear Dr. Murley:

Enclosed is a copy of the Semi-Annual Effluent and Waste Disposal Report for the period July 1, 1984 through December 31, 1984.

Very truly yours,

John D. O'Toole

Encl.
cc: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Senior Resident Inspector
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