Effluent and Waste Disposal

Semi-Annual Report

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". 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 & Particulates

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

d. Liquid Effluents

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

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

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

3. Average Energy

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

3rd Quarter:	$\bar{E}\gamma$ = 1.01 E-1 MeV/dis	$\bar{E}\beta$ = 1.80 E-1 MeV/dis
4th Quarter:	$\bar{E}\gamma$ = 9.41 E-2 MeV/dis	$\bar{E}\beta$ = 1.80 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 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 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 the period.

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

5. BATCH RELEASES

a) Liquid

	3rd Quarter	4th Quarter
	All Releases by Con Edison	Releases by Con Edison, plus: 1) 2745 min, primary to secondary leak 2) Na-24 Test 3017 min
Number of Batch Releases	17	53
Total Time Period Batch Releases	50369 min	7274 min
Maximum " " " "	44640 min	352 min
Average " " " "	2963 min	137 min
Minimum " " " "	30 min	5 min
Average Stream Flow		

b) Gaseous

Number of Batch Releases
Total Time Period Batch Releases
Maximum " " " "
Average " " " "
Minimum " " " "

6. ABNORMAL RELEASES

a) Liquid
None

b) Gaseous
None

EFFLUENT AND WASTE DISPOSAL

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B. GASEOUS EFFLUENTS
THIRD AND FOURTH
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TABLE 1A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1978)

GASEOUS EFFLUENTS—SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission & activation gases				
1. Total release	Ci	8.88 E+1	2.66 E+2	2.5 E+1
2. Average release rate for period	μCi/sec	1.12 E+1	3.55 E+1	
3. Percent of Technical specification limit	%	4.19 E-1	1.13 E0	
B. Iodines				
1. Total iodine-131	Ci	2.12 E-3	3.90 E-4	2.5 E+1
2. Average release rate for period	μCi/sec	2.67 E-4	4.91 E-5	
3. Percent of technical specification limit	%	2.06 E-1	4.30 E-2	
C. Particulates				
1. Particulates with half-lives >8 days	Ci	2.17 E-3	4.53 E-4	2.5 E+1
2. Average release rate for period	μCi/sec	2.73 E-4	5.70 E-5	
3. Percent of technical specification limit	%	2.06 E-1	4.30 E-2	
4. Gross alpha radioactivity	Ci	<1.87 E-7	<1.87 E-7	
D. Tritium				
1. Total release	Ci	2.09 E0	4.28 E0	2.5 E+1
2. Average release rate for period	μCi/sec	2.63 E-1	5.38 E-1	
3. Percent of technical specification limit	%	. E	E	

TABLE 1C

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1978)

GASEOUS EFFLUENTS–GROUND-LEVEL RELEASES

uclides Released	Unit	CONTINUOUS MODE Quarter 3	CONTINUOUS MODE Quarter 4	BATCH MODE Quarter 3	BATCH MODE Quarter 4
1. Fission gases					
krypton-85	Ci	1.78 E0	6.59 E0	1.21 E0	7.58 E-1
krypton-85m	Ci	0.00 E0	4.32 E-3	3.90 E-1	5.85 E-2
krypton-87	Ci	0.00 E0	3.97 E-2	1.06 E-1	3.45 E-2
krypton-88	Ci	3.70 E-1	7.86 E-2	6.27 E-2	6.98 E-2
xenon-133	Ci	5.15 E+1	1.90 E+2	1.10 E+1	2.22 E+1
xenon-135	Ci	1.63 E+1	4.44 E+1	4.60 E0	1.00 E0
xenon-135m	Ci	3.33 E-1	1.86 E-2	0.00 E0	6.88 E-2
xenon-138	Ci	5.56 E-1	1.50 E-2	0.00 E0	7.79 E-2
Others (specify)	Ci	. E	. E	. E	. E
Xe 131m	Ci	0.00 E0	1.72 E-2	1.73 E-2	4.19 E-1
Xe 133m	Ci	2.64 E-1	0.00 E0	1.89 E-1	3.11 E-1
identified	Ci	0.00 E0	0.00 E0	0.00 E0	0.00 E0
Total for period	Ci	7.12 E+1	2.41 E+2	1.76 E+1	2.49 E+1
2. Iodines					
iodine-131	Ci	2.12 E-3	3.90 E-4	. E	. E
iodine-133	Ci	3.95 E-3	2.08 E-4	. E	. E
iodine-135	Ci	4.31 E-3	7.86 E-4	. E	. E
Total for period	Ci	1.04 E-2	1.38 E-3	. E	. E
3. Particulates					
strontium-89	Ci	7.01 E-7	1.20 E-7	. E	. E
strontium-90	Ci	1.86 E-7	2.23 E-7	. E	. E
cesium-134	Ci	0.00 E0	0.00 E0	. E	. E
cesium-137	Ci	8.32 E-6	6.69 E-6	. E	. E
barium-lanthanum-140	Ci	0.00 E0	0.00 E0	. E	. E
Co60	Ci	1.59 E-5	2.64 E-5	. E	. E
Co58	Ci	1.97 E-5	2.55 E-5	. E	. E
09	Ci	0.00 E0	3.92 E-6	. E	. E
unidentified	Ci	0.00 E0	0.00 E0	. E	. E
Particulates (other)					
Ce-141	Ci	5.39 E-7	0.00 E0		
Mn-54	Ci	2.76 E-6	4.33 E-7		
Ce-139	Ci	5.26 E-7	0.00 E0		

EFFLUENT AND WASTE DISPOSAL

SEMI - ANNUAL REPORT

C. LIQUID EFFLUENTS
THIRD AND FOURTH
QUARTERS, 1978

TABLE 2A

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1978)

LIQUID EFFLUENTS—SUMMATION OF ALL RELEASES

	Unit	Quarter 3	Quarter 4	Est. Total Error, %
A. Fission and activation products				
1. Total release (not including tritium, gases, alpha)	Ci	1.11 E-1	6.18 E-1	2.5 E+1
2. Average diluted concentration during period	μCi/ml	2.90 E-10	1.58 E-9	
3. Percent of applicable limit	%	8.34 E-3	2.61 E-2	
B. Tritium				
1. Total release	Ci	7.01 E+1	9.89 E+1	2.5 E+1
2. Average diluted concentration during period	μCi/ml	1.83 E-7	2.53 E-7	
3. Percent of applicable limit	%	6.10 E-3	8.43 E-3	
C. Dissolved and entrained gases				
1. Total release	Ci	2.71 E-1	2.33 E-1	2.5 E+1
2. Average diluted concentration during period	μCi/ml	7.08 E-10	5.96 E-10	
3. Percent of applicable limit	%	2.75 E-5	2.34 E-5	
D. Gross alpha radioactivity				
1. Total release	Ci	<3.06 E-5	<1.89 E-4	2.5 E+1
E. Volume of waste released (prior to dilution)	liters	1.82 E+6	2.35 E+6	1.0 E+1
F. Volume of dilution water used during period	liters	3.83 E+11	3.91 E+11	1.0 E+1

TABLE 2B

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1978)

LIQUID EFFLUENTS

Nuclides Released	Unit	CONTINUOUS MODE Quarter 3	CONTINUOUS MODE Quarter 4	BATCH MODE Quarter 3	BATCH MODE Quarter 4
strontium-89	Ci	. E	. E	6.08 E-5	1.42 E-4
strontium-90	Ci	. E	. E	4.83 E-5	3.77 E-5
cesium-134	Ci	. E	. E	3.92 E-3	4.66 E-2
cesium-137	Ci	. E	. E	1.83 E-2	8.60 E-2
iodine-131	Ci	. E	. E	8.67 E-3	1.84 E-2
cobalt-58	Ci	. E	. E	8.69 E-3	4.13 E-2
cobalt-60	Ci	. E	. E	2.49 E-2	1.62 E-2
iron-59	Ci	. E	. E	9.59 E-4	1.18 E-3
zinc-65	Ci	. E	. E	1.36 E-3	1.17 E-3
manganese-54	Ci	. E	. E	3.10 E-2	2.21 E-3
chromium-51	Ci	. E	. E	4.85 E-3	1.06 E-2
zirconium-niobium-95	Ci	. E	. E	1.64 E-4	8.06 E-4
molybdenum-99	Ci	. E	. E	3.23 E-3	6.40 E-3
[illegible]hnetium-99m	Ci	. E	. E	2.59 E-4	9.37 E-4
[illegible]rium-lanthanum-140	Ci	. E	. E	3.03 E-3	4.54 E-3
cerium-141	Ci	. E	. E	6.52 E-4	1.47 E-3
*Na-24	Ci	. E	. E	. E	3.20 E-1
Mn-56	Ci	. E	. E	. E	3.63 E-3
I-132	Ci	. E	. E	. E	1.00 E-2
I-133	Ci	. E	. E	. E	1.02 E-2
I-134	Ci	. E	. E	. E	7.86 E-3
unidentified	Ci	. E	. E	. E	E
CONTINUED BELOW					
Total for period (above)	Ci	. E	. E	1.11 E-1	6.18 E-1
xenon-133	Ci	. E	. E	2.70 E-1	2.30 E-7
xenon-135	Ci	. E	. E	5.38 E-4	2.70 E-3

*Steam Generator moisturecarryover test

other nuclides released

I-135	Ci	-	-	-	1.78 E-2
Rh-106	Ci	-	-	-	5.92 E-3
Cs-138	Ci	-	-	-	4.49 E-3
Ce-139	Ci	-	-	-	2.66 E-4

EFFLUENT AND WASTE DISPOSAL

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D. SOLID WASTE
THIRD AND FOURTH
QUARTERS, 1978

TABLE 3

EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1978)

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	3.2 E0 4.1 E0	1.00E+2
b. Dry compressible waste, contaminated equip, etc.	m^3 Ci	4.9 E+2 6.7 E0	1.00E+2
c. Irradiated components, control rods, etc.	m^3 Ci	. E . E	. E
d. Other (describe) Filter cartridges	m^3 Ci	7.0 E0 5.3 E+1	1.00E+2

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

a.	Co-58	%	7.8 E+1
	Cr-51	%	1.3 E+1
	Co-60	%	9.0 E0
b.	Co-58	%	7.3 E+1
	Cr-51	%	1.5 E+1
	Co-60	%	1.2 E+1
c.		%	. E
		%	. E
		%	. E
d.	Co-58	%	7.6 E+1
	Cr-51	%	1.3 E+1
	C0-60	%	1.1 E+1

3. Solid Waste Disposition

Number of Shipments	Mode of Transportation	Destination
14	Truck	Barnwell, South Carolina

B. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments	Mode of Transportation	Destination

EFFLUENT & WASTE DISPOSAL

SEMI-ANNUAL REPORT

THIRD AND FOURTH QUARTERS, 1978

E. RADIOLOGICAL IMPACT ON MAN

RADIOLOGICAL IMPACT EVALUATION

Doses from noble gas immersion, inhalation, ground deposition, and vegetation ingestion were evaluated for the residence located 1525 meters SSW of Indian Point Unit No. 3, which is the point of maximum offsite radiation dose (all pathways considered) likely to be occupied. Doses were evaluated for an individual ingesting milk and meat from a cow located about 7.5 miles to the NNE. 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	5.77×10^{-4}	1.51×10^{-3}	-	-
b) Continuous Releases	2.81×10^{-2}	6.92×10^{-2}	-	-
Inhalation	5.23×10^{-3}*	-	1.77×10^{-2}*	1.12×10^{-2}**
Ground Deposition	3.94×10^{-4}	4.04×10^{-4}	-	-
Milk Ingestion*	1.50×10^{-2}	-	1.96×10^{-2}	1.49×10^{-2}
Meat Ingestion	2.26×10^{-3}***	-	2.28×10^{-3}***	7.58×10^{-3}**
Vegetable Ingestion	2.08×10^{-2}***	-	3.47×10^{-2}***	6.32×10^{-2}**

* 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	.05	-
b) Continuous Release	1.7	-
Inhalation	.29	.86
Ground Deposition	.01	-
Totals	2.05	.86

Pathways (Liquid)

All — See attached "LADTAP" printout Attachment I

C. Average Doses to Individuals

1. Liquid-Total Body
   5.63×10^{-5} mr

2. Gaseous-Total Body
   6.41×10^{-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		9.38E-02	1.54E-01	1.11E-01	3.28E-03	5.18E-02	1.72E-02	4.55E-03
INVERTEBRATE		1.40E-03	1.56E-02	4.18E-03	3.11E-04	4.88E-03	2.85E-04	4.19E-02
ALGAE		1.27E-08	2.52E-08	1.50E-08	4.20E-09	8.42E-09	2.30E-09	1.26E-08
DRINKING		2.40E-13	8.15E-13	7.14E-13	1.13E-12	5.69E-13	4.81E-13	5.12E-13
SHORELINE	6.95E-04	5.94E-04	5.94E-04	5.94E-04	5.94E-04	5.94E-04	5.94E-04	5.94E-04
SWIMMING	0.0	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05
BOATING	0.0	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05
TOTAL	6.95E-04	9.58E-02	1.71E-01	1.16E-01	4.25E-03	5.73E-02	1.81E-02	4.69E-02

	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		9.48E-02	1.55E-01	6.15E-02	2.89E-03	3.95E-02	1.99E-02	3.15E-03
INVERTEBRATE		1.37E-03	1.23E-02	2.92E-03	2.55E-04	3.71E-03	2.94E-04	3.14E-02
ALGAE		1.67E-08	2.90E-08	1.15E-08	4.86E-09	8.42E-09	3.35E-09	1.22E-08
DRINKING		3.20E-13	8.40E-13	5.54E-13	1.15E-12	5.69E-13	4.10E-13	4.87E-13
SHORELINE	9.31E-04	7.96E-04	7.96E-04	7.96E-04	7.96E-04	7.96E-04	7.96E-04	7.96E-04
SWIMMING	0.0	6.08E-05	6.08E-05	6.08E-05	6.08E-05	6.08E-05	6.08E-05	6.08E-05
BOATING	0.0	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05
TOTAL	9.31E-04	9.71E-02	1.68E-01	6.55E-02	4.04E-03	4.41E-02	2.11E-02	3.57E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	5.0	25.00
INVERTEBRATE	5.8	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		1.18E-01	1.56E-01	2.57E-02	2.94E-03	1.70E-02	1.56E-02	1.31E-03
INVERTEBRATE		1.61E-03	6.57E-03	1.32E-03	2.61E-04	1.66E-03	2.23E-04	1.41E-02
ALGAE		4.56E-06	5.41E-06	1.06E-06	1.14E-06	8.42E-06	5.93E-06	1.21E-06
DRINKING		9.00E-13	1.66E-09	8.68E-10	2.59E-09	5.68E-10	7.90E-10	7.20E-10
SHORELINE	1.95E-04	1.66E-04	1.66E-04	1.66E-04	1.66E-04	1.66E-04	1.66E-04	1.66E-04
SWIMMING	0.0	1.52E-05	1.52E-05	1.52E-05	1.52E-05	1.52E-05	1.52E-05	1.52E-05
BOATING	0.0	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05	3.04E-05
TOTAL	1.95E-04	1.20E-01	1.42E-01	2.52E-02	3.43E-03	1.89E-02	1.61E-02	1.57E-02

	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

I N F A N T D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.77E-02	2.29E-02	1.56E-03	5.09E-04	1.23E-03	2.71E-03	9.59E-05
INVERTEBRATE		1.91E-04	5.07E-04	7.90E-05	3.55E-05	9.75E-05	2.95E-05	8.31E-04
ALGAE		9.32E-08	1.20E-07	1.05E-08	2.71E-08	8.42E-09	1.39E-08	1.20E-06
DRINKING		1.85E-12	3.33E-12	1.21E-12	5.65E-12	5.68E-13	1.28E-12	1.06E-12
SHORELINE	4.17E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05	3.56E-05
SWIMMING	0.0	6.08E-12	6.08E-12	6.08E-12	6.08E-12	6.08E-12	6.08E-12	6.08E-12
BOATING	0.0	1.52E-07	1.52E-07	1.52E-07	1.52E-07	1.52E-07	1.52E-07	1.52E-07
TOTAL	4.17E-05	1.80E-02	2.35E-02	1.67E-03	5.80E-04	1.37E-03	2.78E-03	9.65E-04

	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 * * *

LOCA[redacted]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		6.70E-02	1.10E-01	7.93E-02	2.26E-03	3.70E-02	1.23E-02	3.22E-03
INVERTEBRATE		9.94E-04	1.11E-02	2.98E-03	2.09E-04	3.47E-03	1.96E-04	2.98E-02
ALGAE		9.02E-09	1.65E-08	1.07E-08	2.88E-09	5.97E-09	1.60E-09	8.97E-09
DRINKING		1.77E-11	5.88E-11	5.16E-11	1.05E-10	4.12E-11	3.48E-11	3.75E-11
SHORELINE	4.96E-04	4.24E-04	4.24E-04	4.24E-04	4.24E-04	4.24E-04	4.24E-04	4.24E-04
SWIMMING	0.0	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05
BOATING	0.0	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05
TOTAL	4.96E-04	6.84E-02	1.22E-01	8.28E-02	2.93E-03	4.09E-02	1.29E-02	3.35E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	7.0	51.00
INVERTEBRATE	5.0	7.0	51.00
ALGAE	0.0	7.0	51.00
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		6.77E-02	1.11E-01	4.39E-02	1.99E-03	2.82E-02	1.42E-02	2.24E-03
INVERTEBRATE		9.74E-04	8.79E-03	2.08E-03	1.78E-04	2.64E-03	2.04E-04	2.26E-02
ALGAE		1.19E-08	2.07E-08	8.15E-09	3.54E-09	5.97E-09	2.36E-09	8.63E-09
DRINKING		2.44E-11	6.06E-11	4.03E-11	1.10E-10	4.12E-11	2.97E-11	2.57E-11
SHORELINE	6.65E-04	5.68E-04	5.68E-04	5.68E-04	5.68E-04	5.68E-04	5.68E-04	5.68E-04
SWIMMING	0.0	3.43E-05	3.43E-05	3.43E-05	3.43E-05	3.43E-05	3.43E-05	3.43E-05
BOATING	0.0	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05
TOTAL	6.65E-04	6.93E-02	1.20E-01	4.66E-02	2.79E-03	3.14E-02	1.50E-02	2.54E-02

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	7.0	51.00
INVERTEBRATE	3.8	7.0	51.00
ALGAE	0.0	7.0	51.00
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		8.40E-02	9.69E-02	1.65E-02	2.05E-03	1.22E-02	1.12E-02	9.29E-04
INVERTEBRATE		1.15E-03	4.55E-03	9.38E-04	1.79E-04	1.18E-03	1.57E-04	1.01E-02

ALGAE		3.25E-05	3.86E-05	7.70E-06	7.85E-06	5.97E-06	4.[illegible]E-06	8.56E-06
DRINKING		6.52E-08	1.20E-07	6.26E-08	2.53E-07	4.12E-08	5.[illegible]E-08	5.21E-08
SHORELINE	1.39E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.19E-04	1.[illegible]E-04	1.19E-04
SWIMMING	0.0	8.58E-06	8.58E-06	8.58E-06	8.58E-06	8.58E-06	8.58E-06	8.58E-06
BOATING	0.0	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05	1.72E-05
TOTAL	1.39E-04	8.55E-02	1.02E-01	1.80E-02	2.57E-03	1.35E-02	1.15E-02	1.12E-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

I N F A N T D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.27E-02	1.64E-02	1.11E-03	3.52E-04	8.81E-04	1.94E-03	6.81E-05
INVERTEBRATE		1.56E-04	3.62E-04	5.63E-05	2.43E-05	6.95E-05	2.07E-05	5.53E-04
ALGAE		6.65E-08	8.54E-08	7.47E-09	1.87E-08	5.97E-09	9.86E-09	8.55E-09
DRINKING		1.34E-10	2.39E-10	8.74E-11	5.67E-10	4.12E-11	9.19E-11	7.66E-11
SHORELINE	2.58E-05	2.54E-05	2.54E-05	2.54E-05	2.54E-05	2.54E-05	2.54E-05	2.54E-05
SWIMMING	0.0	3.43E-12	3.43E-12	3.43E-12	3.43E-12	3.43E-12	3.43E-12	3.43E-12
BOATING	0.0	8.58E-08	8.58E-08	8.58E-08	8.58E-08	8.58E-08	8.58E-08	8.58E-08
TOTAL	2.98E-05	1.28E-02	1.67E-02	1.19E-03	4.02E-04	9.76E-04	1.98E-03	6.87E-04

	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 [illegible]ULATION DOSES * * *
MAN-REM

SPORTFISH HARVEST

			DOSE (MAN-REM)						
PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	ADULT	7.24E+04	2.26E-01	3.73E-01	2.68E-01	4.50E-05	1.25E-01	4.13E-02	1.06E-02
FISH	TEENAGER	1.16E+04	4.81E-02	7.84E-02	5.11E-02	8.25E-04	2.60E-02	1.00E-02	1.55E-03
FISH	CHILD	7.00E+03	8.36E-02	9.64E-02	1.68E-02	1.19E-03	1.21E-02	1.11E-02	9.02E-04
FISH	TOTAL	9.10E+04	3.58E-01	5.48E-01	3.16E-01	6.51E-05	1.57E-01	6.24E-02	1.31E-02

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

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

* * * FISH CONSUMPTION [illegible]PULATION DOSES * * *
MAN-RE[illegible]

COMMERCIAL HARVEST

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	ADULT	8.65E+07	9.52E-01	1.57E+00	1.13E+00	1.48E-02	5.25E-01	1.74E-01	4.46E-02
FISH	TEENAGER	1.38E+07	2.02E-01	3.30E-01	1.31E-01	2.70E-03	8.39E-02	4.22E-02	6.50E-03
FISH	CHILD	8.36E+06	3.52E-01	4.05E-01	7.05E-02	3.88E-03	5.07E-02	4.66E-02	3.78E-03
FISH	TOTAL	1.09E+08	1.51E+00	2.30E+00	1.33E+00	2.14E-02	6.60E-01	2.62E-01	5.49E-02

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

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

DOSE (MAN-REM)

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	ADULT	1.23E+05	5.85E-01	6.34E-01	4.56E-01	5.99E-03	2.12E-01	7.03E-02	1.81E-02
FISH	TEENAGER	1.97E+04	8.18E-02	1.33E-01	5.30E-02	1.09E-03	3.40E-02	1.71E-02	2.63E-03
FISH	CHILD	1.19E+04	1.42E-01	1.64E-01	2.85E-02	1.57E-03	2.05E-02	1.89E-02	1.53E-03
FISH	TOTAL	1.55E+05	6.09E-01	9.32E-01	5.38E-01	8.65E-03	2.67E-01	1.06E-01	2.22E-02

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

SPORTFISH HARVEST

		DOSE (MAN-REM)							
PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	ADULT	7.94E+03	1.50E-03	1.72E-02	4.57E-03	1.79E-04	5.32E-03	2.65E-04	4.59E-02
INVER	TEENAGER	1.26E+03	3.09E-04	2.03E-03	6.66E-04	3.19E-05	8.47E-04	6.04E-05	7.28E-03
INVER	CHILD	7.94E+02	5.18E-04	2.06E-03	4.22E-04	4.71E-05	5.32E-04	6.80E-05	4.57E-03
INVER	TOTAL	1.00E+04	2.33E-03	2.21E-02	5.65E-03	2.58E-04	6.70E-03	3.95E-04	5.77E-02

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

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	ADULT	1.25E+07	1.02E-03	1.17E-02	3.12E-03	9.84E-05	3.65E-03	1.82E-04	3.15E-02
INVER	TEENAGER	1.99E+06	2.11E-04	1.95E-03	4.55E-04	1.73E-05	5.78E-04	4.13E-05	4.96E-03
INVER	CHILD	1.25E+06	3.54E-04	1.41E-03	2.86E-04	2.55E-05	3.65E-04	4.66E-05	3.11E-03
INVER	TOTAL	1.58E+07	1.59E-03	1.50E-02	3.86E-03	1.41E-04	4.57E-03	2.70E-04	3.93E-02

DILUTION 7.00E+00 CATCH 1.00E+05 TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=1.90E+07

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) ADULT=1.00E+00 TEEN=7.50E-01 CHILD=5.30E-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	ADULT	7.94E+02	1.49E-04	1.71E-03	4.54E-04	1.43E-05	5.29E-04	2.65E-05	4.55E-03
INVER	TEENAGER	1.26E+02	4.08E-05	2.82E-04	6.62E-05	2.52E-06	8.42E-05	6.02E-06	7.23E-04
INVER	CHILD	7.94E+01	5.16E-05	2.05E-04	4.20E-05	3.71E-06	5.29E-05	6.78E-06	4.54E-04
INVER	TOTAL	1.00E+03	2.31E-04	2.19E-03	5.62E-04	2.08E-05	6.66E-04	3.93E-05	5.73E-03

			DOSE (MAN-REM)						
PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	ADULT	2.44E+02	1.52E-09	2.05E-09	1.38E-09	8.87E-11	7.49E-10	3.97E-10	1.27E-10
DRINKING	TEENAGER	5.64E+01	5.04E-10	5.92E-10	1.49E-10	1.05E-11	1.12E-10	6.11E-11	1.60E-11
DRINKING	CHILD	5.20E+01	1.25E-09	1.17E-09	2.11E-10	2.86E-11	1.59E-10	1.65E-10	5.62E-11
DRINKING	TOTAL	3.33E+02	3.06E-09	3.59E-09	1.75E-09	1.28E-10	1.02E-09	5.31E-10	1.80E-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	3.06E-09	3.59E-09	1.75E-09	1.28E-10	1.02E-09	5.31E-10	1.80E-10

----------HYDROSPHERE TRITIUM DOSE----------

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
WATER	TOTAL	2.20E+00	2.12E-09	2.12E-09	2.12E-09	2.12E-09	2.12E-09	2.12E-09	2.12E-09

			DOSE(MAN-REM)		
PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	1.65E-01	1.41E-01	1.41E-01

LOCATION- DOWNSTREAM

DILUTION=3.70E+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	6.37E-03	6.37E-03

LOCATION- DOWNSTREAM

DILUTION=3.70E+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	5.18E-03	5.18E-03

LOCATION- DOWNSTREAM

DILUTION=3.70E+01 TRANSIT TIME=0.40E+01 HR

* * * DOSE TO BIOTA * * *

MRADS PER YEAR

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

	INTERNAL	EXTERNAL	TOTAL
FISH	2.75E-01	3.75E-01	6.50E-01
INVERTEBRATE	7.99E-01	7.44E-01	1.55E+00
ALGAE	4.31E-01	3.66E-05	4.34E-01
MUSKRAT	1.41E+00	2.49E-01	1.66E+00
RACCOON	1.29E-01	1.86E-01	3.15E-01
HERON	7.59E+00	2.49E-01	7.84E+00
DUCK	1.23E+00	3.73E-01	1.61E+00

* * * COST-BENEFIT ANALYSIS * * *

NU[illegible]		RELEASE CI/YR	MAN-REM DOSE TOTAL BODY	MAN-REM DOSE THYROID	MAN-REM PER CURIE TOTAL BODY	MAN-REM PER CURIE THYROID
38SR	89	2.03E-04	4.57E-06	2.41E-09	2.25E-02	1.19E-05
38SR	90	2.60E-05	4.06E-04	1.07E-10	4.66E+00	1.25E-06
55CS	134	5.05E-02	7.61E-01	2.09E-02	1.51E+01	4.12E-01
55CS	137	1.04E-01	9.65E-01	6.53E-02	9.28E+00	6.15E-01
53I	131	2.71E-02	1.26E-04	2.71E-02	4.66E-03	9.95E-01
27CO	58	5.00E-02	1.69E-03	1.54E-03	3.38E-02	2.69E-02
27CO	60	4.11E-02	5.58E-02	5.29E-02	1.31E+00	1.29E+00
26FE	59	2.11E-03	1.45E-04	4.47E-05	6.86E-02	2.12E-02
30ZN	65	2.55E-03	2.74E-03	1.18E-04	1.08E+00	4.65E-02
25MN	54	3.32E-02	9.48E-03	2.85E-03	2.85E-01	8.55E-02
24CR	51	1.51E-02	6.53E-06	6.31E-06	4.33E-04	4.18E-04
40ZR	95	9.78E-04	1.78E-05	1.78E-05	1.84E-02	1.85E-02
43TC	99M	1.20E-03	4.28E-07	4.28E-07	3.57E-04	3.57E-04
42MO	99	9.63E-03	1.27E-05	1.22E-05	1.32E-03	1.27E-03
56BA	140	7.57E-03	2.33E-05	1.74E-05	3.08E-03	2.33E-03
58CE	141	2.12E-03	2.35E-06	2.35E-06	1.11E-03	1.11E-03
11NA	24	3.20E-01	4.98E-03	4.97E-03	1.56E-02	1.56E-02
25MN	56	3.63E-03	9.21E-06	9.21E-06	2.54E-03	2.54E-03
1H	3	1.69E+02	1.53E-03	1.53E-03	8.18E-06	8.18E-06
53I	132	1.00E-02	3.04E-05	3.04E-05	3.04E-03	3.04E-03
53I	133	1.02E-02	2.11E-05	2.71E-05	2.07E-03	2.65E-03
53I	134	7.86E-03	3.21E-06	3.21E-06	4.09E-04	4.09E-04
53I	135	1.78E-02	9.08E-05	9.08E-05	5.10E-03	5.10E-03
55CS	138	4.49E-03	2.40E-07	2.40E-07	5.34E-05	5.34E-05
TOTAL			1.80E+00	1.75E-01		

EFFLUENT & WASTE DISPOSAL

SEMI-ANNUAL REPORT

THIRD AND FOURTH QUARTERS, 1978

F. METEOROLOGICAL DATA

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: July 1 - September 30, 1978

STABILITY CLASS: A

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	29	59	6	0	0	8	102
NNE	5	14	2	0	1	4	26
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	1	0	1
ESE	1	0	0	0	0	0	1
SE	1	2	0	0	0	0	3
SSE	3	1	0	0	0	0	4
S	52	29	0	0	1	4	86
SSW	54	34	0	0	1	7	96
SW	3	16	1	0	2	4	26
WSW	10	5	0	0	1	1	17
W	9	4	0	0	0	0	13
WNW	6	4	0	0	0	2	12
NW	5	7	0	0	0	2	14
NNW	13	11	0	0	0	1	25
Total	191	186	9	0	7	33	426

Periods of calm (hours): 0

Hours of missing data: Total hours of missing data for all stability classes this quarter is 49.

[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: July 1 - September 30, 1978

STABILITY CLASS: B

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	9	12	1	0	0	0	22
NNE	3	3	1	0	0	0	7
NE	2	1	0	0	0	0	3
ENE	0	1	0	0	0	0	1
E	0	1	0	0	0	0	1
ESE	0	0	0	0	0	0	0
SE	1	0	0	0	0	0	1
SSE	2	1	0	0	0	0	3
S	9	3	0	0	0	0	12
SSW	11	6	0	0	0	0	17
SW	6	4	3	0	0	0	13
WSW	1	3	0	0	0	0	4
W	3	0	0	0	0	0	3
WNW	0	1	0	0	0	0	1
NW	1	2	0	0	0	0	3
NNW	4	0	0	0	0	0	4
Total	52	38	5	0	0	0	95

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: July 1 - September 30, 1978

STABILITY CLASS: C

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	7	6	0	0	0	0	13
NNE	7	3	0	0	0	0	10
NE	5	1	0	0	0	0	6
ENE	0	0	0	0	0	0	0
E	2	0	0	0	0	0	2
ESE	2	0	0	0	0	0	2
SE	1	0	0	0	0	0	1
SSE	1	0	0	0	0	0	1
S	10	2	0	0	0	0	12
SSW	13	5	1	0	0	0	19
SW	2	7	1	0	0	0	10
WSW	3	1	0	0	0	0	4
W	2	1	0	0	0	0	3
WNW	0	1	0	0	0	0	1
NW	1	1	0	0	0	0	2
NNW	6	1	0	0	0	0	7
Total	62	29	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: July 1 - September 30, 1978

STABILITY CLASS: D

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	22	39	11	0	1	1	74
NNE	30	90	22	0	3	6	151
NE	39	18	0	0	1	2	60
ENE	17	0	0	0	1	1	19
E	11	0	1	0	0	0	12
ESE	9	0	0	0	0	0	9
SE	7	0	0	0	1	0	8
SSE	18	2	0	0	0	0	20
S	70	12	0	0	0	1	83
SSW	36	44	0	0	1	7	88
SW	19	24	3	0	0	3	49
WSW	3	2	0	0	0	0	5
W	5	2	1	0	0	1	9
WNW	1	0	0	0	0	2	3
NW	2	2	0	0	0	0	4
NNW	3	6	0	0	0	0	9
Total	292	241	38	0	8	24	603

Periods of calm (hours): 1
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: July 1 - September 30, 1978

STABILITY CLASS: E

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	40	10	0	0	2	1	53
NNE	58	43	4	0	4	8	117
NE	32	19	1	0	0	3	55
ENE	21	1	0	0	0	0	22
E	17	1	1	0	0	0	19
ESE	15	1	0	0	1	0	17
SE	17	0	0	0	0	0	17
SSE	27	4	0	0	0	0	31
S	88	13	1	0	2	1	105
SSW	93	26	0	0	3	4	126
SW	24	7	1	0	0	1	33
WSW	6	1	0	0	1	0	8
W	13	1	0	0	0	2	16
WNW	7	0	0	0	0	0	7
NW	4	1	0	0	0	0	5
NNW	5	0	0	0	0	1	6
Total	467	128	8	0	13	21	637

Periods of calm (hours): 2
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: July 1 - September 30, 1978

STABILITY CLASS: F

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	29	0	0	0	0	0	29
NNE	68	23	0	0	0	0	91
NE	44	25	0	0	0	0	69
ENE	11	1	0	0	0	0	12
E	10	0	0	0	0	0	10
ESE	9	0	0	0	0	0	9
SE	13	2	0	0	0	0	15
SSE	11	0	0	0	0	0	11
S	16	0	0	0	0	0	16
SSW	8	0	0	0	0	0	8
SW	2	0	0	0	0	0	2
WSW	5	0	0	0	0	0	5
W	3	0	0	0	0	0	3
WNW	1	0	0	0	0	0	1
NW	1	0	0	0	0	0	1
NNW	3	0	0	0	0	0	3
Total	234	51	0	0	0	0	285

Periods of calm (hours): 1

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: July 1 - September 30, 1978

STABILITY CLASS: G

ELEVATION: 10 Meters

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	6	1	0	0	0	0	7
NE	2	4	0	0	0	0	6
ENE	0	0	0	0	0	0	0
E	1	0	0	0	0	0	1
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Total	11	5	0	0	0	0	16

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: October 1 - December 31, 1978

STABILITY CLASS: A

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	23	2	0	0	0	25
NNE	0	3	2	0	0	0	5
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	2	0	0	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	6	0	0	0	0	0	6
S	20	12	1	0	0	0	33
SSW	4	16	3	0	0	0	23
SW	0	1	0	0	0	0	1
WSW	1	4	0	0	0	0	5
W	0	4	0	0	0	0	4
WNW	0	3	0	0	0	0	3
NW	0	5	0	0	0	0	5
NNW	5	12	0	0	0	0	17
Total	38	84	8	0	0	0	130

Periods of calm (hours): 0

Hours of missing data: Total hours of missing data for all stability classes this quarter is 37

[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: October 1 - December 31, 1978

STABILITY CLASS: B

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	2	8	2	0	0	0	12
NNE	1	2	0	0	0	0	3
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	1	0	0	0	0	0	1
SE	1	0	0	0	0	0	1
SSE	1	0	0	0	0	0	1
S	7	2	0	0	0	0	9
SSW	3	5	1	0	0	0	9
SW	1	2	0	0	0	0	3
WSW	0	2	0	0	0	0	2
W	0	0	0	0	0	0	0
WNW	0	1	0	0	0	0	1
NW	0	1	0	0	0	0	1
NNW	1	4	0	0	0	0	5
Total	18	27	3	0	0	0	48

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: October 1 - December 31, 1978

STABILITY CLASS: C

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	0	12	1	0	0	0	13
NNE	0	2	1	0	0	0	3
NE	2	0	0	0	0	0	2
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	1	0	0	0	0	0	1
SE	2	0	0	0	0	0	2
SSE	2	0	0	0	0	0	2
S	10	2	0	0	0	0	12
SSW	7	4	1	0	0	0	12
SW	4	3	0	0	0	0	7
WSW	4	3	0	0	0	0	7
W	0	4	0	0	0	0	4
WNW	1	6	1	0	0	0	8
NW	1	3	0	0	0	0	4
NNW	0	2	0	0	0	0	2
Total	34	41	4	0	0	0	79

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: October 1 - December 31, 1978

STABILITY CLASS: D

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	8	93	20	0	0	0	121
NNE	17	75	12	0	0	0	104
NE	31	51	1	0	0	0	83
ENE	19	3	0	0	0	0	22
E	9	0	0	0	0	0	9
ESE	1	2	0	0	0	0	3
SE	8	0	0	0	0	0	8
SSE	17	2	0	0	0	0	19
S	30	11	0	0	0	0	41
SSW	26	12	2	0	0	0	40
SW	20	8	0	0	0	0	28
WSW	10	8	0	0	0	0	18
W	12	28	6	0	0	0	46
WNW	5	25	14	0	0	0	44
NW	6	38	42	2	0	0	88
NNW	4	30	23	1	0	0	53
Total	223	386	120	3	0	0	732

Periods of calm (hours): 2

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: October 1 - December 31, 1978

STABILITY CLASS: E

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level 1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	24	32	10	0	0	0	66
NNE	41	57	7	0	0	0	105
NE	44	24	0	0	0	0	68
ENE	34	1	0	0	0	0	35
E	22	0	0	0	0	0	22
ESE	9	0	0	0	0	0	9
SE	16	0	0	0	0	0	16
SSE	32	0	0	0	0	0	32
S	77	20	4	0	0	0	101
SSW	53	46	5	0	0	0	104
SW	24	12	1	0	0	0	37
WSW	25	14	1	0	0	0	40
W	43	52	7	0	0	0	102
WNW	8	20	18	6	0	0	52
NW	4	13	22	15	1	0	55
NNW	9	14	8	0	0	0	31
Total	465	305	83	21	1	0	875

Periods of calm (hours): 4
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: October 1 - December 31, 1978

STABILITY CLASS: F

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	21	0	0	0	0	0	21
NNE	42	8	0	0	0	0	50
NE	43	30	0	0	0	0	73
ENE	8	2	0	0	0	0	10
E	6	0	0	0	0	0	6
ESE	4	0	0	0	0	0	4
SE	3	0	0	0	0	0	3
SSE	7	0	0	0	0	0	7
S	27	2	0	0	0	0	29
SSW	16	0	0	0	0	0	16
SW	4	0	0	0	0	0	4
WSW	6	0	0	0	0	0	6
W	8	0	0	0	0	0	8
WNW	7	0	0	0	0	0	7
NW	2	0	0	0	0	0	2
NNW	9	0	0	0	0	0	9
Total	213	42	0	0	0	0	225

Periods of calm (hours): 1

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: October 1 - December 31, 1978

STABILITY CLASS: G

ELEVATION: 10 Meters

Wind Direction	Wind Speed (mph) at 10m Level						
	1-3	4-7	8-12	13-18	19-24	>24	TOTAL
N	5	0	0	0	0	0	5
NNE	11	0	0	0	0	0	11
NE	11	8	0	0	0	0	19
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	1	0	0	0	0	0	1
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	1	0	0	0	0	0	1
W	1	0	0	0	0	0	1
WNW	0	0	0	0	0	0	0
NW	2	0	0	0	0	0	2
NNW	3	0	0	0	0	0	3
Total	36	9	0	0	0	0	45

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.