Effluent and Waste Disposal

Semi-Annual Report

January 1 - June 30, 1980

Facility Indian Point 3

Licensee Power Authority of the State of New York

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 percent of technical specification limit reported in Table 1A and the percent of applicable limit reported in Table 2A are the percent of one half of the quarterly limit 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 PASNY and Con Edison.

b&c. Iodines & Pariculates

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.

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 first and second 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:

1st Quarter:	E = 1.35 E-1 MeV/dis	EB = 2.23 E-1 MeV/dis
2nd Quarter:	E = 6.87 E-2 MeV/dis	EB = 1.65 E-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 ventilation 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. 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 by this route. The batch and containment ventilation releases are then used to determine continuous 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 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 is taken and an isotopic analysis is performed in compliance with requirements specified in Table 2.4-1 of the ETSR. 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. Additional Information

Although there were no abnormal releases as defined in the Environmental Technical Specifications 2.4.2.f. during the reporting period, there were three unplanned gaseous releases totalling 2.09 curies of noble gases.

The reported Fe-55 and Ni-63 activities in continuous liquid discharges are suspected to be much higher than actual because of possible analytical problems. These higher reported values were used to determine the radiological impact on man. The resulting doses were well below 10CFR50 Appendix I limits. This problem is being investigated and will be corrected in subsequent reports, if necessary.

6. Batch Releases

a. Liquid (1)

	1980	
	1st Quarter	2nd Quarter
Number of Batch Releases	15	41
Total Time Period Batch Releases (Min.)	2788	10277
Maximum " " " " "	460	540
Average " " " " "	185.9	250.7
Minimum " " " " "	82	100
Average Stream Flow (cfs)	-	-

b. Gaseous

Number of Batch Releases	29	37
Total Time Period Batch Releases	4280	5995
Maximum " " " "	240	290
Average " " " "	147.6	162
Minimum " " " "	31	70

7. Abnormal Releases

a. Liquid
None

b. Gaseous
None

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B. Gaseous Effluents
First and Second
Quarters, 1980

TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (YEAR) 1980

GASEOUS EFFLUENTS—SUMMATION OF ALL RELEASES

	Unit	Quarter 1st	Quarter 2nd	Est. Total Error, %
A. Fission & activation gases				
1. Total release	Ci	2.00 E+1	6.00 E+1	2.5 E+1
2. Average release rate for period	μCi/sec	2.40 E0	7.63 E0	
3. Percent of Technical specification limit	%	1.14 E-1	2.34 E-1	
B. Iodines				
1. Total iodine-131	Ci	3.23 E-4	5.02 E-4	2.5 E+1
2. Average release rate for period	μCi/sec	4.11 E-5	6.38 E-5	
3. Percent of technical specification limit	%	7.06 E-2	5.64 E-2	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	7.37 E-4	5.88 E-4	2.5 E+1
2. Average release rate for period	μCi/sec	9.37 E-5	7.48 E-5	
3. Percent of technical specification limit	%	7.06 E-2	5.64 E-2	
4. Gross alpha radioactivity	Ci	<1.66 E-7	<1.35 E-7	
D. Tritium				
1. Total release	Ci	1.67 E-3	2.16 E-3	2.5 E+1
2. Average release rate for period	μCi/sec	2.12 E-4	2.75 E-4	
3. Percent of technical specification limit	%	E	E	

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR) 1980

GASEOUS EFFLUENTS—GROUND-LEVEL RELEASES

Nuclides Released	Unit	CONTINUOUS MODE 1st Quarter	CONTINUOUS MODE 2nd Quarter	BATCH MODE 1st Quarter	BATCH MODE 2nd Quarter
1. Fission gases					
krypton-85	Ci	2.30 E-2	5.24 E-2	1.72 E-2	7.63 E-1
krypton-85m	Ci	1.01 E+1	3.78 E-1	3.42 E-2	1.20 E-1
krypton-87	Ci	. E	. E	4.63 E-3	9.20 E-2
krypton-88	Ci	. E	. E	2.08 E-2	1.69 E-1
xenon-133	Ci	3.48 E0	7.90 E0	2.60 E0	4.46 E+1
xenon-135	Ci	2.63 E0	2.08 E0	5.41 E-1	1.54 E0
xenon-135m	Ci	. E	. E	2.34 E-4	0.00 E0
xenon-138	Ci	. E	. E	. E	2.56 E-1
Others (specify)	Ci	. E	. E	. E	. E
Xe-131m	Ci	. E	. E	5.70 E-2	1.58 E0
Xe-133m	Ci	4.01 E-1	. E	7.40 E-2	4.47 E-1
unidentified	Ci	. E	. E	. E	. E
Total for period	Ci	1.66 E+1	1.04 E+1	3.35 E0	4.96 E+1
2. Iodines					
iodine-131	Ci	3.23 E-4	5.02 E-4	. E	. E
iodine-133	Ci	. E	3.46 E-4	. E	. E
iodine-135	Ci	. E	. E	. E	. E
Total for period	Ci	3.23 E-4	8.48 E-4	. E	. E
3. Particulates					
strontium-89	Ci	1.08 E-6	2.69 E-6	. E	. E
strontium-90	Ci	1.20 E-7	6.06 E-7	. E	. E
cesium-134	Ci	1.03 E-5	1.90 E-7	. E	. E
cesium-137	Ci	2.35 E-5	4.61 E-6	. E	. E
barium-lanthanum-140	Ci	. E	. E	. E	. E
phosphorus - 32	Ci	3.22 E-7	7.81 E-7	. E	. E
nickel 63	Ci	2.09 E-5	5.56 E-5	. E	. E
iron 55	Ci	2.25 E-4	1.16 E-5	. E	. E
unidentified	Ci	. E	. E	. E	. E
cobalt - 58	Ci	4.94E-5	4.85E-7		
cobalt - 60	Ci	5.94E-5	1.30E+6		
manganese - 54	Ci	1.07E-5	6.18E-7		
cobalt - 57	Ci	1.32E-6	1.74E-7		
cerium - 141	Ci	4.35E-7	7.69E-7		
cerium - 144	Ci	1.36E-6	1.89E-7		
neptunium - 239	Ci	1.21E-6	4.20E-6		
antomony - 122	Ci	1.91E-6			
cerium - 139	Ci	6.10E-7			
tin - 113	Ci	9.42E-7			
chromium - 51	Ci	4.59E-6			
barium - 138	Ci	1.04E-6			
technicium 99m	Ci		2.37E-7		
cadmium -109	Ci		3.62E-6		
barium - 133	Ci		5.58E-7		
strontion - 85	Ci		6.98E-7		

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C. Liquid Efluents
First and Second
Quarters, 1980

TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR) 1980

LIQUID EFFLUENTS–SUMMATION OF ALL RELEASES

	Unit	Quarter 1st	Quarter 2nd	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	4.06 E-1	8.80 E-1	2.5 E+1
2. Average diluted concentration during period	μCi/ml	2.82 E-9	2.87 E-9	
3. Percent of applicable limit	%	3.74 E-2	3.13 E-2	
B. Tritium				
1. Total release	Ci	4.89 E+1	1.19 E+2	2.5 E+1
2. Average diluted concentration during period	μCi/ml	3.40 E-7	3.88 E-7	
3. Percent of applicable limit	%	1.13 E-2	1.29 E-2	
C. Dissolved and entrained gases				
1. Total release	Ci	6.35 E-2	1.00 E0	2.5 E+1
2. Average diluted concentration during period	μCi/ml	4.41 E-10	3.26 E-9	
3. Percent of applicable limit	%	1.73 E-5	1.28 E-4	
D. Gross alpha radioactivity				
1. Total release	Ci	<1.60 E-4	<5.58 E-4	2.5 E+1
E. Volume of waste released (prior to dilution)	liters	5.30 E+7	4.19 E+7	1.0 E+1
F. Volume of dilution water used during period	liters	1.44 E+11	3.07 E+11	1.0 E+1

TABLE 2B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR) 1980

LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE 1st Quarter	CONTINUOUS MODE 2nd Quarter	BATCH MODE 1st Quarter	BATCH MODE 2nd Quarter
strontium-89	Ci	. E	. E	1.54 E-4	2.50 E-4
strontium-90	Ci	2.34 E-3	. E	9.63 E-4	3.89 E-4
cesium-134	Ci	1.94 E-3	. E	1.79 E-2	2.44 E-2
cesium-137	Ci	3.14 E-3	. E	5.00 E-2	5.74 E-2
iodine-131	Ci	. E	. E	1.35 E-2	2.33 E-2
cobalt-58	Ci	1.56 E-3	. E	3.05 E-4	1.83 E-1
cobalt-60	Ci	1.87 E-3	. E	3.31 E-2	2.82 E-2
iron-59	Ci	. E	. E	5.85 E-4	1.88 E-3
zinc-65	Ci	. E	. E	7.36 E-4	5.80 E-4
manganese-54	Ci	1.60 E-3	. E	5.62 E-3	6.63 E-3
chromium-51	Ci	. E	. E	5.46 E-3	2.66 E-2
zirconium-niobium-95	Ci	. E	. E	2.97 E-3	5.76 E-3
molybdenum-99	Ci	. E	. E	2.63 E-3	1.48 E-3
technetium-99m	Ci	. E	. E	3.70 E-4	4.61 E-4
barium-lanthanum-140	Ci	. E	. E	3.02 E-3	3.66 E-3
cerium-141	Ci	4.92 E-4	. E	7.61 E-4	4.23 E-4
tin 113	Ci	. E	. E	3.91 E-5	3.43 E-4
sodium 24	Ci	. E	. E	9.00 E-6	6.02 E-5
iron 55	Ci	1.44 E-1	3.71 E-1	3.35 E-2	6.66 E-2
nickel 63	Ci	2.53 E-1	2.74 E-2	1.42 E-2	7.25 E-3
	Ci	. E	. E	. E	. E
unidentified	Ci	0.00 E0	0.00 E0	0.00 E0	0.00 E0
Total for period (above)	Ci	1.84 E-1	3.99 E-1	2.22 E-1	4.81 E-1
xenon-133	Ci	. E	. E	5.91 E-2	9.70 E-1
xenon-135	Ci	. E	. E	4.35 E-3	2.99 E-2
manganese 56	Ci			8.51E-5	7.12E-6
cobalt 57	Ci		1.06E-4	1.37E-4	4.23E-4
antimony 122	Ci	2.97E-4		9.80E-5	1.09E-3
antimony 124	Ci			2.72E-4	4.84E-4
antimony 125	Ci			1.16E-3	2.49E-3
silver 110m	Ci			2.27E-4	1.24E-3
niogium 97	Ci			3.47E-4	1.82E-3
tungsten 187	Ci			1.25E-4	3.79E-4
ruthenium 103	Ci			3.89E-5	4.19E-5
phosphorus 32	Ci			3.58E-3	1.05E-2
cerium 144	Ci	8.61E-4			5.23E-5
cerium 139	Ci	5.29E-4			4.13E-5
barium 133	Ci				2.66E-5
iodine 134	Ci				3.60E-5
rhodium 106	Ci				2.65E-4
cesium 136	Ci				7.64E-5
strontium 85	Ci				5.00E-5
rubidium 88	Ci				1.64E-2
iodine 132	Ci				4.18E-4
iodine 135	Ci				9.56E-4
yttrium 88	Ci				1.63E-3
strontium 92	Ci				6.96E-5

TABLE 2B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (YEAR) 1980

LIQUID EFFLUENTS

		CONTINUOUS MODE		BATCH MODE	
Nuclides Released	Unit	Quarter	Quarter	Quarter	2nd Quarter
strontium-89	Ci	. E	. E	. E	. E
strontium-90	Ci	. E	. E	. E	. E
cesium-134	Ci	. E	. E	. E	. E
cesium-137	Ci	. E	. E	. E	. E
iodine-131	Ci	. E	. E	. E	. E
cobalt-58	Ci	. E	. E	. E	. E
cobalt-60	Ci	. E	. E	. E	. E
iron-59	Ci	. E	. E	. E	. E
zinc-65	Ci	. E	. E	. E	. E
manganese-54	Ci	. E	. E	. E	. E
chromium-51	Ci	. E	. E	. E	. E
zirconium-niobium-95	Ci	. E	. E	. E	. E
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
iodine 133	Ci	. E	. E	. E	4.24 E-3
cesium 138	Ci	. E	. E	. E	8.17 E-5
mercury 208	Ci	. E	. E	. E	3.71 E-6
mercury 203	Ci	. E	. E	. E	7.34 E-6
yttrium 91m	Ci	. E	. E	. E	1.46 E-5
unidentified	Ci	. E	. E	. E	. E
Total for period (above)	Ci	. E	. E	. E	. E
xenon-133	Ci	. E	. E	. E	. E
xenon-135	Ci	. E	. E	. E	. E

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D. Solid Waste
First and Second
Quarters, 1980

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1980)

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	9.77 E0 4.54 E0	1.0 E+2
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	2.08 E+2 3.53 E0	1.0 E+2
c. Irradiated components, control rods, etc.	m^3 Ci	. E . E	. E
d. Other (describe) Filter cartridges	m^3 Ci	2.12 E-1 4.7 E-2	1.0 E+2

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

a.	Cobalt-58	%	3.3 E+1
	Cobalt-60	%	3.1 E+1
	Cesium-137	%	1.6 E+1
b.	Cobalt-60	%	5.0 E+1
	Cobalt-58	%	2.5 E+1
	Cesium-137	%	1.2 E+1
c.		%	. E
		%	. E
		%	. E
d.	Cobalt-58	%	5.0 E+1
	Cobalt-60	%	1.7 E+1
	Cesium-137	%	1.7 E+1

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
9	Truck	Barnwell, South Carolina
1	Truck	Beatty, Nevada

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination

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E. Radiological Impact
On Man
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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. Noble gas release 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.

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 Unit 3

RADIOLOGICAL IMPACT ON MAN

(Reference regulatory guide 1.21, page 12)

A. Maximum Individual Doses

Pathways (Gaseous)	Total Body (mr)	Skin (mr)	Thyroid (mr)	Bone (mr)
Noble Gas Immersion				
a) Batch Releases	1.35×10^{-2}	2.45×10^{-2}	-	-
b) Continuous Releases	5.20×10^{-3}	1.35×10^{-2}	-	-
Inhalation*	4.63×10^{-3}	-	7.56×10^{-3}	2.31×10^{-2}
Ground Deposition	5.92×10^{-4}	6.96×10^{-4}	-	-
Milk Ingestion*	4.19×10^{-3}	-	4.52×10^{-3}	1.96×10^{-2}
Meat Ingestion***	6.43×10^{-4}	-	6.44×10^{-4}	3.21×10^{-3}
Vegetable Ingestion***	2.11×10^{-2}	-	2.57×10^{-2}	1.06×10^{-1}

* Infants are critical age group
** Adults are critical age group
*** Children are critical age group

Pathways (Liquid)

All — See Attached "LADTAP" printout Attachment I

B. Population Doses

Pathways (Gaseous)	Total Body (man-rem)	Thyroid (man-thyroid rem)
Noble Gas Immersion		
a) Batch Release	.130	-
b) Continuous Release	.218	-
Inhalation	.131	.222
Ground Deposition	1.454×10^{-2}	-
Totals	.494	.222

Pathways (Liquid)

All — See attached "LADTAP" printout Attachment I

C. Average Doses to Individuals

1. Liquid-Total Body
   1.42×10^{-4} mr

2. Gaseous-Total Body
   2.60×10^{-5} mr

* * * AS LOW AS REASONABLY ACHIEVABLE * * *

ADULT DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.56E+00	2.71E-01	1.78E-01	5.64E-03	5.78E-02	3.02E-02	1.71E-01
INVERTEBRATE		9.09E-02	8.68E-02	2.58E-02	4.66E-04	3.13E-03	8.41E-02	6.15E-02
ALGAE		3.48E-06	2.83E-07	1.68E-07	7.07E-09	8.23E-09	5.81E-08	4.15E-07
DRINKING		1.43E-12	1.49E-12	1.20E-12	1.86E-12	7.38E-13	1.18E-12	9.68E-13
SHORELINE	1.10E-03	9.38E-04	9.38E-04	9.38E-04	9.38E-04	9.38E-04	9.38E-04	9.38E-04
SWIMMING	0.0	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05
BOATING	0.0	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05
TOTAL	1.10E-03	1.65E+00	3.59E-01	2.04E-01	7.07E-03	6.19E-02	1.15E-01	2.33E-01

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	5.0	25.00
INVERTEBRATE	5.0	5.0	25.00
ALGAE	0.0	5.0	25.00
DRINKING	0.0	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=0.2

TEENAGER DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.22E+00	2.48E-01	1.10E-01	4.93E-03	4.41E-02	3.08E-02	1.30E-01
INVERTEBRATE		7.05E-02	6.65E-02	1.96E-02	4.05E-04	2.38E-03	6.40E-02	4.66E-02
ALGAE		3.50E-06	2.89E-07	1.68E-07	8.23E-09	8.23E-09	5.93E-08	4.15E-07
DRINKING		1.80E-12	1.50E-12	1.08E-12	1.95E-12	7.38E-13	1.08E-12	8.29E-13
SHORELINE	1.47E-03	1.26E-03	1.26E-03	1.26E-03	1.26E-03	1.26E-03	1.26E-03	1.26E-03
SWIMMING	0.0	2.38E-05	2.38E-05	2.38E-05	2.38E-05	2.38E-05	2.38E-05	2.38E-05
BOATING	0.0	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05
TOTAL	1.47E-03	1.29E+00	3.16E-01	1.31E-01	6.68E-03	4.77E-02	9.61E-02	1.78E-01

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	5.0	25.00
INVERTEBRATE	3.8	5.0	25.00
ALGAE	0.0	5.0	25.00
DRINKING	0.0	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=0.2

CHILD DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		6.21E-01	1.86E-01	4.50E-02	5.14E-03	1.90E-02	2.14E-02	5.58E-02
INVERTEBRATE		3.39E-02	3.07E-02	9.15E-03	4.31E-04	1.07E-03	2.87E-02	2.08E-02
ALGAE		3.56E-03	3.18E-04	1.76E-04	1.97E-05	8.23E-06	6.23E-05	4.15E-04
DRINKING		3.17E-09	2.51E-09	1.69E-09	4.43E-09	7.38E-10	1.57E-09	1.24E-09
SHORELINE	3.08E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04	2.63E-04
SWIMMING	0.0	5.95E-06	5.95E-06	5.95E-06	5.95E-06	5.95E-06	5.95E-06	5.95E-06
BOATING	0.0	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05	1.19E-05
TOTAL	3.08E-04	6.59E-01	2.17E-01	5.46E-02	5.87E-03	2.04E-02	5.05E-02	7.73E-02

②

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
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

SHOREWIDTH FACTOR=0.2

INFANT DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		5.65E-02	2.87E-02	3.15E-03	8.94E-04	1.38E-03	3.40E-03	4.05E-03
INVERTEBRATE		2.19E-03	1.96E-03	5.64E-04	6.04E-05	6.27E-05	1.71E-03	1.22E-03
ALGAE		3.66E-06	3.95E-07	1.86E-07	4.75E-08	8.23E-09	7.16E-08	4.15E-07
DRINKING		5.11E-12	4.52E-12	2.38E-12	9.88E-13	7.38E-13	2.22E-12	1.69E-12
SHORELINE	6.60E-05	5.63E-05	5.63E-05	5.63E-05	5.63E-05	5.63E-05	5.63E-05	5.63E-05
SWIMMING	0.0	2.38E-12	2.38E-12	2.38E-12	2.38E-12	2.38E-12	2.38E-12	2.38E-12
BOATING	0.0	5.95E-08	5.95E-08	5.95E-08	5.95E-08	5.95E-08	5.95E-08	5.95E-08
TOTAL	6.60E-05	5.88E-02	3.07E-02	3.77E-03	1.01E-03	1.50E-03	5.17E-03	5.32E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
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

SHOREWIDTH FACTOR=0.2

* * * SELECTED LOCATION * * *

LOCATION IS DOWNSTREAM

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		1.10E+00	1.93E-01	1.26E-01	3.[illegible]E-03	4.13E-02	2.16E-02	1.20E-01
INVERTEBRATE		6.43E-02	6.20E-02	1.84E-02	3.[illegible]E-04	2.24E-03	6.01E-02	4.39E-02
ALGAE		2.45E-06	2.00E-07	1.19E-07	4.[illegible]E-09	5.88E-09	4.15E-08	2.93E-07
DRINKING		1.03E-10	1.07E-10	8.62E-11	1.71E-10	5.30E-11	8.47E-11	6.97E-11
SHORELINE	7.85E-04	6.70E-04	6.70E-04	6.70E-04	6.7[illegible]E-04	6.70E-04	6.70E-04	6.70E-04
SWIMMING	0.0	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06
BOATING	0.0	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06
TOTAL	7.85E-04	1.17E+00	2.55E-01	1.45E-01	4.9[illegible]E-03	4.42E-02	8.23E-02	1.65E-01

	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

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		8.61E-01	1.77E-01	7.84E-02	3.47E-03	3.15E-02	2.20E-02	9.15E-02
INVERTEBRATE		4.99E-02	4.74E-02	1.40E-02	2.6[illegible]E-04	1.70E-03	4.57E-02	3.32E-02
ALGAE		2.47E-06	2.05E-07	1.19E-07	5.7[illegible]E-09	5.88E-09	4.24E-08	2.93E-07
DRINKING		1.30E-10	1.07E-10	7.71E-11	1.8[illegible]E-10	5.30E-11	7.76E-11	5.97E-11
SHORELINE	1.05E-03	8.98E-04	8.98E-04	8.98E-04	8.[illegible]E-04	8.98E-04	8.98E-04	8.98E-04
SWIMMING	0.0	1.68E-05	1.68E-05	1.68E-05	1.6[illegible]E-05	1.68E-05	1.68E-05	1.68E-05
BOATING	0.0	8.42E-06	8.42E-06	8.42E-06	8.4[illegible]E-06	8.42E-06	8.42E-06	8.42E-06
TOTAL	1.05E-03	9.12E-01	2.25E-01	9.33E-02	4.6[illegible]E-03	3.41E-02	6.86E-02	1.26E-01

	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

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		4.40E-01	1.32E-01	3.20E-02	3.5[illegible]E-03	1.36E-02	1.53E-02	3.94E-02
INVERTEBRATE		2.40E-02	2.19E-02	6.53E-03	3.0[illegible]E-04	7.61E-04	2.05E-02	1.48E-02

ALGAE		2.52E-03	2.25E-04	1.25E-04	1.37E-05	5.88E-06	4.45E-05	2.93E-04
DRINKING		2.28E-07	1.80E-07	1.21E-07	4.24E-07	5.30E-08	1.12E-07	8.91E-08
SHORELINE	2.20E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04	1.88E-04
SWIMMING	0.0	4.21E-06	4.21E-06	4.21E-06	4.21E-06	4.21E-06	4.21E-06	4.21E-06
BOATING	0.0	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06	8.42E-06
TOTAL	2.20E-04	4.67E-01	1.55E-01	3.80E-02	4.10E-03	1.45E-02	3.60E-02	5.47E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
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

SHOREWIDTH FACTOR=0.2

LOCATION IS DOWNSTREAM

INFANT DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		4.01E-02	2.05E-02	2.24E-03	6.23E-04	9.84E-04	2.43E-03	2.86E-03
INVERTEBRATE		1.55E-03	1.40E-03	4.02E-04	4.22E-05	4.47E-05	1.22E-03	8.71E-04
ALGAE		2.59E-06	2.80E-07	1.32E-07	3.31E-08	5.88E-09	5.11E-08	2.93E-07
DRINKING		3.67E-10	3.24E-10	1.71E-10	9.65E-10	5.30E-11	1.59E-10	1.21E-10
SHORELINE	4.71E-05	4.02E-05	4.02E-05	4.02E-05	4.02E-05	4.02E-05	4.02E-05	4.02E-05
SWIMMING	0.0	1.68E-12	1.68E-12	1.68E-12	1.68E-12	1.68E-12	1.68E-12	1.68E-12
BOATING	0.0	4.21E-08	4.21E-08	4.21E-08	4.21E-08	4.21E-08	4.21E-08	4.21E-08
TOTAL	4.71E-05	4.17E-02	2.19E-02	2.68E-03	7.06E-04	1.07E-03	3.69E-03	3.77E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
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

SHOREWIDTH FACTOR=0.2

* * * FISH CONSUMPTION POPULATION DOSE * * *
MAN-REM

SPORTFISH HARVEST

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	ADULT	7.24E+04	2.91E+00	6.01E-01	3.96E-01	8.18E-03	1.40E-01	7.29E-02	3.15E-01
FISH	TEENAGER	1.16E+04	4.80E-01	1.17E-01	5.06E-02	1.51E-03	2.24E-02	1.56E-02	5.02E-02
FISH	CHILD	7.00E+03	3.58E-01	1.27E-01	2.87E-02	2.17E-03	1.35E-02	1.52E-02	3.03E-02
FISH	TOTAL	9.10E+04	3.74E+00	8.45E-01	4.75E-01	1.19E-02	1.76E-01	1.04E-01	3.95E-01

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	

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

* * * FISH CONSUMPTION POPULATION DOSE * * *
MAN-REM

_____COMMERCIAL HARVEST_____

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	ADULT	8.65E+07	1.07E+01	2.43E+00	1.61E+00	2.68E-02	5.88E-01	3.06E-01	1.16E+00
FISH	TEENAGER	1.38E+07	1.78E+00	4.70E-01	2.04E-01	4.93E-03	9.40E-02	6.56E-02	1.84E-01
FISH	CHILD	8.36E+06	1.36E+00	5.24E-01	1.15E-01	7.08E-03	5.68E-02	6.39E-02	1.11E-01
FISH	TOTAL	1.09E+08	1.39E+01	3.44E+00	1.93E+00	3.88E-02	7.39E-01	4.36E-01	1.45E+00

DILUTION	CATCH	TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR	POPULATION=1.90E+07
7.00E+00	1.55E+05	2.40E+02	

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

_____NEPA DOSES_____

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	ADULT	1.23E+05	4.35E+00	9.85E-01	6.51E-01	1.09E-02	2.38E-01	1.24E-01	4.69E-01
FISH	TEENAGER	1.97E+04	7.21E-01	1.93E-01	8.24E-02	1.99E-03	3.80E-02	2.66E-02	7.46E-02
FISH	CHILD	1.19E+04	5.52E-01	2.12E-01	4.67E-02	2.87E-03	2.30E-02	2.59E-02	4.50E-02
FISH	TOTAL	1.55E+05	5.62E+00	1.39E+00	7.80E-01	1.57E-02	2.99E-01	1.76E-01	5.88E-01

(7)

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

SPORTFISH HARVEST

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	ADULT	7.94E+03	8.22E-02	9.51E-02	2.79E-02	3.19E-04	3.46E-03	9.34E-02	6.59E-02
INVER	TEENAGER	1.26E+03	1.34E-02	1.53E-02	4.44E-03	5.73E-05	5.50E-04	1.49E-02	1.05E-02
INVER	CHILD	7.94E+02	9.18E-03	9.92E-03	2.91E-03	8.50E-05	3.46E-04	9.39E-03	6.55E-03
INVER	TOTAL	1.00E+04	1.05E-01	1.20E-01	3.53E-02	4.61E-04	4.35E-03	1.18E-01	8.29E-02

DILUTION	CATCH	TIME(HR)
7.00E+00	1.00E+04	1.68E+02

INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR POPULATION=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
INVER	ADULT	1.25E+07	5.11E-02	6.48E-02	1.89E-02	1.74E-04	2.36E-05	6.40E-02	4.44E-02
INVER	TEENAGER	1.99E+06	8.35E-03	1.04E-02	3.01E-03	3.10E-05	3.75E-06	1.02E-02	7.05E-03
INVER	CHILD	1.25E+06	5.77E-03	6.76E-03	1.97E-03	4.58E-05	2.36E-05	6.43E-03	4.42E-03
INVER	TOTAL	1.58E+07	6.52E-02	8.20E-02	2.39E-02	2.50E-04	2.97E-05	8.06E-02	5.59E-02

DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=1.90E+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

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	ADULT	7.94E+02	7.44E-03	9.44E-03	2.76E-03	2.53E-05	3.44E-06	9.32E-03	6.47E-03
INVER	TEENAGER	1.26E+02	1.22E-03	1.51E-03	4.38E-04	4.51E-06	5.47E-07	1.49E-03	1.03E-03
INVER	CHILD	7.94E+01	8.40E-04	9.85E-04	2.88E-04	6.67E-06	3.44E-05	9.37E-04	6.44E-04
INVER	TOTAL	1.00E+03	9.50E-03	1.19E-02	3.48E-03	3.65E-05	4.33E-06	1.17E-02	8.14E-03

* * * POPULATION WATER CONSUMPTION DOSES * * *

----------DOSE (MAN-REM)----------

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	ADULT	2.44E+02	2.20E-08	3.90E-09	3.88E-09	1.20E-10	1.07E-09	4.36E-10	4.56E-10
DRINKING	TEENAGER	3.64E+01	3.71E-09	7.12E-10	5.76E-10	1.41E-11	1.60E-10	8.74E-11	7.73E-11
DRINKING	CHILD	5.20E+01	7.55E-09	1.90E-09	1.11E-09	3.86E-11	2.29E-10	2.33E-10	1.30E-10
DRINKING	TOTAL	3.33E+02	3.33E-08	6.52E-09	5.56E-09	1.72E-10	1.46E-09	7.56E-10	6.64E-10

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	3.33E-08	6.52E-09	5.56E-09	1.72E-10	1.46E-09	7.56E-10	6.64E-10

_____HYDROSPHERE TRITIUM DOSE_____

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
WATER	TOTAL	2.20E+00	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03	1.76E-03

* * * RECREATION POPULATION DOSES * * *

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	2.61E-01	2.22E-01	2.22E-01

LOCATION- DOWNSTREAM

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

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.0	2.80E-03	2.80E-03

LOCATION- DOWNSTREAM

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

DOSE(MAN-REM)

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.0	1.40E-03	1.40E-03

LOCATION- DOWNSTREAM

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

* * * DOSE TO BIOTA * * *

MRADS PER YEAR

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

	INTERNAL	EXTERNAL	TOTAL
FISH	3.72E+00	5.89E-01	4.30E+00
INVERTEBRATE	1.03E+00	1.18E+00	2.21E+00
ALGAE	1.74E+01	1.48E-03	1.74E+01
MUSKRAT	3.05E+01	3.92E-01	3.09E+01
RACCOON	1.49E+00	2.94E-01	1.78E+00
HERON	1.54E+01	3.92E-01	1.58E+01
DUCK	3.03E+01	5.88E-01	3.09E+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
1H 3	1.68E+02	1.86E-03	1.86E-03	1.11E-05	1.11E-05
38SR 89	4.04E-04	1.23E-05	6.50E-09	3.05E-02	1.61E-05
38SR 90	3.69E-03	2.33E-02	6.24E-09	6.31E+00	1.69E-06
55CS 134	2.23E-02	4.56E-01	1.25E-02	2.04E+01	5.59E-01
55CS 137	1.11E-01	1.40E+00	9.23E-02	1.26E+01	8.32E-01
53I 131	3.68E-02	2.33E-04	4.97E-02	6.32E-03	1.35E+00
27CO 58	1.85E-01	8.47E-03	6.74E-03	4.58E-02	3.64E-02
27CO 60	6.32E-02	1.12E-01	1.10E-01	1.77E+00	1.75E+00
26FE 59	2.47E-03	2.30E-04	7.10E-05	9.30E-02	2.87E-02
30ZN 65	1.32E-03	1.94E-03	8.32E-05	1.47E+00	6.30E-02
25MN 54	1.39E-02	5.38E-03	1.61E-03	3.87E-01	1.16E-01
24CR 51	3.21E-02	1.88E-05	1.82E-05	5.87E-04	5.66E-04
40ZR 95	8.73E-03	2.17E-04	2.17E-04	2.49E-02	2.49E-02
42MO 99	4.11E-03	7.36E-06	7.06E-06	1.79E-03	1.72E-03
43TC 99M	8.31E-04	4.02E-07	4.02E-07	4.84E-04	4.84E-04
56BA 140	6.68E-03	2.79E-05	2.11E-05	4.18E-03	3.15E-03
58CE 141	1.68E-03	2.52E-06	2.52E-06	1.50E-03	1.50E-03
11NA 24	6.92E-05	1.46E-06	1.46E-06	2.11E-02	2.11E-02
26FE 55	6.15E-01	8.42E-02	1.23E-07	1.37E-01	2.00E-07
28NI 63	7.42E-02	2.94E-03	0.0	3.97E-02	0.0
25MN 56	9.22E-05	3.17E-07	3.17E-07	3.44E-03	3.44E-03
27CO 57	6.66E-04	1.15E-05	1.05E-05	1.72E-02	1.58E-02
51SB 124	7.56E-04	4.50E-05	4.49E-05	5.95E-02	5.94E-02
51SB 125	3.65E-03	6.86E-04	6.86E-04	1.88E-01	1.88E-01
47AG 110M	1.47E-03	4.32E-04	4.32E-04	2.94E-01	2.94E-01
41NB 97	2.17E-03	8.53E-07	8.53E-07	3.93E-04	3.93E-04
74W 187	5.04E-04	1.25E-06	1.25E-06	2.49E-03	2.48E-03
44RU 103	8.08E-05	9.45E-07	9.33E-07	1.17E-02	1.15E-02
15P 32	1.41E-02	5.91E-01	2.80E-07	4.19E+01	1.99E-05
58CE 144	9.13E-04	5.44E-06	5.34E-06	5.96E-03	5.85E-03
53I 134	3.60E-05	2.00E-08	2.00E-08	5.55E-04	5.55E-04
55CS 136	7.64E-05	1.53E-04	1.88E-06	2.00E+00	2.46E-02
37RB 88	1.64E-02	5.08E-09	5.08E-09	3.10E-07	3.10E-07
53I 132	4.18E-04	1.72E-06	1.72E-06	4.13E-03	4.13E-03
53I 135	9.56E-04	6.61E-06	6.61E-06	6.91E-03	6.91E-03
38SR 92	6.96E-05	2.05E-07	2.05E-07	2.95E-03	2.95E-03
53I 133	4.24E-03	1.19E-05	1.53E-05	2.80E-03	3.60E-03
55CS 138	8.17E-05	5.91E-09	5.91E-09	7.24E-05	7.24E-05
39Y 91M	1.46E-05	1.62E-09	1.62E-09	1.11E-04	1.11E-04
TOTAL		2.69E+00	2.77E-01		

Indian Point 3

Effluent and Waste Disposal

Semi - Annual Report

F. Meteorological Data
First and Second
Quarters, 1980

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1980

STABILITY CLASS: Pasquill Class A

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	11	15	0	0	0	26
NNE	1	22	6	0	0	0	29
NE	2	7	11	1	0	0	21
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	0	0	0	0	0	0	0
SSE	1	0	0	0	0	0	1
S	8	8	0	0	0	0	16
SSW	10	9	0	0	0	0	19
SW	7	7	0	0	0	0	14
WSW	0	0	1	0	0	0	1
W	0	4	0	0	0	0	4
WNW	1	0	0	0	0	0	1
NW	1	5	3	1	0	0	10
NNW	0	12	22	5	0	0	39
VARIABLE							
Total	31	86	58	7	0	0	182

Periods of calm (hours): 0

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class B

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	8	7	0	0	0	16
NNE	1	7	2	0	0	0	10
NE	0	11	7	1	0	0	19
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	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	1	1	0	0	0	0	2
SSW	1	1	0	0	0	0	2
SW	1	2	0	0	0	0	3
WSW	1	0	0	0	0	0	1
W	0	2	0	0	0	0	2
WNW	1	4	1	0	0	0	6
NW	0	12	2	1	0	0	15
NNW	1	7	9	5	0	0	22
VARIABLE							
Total	8	56	28	7	0	0	99

Periods of calm (hours): 0

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class C

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	10	9	0	0	0	23
NNE	3	13	2	0	0	0	18
NE	1	9	16	1	0	0	27
ENE	0	7	1	0	0	0	8
E	1	2	0	0	0	0	3
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	1	1	0	0	0	0	2
S	2	0	0	0	0	0	2
SSW	2	1	0	0	0	0	3
SW	4	2	0	0	0	0	6
WSW	0	1	0	0	0	0	1
W	2	1	0	0	0	0	3
WNW	0	1	0	0	0	0	1
NW	0	5	3	2	0	0	10
NNW	0	6	13	4	0	0	23
VARIABLE							
Total	20	59	44	7	0	0	130

Periods of calm (hours): 0

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class D

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	15	118	52	1	0	0	186
NNE	10	56	13	2	0	0	81
NE	12	101	74	20	0	0	207
ENE	11	33	5	1	0	0	50
E	7	7	0	0	0	0	14
ESE	3	1	0	0	0	0	4
SE	2	2	0	0	0	0	4
SSE	0	0	0	0	0	0	0
S	11	4	0	0	0	0	15
SSW	18	5	0	0	0	0	23
SW	14	14	5	0	0	0	33
WSW	10	6	0	0	0	0	16
W	16	9	0	0	0	0	25
WNW	9	23	2	0	0	0	34
NW	8	52	24	1	0	0	85
NNW	9	85	82	9	0	0	185
VARIABLE							
Total	155	516	257	34	0	0	962

Periods of calm (hours): 0

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class E

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	12	21	4	0	0	0	37
NNE	15	14	3	0	0	0	32
NE	32	41	12	10	0	0	95
ENE	28	23	1	0	0	0	52
E	24	7	0	0	0	0	31
ESE	7	0	0	0	0	0	7
SE	15	0	0	0	0	0	15
SSE	12	0	0	0	0	0	12
S	34	2	0	0	0	0	36
SSW	63	7	4	0	0	0	74
SW	42	11	4	0	0	0	57
WSW	31	3	0	0	0	0	34
W	32	1	1	0	0	0	34
WNW	14	6	0	0	0	0	20
NW	10	17	0	0	0	0	27
NNW	8	10	2	1	0	0	21
VARIABLE							
Total	379	163	31	11	0	0	584

Periods of calm (hours): 1

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class F

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	0	0	0	0	0	6
NNE	7	0	0	0	0	0	7
NE	10	2	0	0	0	0	12
ENE	12	0	0	0	0	0	12
E	8	5	0	0	0	0	13
ESE	0	0	0	0	0	0	0
SE	2	0	0	0	0	0	2
SSE	2	2	1	0	0	0	5
S	12	6	0	0	0	0	18
SSW	15	1	0	0	0	0	16
SW	8	0	0	0	0	0	8
WSW	10	0	0	0	0	0	10
W	9	1	0	0	0	0	10
WNW	9	0	0	1	0	0	10
NW	1	0	1	0	0	0	2
NNW	2	0	0	0	0	0	2
VARIABLE							
Total	113	17	2	1	0	0	133

Periods of calm (hours): 2

Hours of missing data: 1st Qtr. = 52

[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: January - March 1980

STABILITY CLASS: Pasquill Class G

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	0	0	0	0	0	2
NNE	2	0	0	0	0	0	2
NE	4	5	1	0	0	0	10
ENE	2	2	0	0	0	0	4
E	3	0	0	0	0	0	3
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	1	0	0	0	0	0	1
S	4	3	0	0	0	0	7
SSW	3	1	0	0	0	0	4
SW	1	0	0	0	0	0	1
WSW	0	0	0	0	0	0	0
W	2	0	0	0	0	0	2
WNW	1	0	0	0	0	0	1
NW	0	0	0	0	0	0	0
NNW	2	0	0	0	0	0	2
VARIABLE							
Total	27	11	1	0	0	0	39

Periods of calm (hours): 0

Hours of missing data: 1st Qtr. = 52

[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: April - June 1980

STABILITY CLASS: Pasquill Class A

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	13	46	5	1	0	0	65
NNE	5	45	4	0	0	0	54
NE	1	21	6	0	0	0	28
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	14	37	0	0	0	0	51
SSW	27	43	0	0	0	0	70
SW	17	25	0	0	0	0	42
WSW	9	12	0	0	0	0	21
W	11	18	0	0	0	0	29
WNW	4	12	0	0	0	0	16
NW	5	26	2	0	0	0	33
NNW	5	19	8	3	0	0	35
VARIABLE							
Total	112	304	25	4	0	0	445

Periods of calm (hours): 0

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class B

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	1	7	4	0	0	0	12
NNE	3	5	0	0	0	0	8
NE	1	8	1	0	0	0	10
ENE	1	3	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	1	0	0	0	0	0	1
S	8	2	0	0	0	0	10
SSW	5	4	0	0	0	0	9
SW	6	3	1	0	0	0	10
WSW	2	2	0	0	0	0	4
W	3	4	2	0	0	0	9
WNW	3	1	0	0	0	0	4
NW	4	3	1	0	0	0	8
NNW	2	4	1	0	0	0	7
VARIABLE							
Total	41	46	10	0	0	0	97

Periods of calm (hours): 0

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class C

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	3	8	2	0	0	0	13
NNE	4	6	0	0	0	0	10
NE	4	6	2	0	0	0	12
ENE	1	1	0	0	0	0	2
E	2	0	0	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	8	2	0	0	0	0	10
SSW	4	2	0	0	0	0	6
SW	3	2	0	0	0	0	5
WSW	6	0	0	0	0	0	6
W	3	3	0	0	0	0	6
WNW	2	1	0	0	0	0	3
NW	1	4	0	0	0	0	5
NNW	0	4	1	0	0	0	5
VARIABLE							
Total	42	39	5	0	0	0	86

Periods of calm (hours): 0

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class D

ELEVATION: Wind & Speed Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	6	23	8	1	0	0	38
NNE	17	44	7	0	0	0	68
NE	23	41	11	0	0	0	75
ENE	16	14	2	0	0	0	32
E	14	4	0	0	0	0	18
ESE	8	0	0	0	0	0	8
SE	10	2	0	0	0	0	12
SSE	12	3	0	0	0	0	15
S	36	11	0	0	0	0	47
SSW	40	19	0	0	0	0	59
SW	17	13	0	0	0	0	30
WSW	15	5	0	0	0	0	20
W	11	15	4	0	0	0	30
WNW	7	14	2	0	0	0	23
NW	4	16	5	0	0	0	25
NNW	5	13	4	0	0	0	22
VARIABLE							
Total	241	237	43	1	0	0	522

Periods of calm (hours): 0

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class E

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	24	34	0	0	0	0	58
NNE	25	24	1	0	0	0	50
NE	26	35	2	0	0	0	63
ENE	26	16	1	0	0	0	43
E	29	2	0	0	0	0	31
ESE	14	1	0	0	0	0	15
SE	13	1	0	0	0	0	14
SSE	9	1	0	0	0	0	10
S	55	6	0	0	0	0	61
SSW	72	45	3	0	0	0	120
SW	49	18	3	0	0	0	70
WSW	25	1	0	0	0	0	26
W	22	5	1	0	0	0	28
WNW	17	18	1	0	0	0	36
NW	9	16	1	0	0	0	26
NNW	11	12	0	0	0	0	23
VARIABLE							
Total	426	235	13	0	0	0	674

Periods of calm (hours): 3

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class F

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	18	0	0	0	0	0	18
NNE	16	0	0	0	0	0	16
NE	28	9	1	0	0	0	38
ENE	30	7	0	0	0	0	37
E	8	4	0	0	0	0	12
ESE	5	0	0	0	0	0	5
SE	9	0	0	0	0	0	9
SSE	6	0	0	0	0	0	6
S	14	1	0	0	0	0	15
SSW	13	1	1	0	0	0	15
SW	16	0	0	0	0	0	16
WSW	4	0	0	0	0	0	4
W	11	0	0	0	0	0	11
WNW	6	0	0	0	0	0	6
NW	3	0	0	0	0	0	3
NNW	7	0	0	0	0	0	7
VARIABLE							
Total	194	22	2	0	0	0	218

Periods of calm (hours): 2

Hours of missing data: 2nd Qtr. = 87

[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: April - June 1980

STABILITY CLASS: Pasquill Class G

ELEVATION: Wind Speed & Direction with 61-10 Meter Delta T

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	4	0	0	0	0	0	4
NNE	5	0	0	0	0	0	5
NE	8	5	0	0	0	0	13
ENE	8	3	0	0	0	0	11
E	0	1	0	0	0	0	1
ESE	1	0	0	0	0	0	1
SE	0	0	0	0	0	0	0
SSE	1	0	0	0	0	0	1
S	1	0	0	0	0	0	1
SSW	0	0	0	0	0	0	0
SW	4	0	0	0	0	0	4
WSW	0	0	0	0	0	0	0
W	3	0	0	0	0	0	3
WNW	2	0	0	0	0	0	2
NW	2	0	0	0	0	0	2
NNW	2	0	0	0	0	0	2
VARIABLE							
Total	41	9	0	0	0	0	50

Periods of calm (hours): 0

Hours of missing data: 2nd Qtr. - 87

[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.