

EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

1st & 2nd Quarter 1985

FACILITY: Indian Point Station (Units 1 and 2)

LICENSEE: Consolidated Edison Company of New York, Inc.

This information is provided per 10 CFR 50.36a(a)(2), employing certain guidance set forth in 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. This Semi-Annual Effluent and Waste Disposal Report for Indian Point Units 1 and 2 covers discharges for the first and second quarters of 1985.

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

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.

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\* The New York Power Authority, licensee of Indian Point Unit 3, has chosen to issue a separate semi-annual report.

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

3. Average Energy

The average energy ( $\bar{E}$ ) of the radionuclide mixture in releases of fission and activation gases for the first quarter was .0331 Mev/Dis. for  $\bar{E}_\gamma$  and .149 Mev/Dis. for  $\bar{E}_\alpha$ . The corresponding values for the second quarter were .0371 Mev/Dis. and .154 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 week 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 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. <u>Batch Releases</u>	1985	
	<u>1st Qtr.</u>	<u>2nd Qtr.</u>
a. <u>Liquid</u>		
Number of Batch Releases	75	14
Total Time Period Batch Release (Min)	8,286	1,360
Maximum Time Period Batch Release (Min)	170	227
Average Time Period Batch Release (Min)	110	97
Minimum Time Period Batch Release	20	61
Average Stream Flow (cfs)	*	*
b. <u>Gaseous</u>		
Number of Batch Release	98	82
Total Time Period Batch Release (Min)	54,100	7,740
Maximum Time Period Batch Release (Min)	44,700	361
Average Time Period Batch Release (Min)	553	94
Minimum Time Period Batch Release	15	30
6. <u>ABNORMAL RELEASES</u>		
a. Liquid - None		
b. Gaseous - None		

\* Stream flow data from U.S. Department of Interior Geological Survey was not available prior to the issuance of this report. These values will be reported in an addendum when they become available.

EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

B - GASEOUS EFFLUENTS

FIRST HALF - 1985

CONSOLIDATED EDISON CO. OF NY  
 INDIAN POINT UNITS 1 & 2  
 QUARTER 1 : START DATE 85010101  
 QUARTER 2 : START DATE 85040101

DATE OF REPORT: AUG. 21, 1985  
 PREPARED BY: B. HONYK  
 END DATE 85033124  
 END DATE 85063024

EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS -- SUMMATION OF ALL RELEASES

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-----
: UNITS : QUARTER : QUARTER : EST. TOTAL :
:       : 1       : 2       : ERROR, % :
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A. FISSION AND ACTIVATION GASES

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-----
: 1. TOTAL RELEASE      : CI : 4.09E 02 : 5.63E 02 : 5.00E 01 :
-----
: 2. AVERAGE RELEASE   : UCI/SEC: 5.26E 01 : 7.17E 01 :
: RATE FOR PERIOD      :       :           :           :
-----
: 3. PERCENT OF TECHNICAL: %   : NA       : NA       :
: SPECIFICATION LIMIT  :       :           :           :
-----

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B. IODINES

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-----
: 1. TOTAL IODINE-131   : CI : 1.28E-05 : 1.67E-04 : 5.00E 01 :
-----
: 2. AVERAGE RELEASE   : UCI/SEC: 1.65E-06 : 2.13E-05 :
: RATE FOR PERIOD      :       :           :           :
-----
: 3. PERCENT OF TECHNICAL: %   : NA       : NA       :
: SPECIFICATION LIMIT  :       :           :           :
-----

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C. PARTICULATES

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-----
: 1. PARTICULATES WITH  : CI : 6.90E-02 : 9.29E-01 : 5.00E 01 :
: HALF-LIVES >8 DAYS  :       :           :           :
-----
: 2. AVERAGE RELEASE   : UCI/SEC: 8.88E-03 : 1.18E-01 :
: RATE FOR PERIOD      :       :           :           :
-----
: 3. PERCENT OF TECHNICAL: %   : NA       : NA       :
: SPECIFICATION LIMIT  :       :           :           :
-----
: 4. GROSS ALPHA        : CI : 0.00E 00 : 0.00E 00 :
: RADIOACTIVITY         :       :           :           :
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D. TRITIUM

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-----
: 1. TOTAL RELEASE      : CI : 2.13E-01 : 5.46E-01 : 5.00E 01 :
-----
: 2. AVERAGE RELEASE   : UCI/SEC: 2.73E-02 : 6.95E-02 :
: RATE FOR PERIOD      :       :           :           :
-----
: 3. PERCENT OF TECHNICAL: %   : NA       : NA       :
: SPECIFICATION LIMIT  :       :           :           :
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EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS FOR ALL RELEASE POINTS

-----  
 QUARTER 1 : START DATE 85010101    END DATE 85033124  
 QUARTER 2 : START DATE 85040101    END DATE 85063024  
 DATE OF REPORT: AUG. 20, 1985  
 PREPARED BY: B. HOMYK

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES	UNITS	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
RELEASED					

1. FISSION AND ACTIVATION GASES

H3	CI	2.13E-01	5.46E-01	0.00E 00	0.00E 00
AR41	CI	8.25E-03	1.47E-01	4.57E-02	3.61E-01
KR85M	CI	1.23E-02	1.88E-01	0.00E 00	0.00E 00
KR85	CI	1.30E-01	1.17E-01	1.85E 00	2.04E 00
KR87	CI	1.42E-02	1.77E-01	0.00E 00	0.00E 00
KR88	CI	2.91E-02	3.60E-01	0.00E 00	0.00E 00
XE131M	CI	0.00E 00	0.00E 00	5.11E-03	1.97E 00
XE133M	CI	0.00E 00	7.18E-02	5.31E-02	6.68E-01
XE133	CI	3.18E 01	1.37E 02	3.69E 02	4.06E 02
XE135M	CI	1.08E-01	1.18E 00	0.00E 00	0.00E 00
XE135	CI	3.40E 00	8.05E 00	2.39E 00	4.31E 00
XE138	CI	0.00E 00	1.04E-01	0.00E 00	0.00E 00
TOTAL FOR					
PERIOD	CI	3.57E 01	1.48E 02	3.74E 02	4.16E 02
(ABOVE)					

EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS FOR ALL RELEASE POINTS

-----  
QUARTER 1 : START DATE 85010101    END DATE 85033124  
QUARTER 2 : START DATE 85040101    END DATE 85063024  
DATE OF REPORT:    AUG. 20, 1985  
PREPARED BY: B. HOMYK

CONTINUOUS MODE

BATCH MODE

-----  
: NUCLIDES : UNITS : QUARTER : QUARTER : QUARTER : QUARTER :  
: RELEASED :        :        1        :        2        :        1        :        2        :  
-----

2. IODINES

-----  
: I131        : CI        : 1.28E-05 : 1.67E-04 : 0.00E 00 : 0.00E 00 :  
-----  
: I133        : CI        : 0.00E 00 : 6.14E-04 : 0.00E 00 : 0.00E 00 :  
-----  
: TOTAL FOR :        :        :        :        :        :        :  
: PERIOD     : CI        : 1.28E-05 : 7.81E-04 : 0.00E 00 : 0.00E 00 :  
: (ABOVE)    :        :        :        :        :        :  
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EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS FOR ALL RELEASE POINTS

QUARTER 1 : START DATE 85010101    END DATE 85033124  
 QUARTER 2 : START DATE 85040101    END DATE 85063024  
 DATE OF REPORT: AUG. 20, 1985  
 PREPARED BY: B. HOMYK

CONTINUOUS MODE

BATCH MODE

NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED	:	1	2	1	2

3. PARTICULATES

CO58	CI	1.99E-05	0.00E 00	0.00E 00	0.00E 00
CO60	CI	1.11E-04	6.82E-05	0.00E 00	0.00E 00
CS134	CI	5.76E-06	1.15E-05	0.00E 00	0.00E 00
CS137	CI	5.40E-05	5.31E-05	0.00E 00	0.00E 00
NI63	CI	1.01E-07	0.00E 00	0.00E 00	0.00E 00
RB88	CI	6.88E-02	9.28E-01	0.00E 00	0.00E 00
TOTAL FOR	:	:	:	:	:
PERIOD	CI	6.90E-02	9.29E-01	0.00E 00	0.00E 00
(ABOVE)	:	:	:	:	:

EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

C - LIQUID EFFLUENTS

FIRST HALF - 1985

CONSOLIDATED EDISON CO. OF NY      DATE OF REPORT: AUG. 19, 1985  
 INDIAN POINT UNITS 1 & 2      PREPARED BY: B. HOMYK  
 QUARTER 1 : START DATE 85010101      END DATE 85033124  
 QUARTER 2 : START DATE 85040101      END DATE 85063024

EFFLUENT AND WASTE DISPOSAL REPORT

LIQUID EFFLUENTS -- SUMMATION OF ALL RELEASES

UNITS	QUARTER 1	QUARTER 2	EST. TOTAL
			ERROR, %

A. FISSION AND ACTIVATION PRODUCTS

1. TOTAL RELEASE (EXCL. TRIT., GASES, ALPHA)	CI	9.95E-02	3.12E-01	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	1.95E-10	5.80E-10	
3. PERCENT OF APPLICABLE LIMIT	%	6.50E-03	1.93E-02	

B. TRITIUM

1. TOTAL RELEASE	CI	4.29E 01	4.32E 01	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	8.41E-08	8.02E-08	
3. PERCENT OF APPLICABLE LIMIT	%	2.80E-03	2.67E-03	

C. DISSOLVED AND ENTRAINED GASES

1. TOTAL RELEASE	CI	5.50E-03	4.47E-01	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	1.08E-11	8.31E-10	
3. PERCENT OF APPLICABLE LIMIT	%	5.40E-06	4.16E-04	

D. GROSS ALPHA RADIOACTIVITY

1. TOTAL RELEASE	CI	0.00E 00	0.00E 00	2.50E 01
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E. VOLUME WASTE RELEASED (PRIOR TO DILUTION)	LITERS	1.35E 07	5.58E 07	1.00E 01
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F. VOLUME DILUTION WATER USED DURING PERIOD	LITERS	5.10E 11	5.38E 11	1.00E 01
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EFFLUENT AND WASTE DISPOSAL REPORT

LIQUID EFFLUENTS FOR ALL RELEASE POINTS

QUARTER 1 : START DATE 85010101 END DATE 85033124  
 QUARTER 2 : START DATE 85040101 END DATE 85063024  
 DATE OF REPORT: AUG. 19, 1985  
 PREPARED BY: B. HOMYK

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES	UNITS	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
RELEASED					
H3	CI	0.00E 00	5.65E-01	4.29E 01	4.26E 01
NA24	CI	0.00E 00	5.16E-02	0.00E 00	0.00E 00
MN54	CI	0.00E 00	0.00E 00	6.30E-05	0.00E 00
FE55	CI	0.00E 00	0.00E 00	4.09E-03	1.75E-02
CO58	CI	0.00E 00	0.00E 00	1.99E-03	1.09E-03
CO60	CI	2.26E-03	0.00E 00	2.45E-02	2.93E-02
NI63	CI	0.00E 00	0.00E 00	1.68E-02	1.70E-03
SR90	CI	0.00E 00	0.00E 00	0.00E 00	1.27E-05
I131	CI	0.00E 00	1.34E-02	2.93E-03	0.00E 00
I132	CI	0.00E 00	1.04E-02	0.00E 00	0.00E 00
I133	CI	0.00E 00	3.83E-02	0.00E 00	0.00E 00
I135	CI	0.00E 00	2.55E-02	0.00E 00	0.00E 00
CS134	CI	6.46E-03	3.57E-02	1.42E-03	1.18E-02
CS137	CI	8.23E-03	4.94E-02	2.19E-02	2.07E-02
SB125	CI	0.00E 00	0.00E 00	8.82E-03	5.46E-03
TOTAL FOR					
PERIOD	CI	1.69E-02	7.89E-01	4.30E 01	4.27E 01
(ABOVE)					

EFFLUENT AND WASTE DISPOSAL REPORT

LIQUID EFFLUENTS FOR ALL RELEASE POINTS

-----  
QUARTER 1 : START DATE 85010101    END DATE 85033124  
QUARTER 2 : START DATE 85040101    END DATE 85063024  
DATE OF REPORT: AUG. 19, 1985  
PREPARED BY: B. HOMYK

CONTINUOUS MODE

BATCH MODE

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NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED		1	2	1	2
XE133	CI	0.00E 00	3.20E-02	5.50E-03	3.89E-03
XE135	CI	0.00E 00	9.43E-02	0.00E 00	0.00E 00
XE135M	CI	0.00E 00	3.17E-01	0.00E 00	0.00E 00

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EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

D - SOLID WASTE

FIRST HALF - 1985

Consolidated Edison Co. of New York  
 Indian Point Units 1 & 2

Effluent and Waste Disposal Report

Solid Waste Shipped Offsite For Burial or Disposal (Not irradiated fuel)

1. Type of waste	Units	6-Month Period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m <sup>3</sup> Ci	3.89 E+1 4.30 E+2	1.00 E+2
b. Dry compressible waste, contaminated equip, etc.	m <sup>3</sup> Ci	2.18 E+2 6.96 E+0	1.00 E+2
c. Irradiated components, control rods, etc.	m <sup>3</sup> Ci	. E . E	. E . E

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

a. Ni-63	%	3.49 E+1
Co-60	%	1.49 E+1
Co-58	%	1.14 E+1
Cs-137	%	1.05 E+1
H-3	%	9.09 E+0
Cs-134	%	4.63 E+0
Fe-55	%	4.12 E+0
b. Co-60	%	4.54 E+1
Ni-63	%	3.48 E+1
Cs-137	%	6.81 E+0
Fe-55	%	5.84 E+0

3. Solid Waste Disposition

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
19	Truck	Barnwell, S.C.

4. Solid waste containers

- a. 12 Fiberglass reinforced pressure vessels
- 12 Pressure vessels
- 3 High intensity containers
- 3 carbon steel containers - cement used for solidification
- b. 91 drums
- 66 crates

No irradiated fuel shipments

EFFLUENT AND WASTE DISPOSAL

SEMI-ANNUAL REPORT

E - RADIOLOGICAL IMPACT ON MAN

FIRST HALF - 1985



## 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 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 ( $\sigma_Y$ ) and vertical direction ( $\sigma_Z$ ).

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.

B. Population

(1) <u>Pathways</u> (Gaseous)	<u>Total Body</u> (man-rem)	<u>Thyroid</u> (man-thyroid rem)
(a) Noble Gas Immersion		
(i) Batch Release	0.32E-01	N/A
(ii) Continuous Release	0.22E+01	N/A
(b) Inhalation	0.18E+00	0.22E+00
(c) Ground Deposition	0.04E+00	N/A
(d) Totals	2.45E+00	0.22E+00

(2) Pathways (Liquid)

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

C. Average Doses to Individuals

(1) Pathways

(a) Liquid-Total Body	2.70E-06 mRem
(b) Gaseous-Total Body	1.22E-04 mRem

N/A = Not Applicable

\* \* \* AS LOW AS REASONABLY ACHIEVABLE \* \* \*

CATEGORY I DOSES

		DOSE (MREM PER YEAR INTAKE)						
PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.74E-03	4.54E-03	3.29E-03	6.68E-05	1.51E-03	5.10E-04	1.01E-04
INVERTEBRATE		5.17E-05	1.10E-04	5.55E-05	5.48E-06	1.84E-05	7.02E-05	3.74E-05
ALGAE		3.44E-10	5.77E-10	4.06E-10	8.53E-11	1.82E-10	3.82E-10	7.39E-11
DRINKING		7.98E-15	1.13E-14	8.13E-15	1.23E-14	3.66E-15	3.46E-15	1.77E-15
SHORELINE	2.21E-05	1.89E-05	1.89E-05	1.89E-05	1.89E-05	1.89E-05	1.89E-05	1.89E-05
SWIMMING	0.0	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07
BOATING	0.0	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07
TOTAL	2.21E-05	2.81E-03	4.67E-03	3.37E-03	9.18E-05	1.55E-03	6.00E-04	1.58E-04

  

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
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	

CATEGORY II DOSES

		DOSE (MREM PER YEAR INTAKE)						
PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.76E-03	4.55E-03	1.82E-03	6.07E-05	1.15E-03	5.88E-04	6.83E-05
INVERTEBRATE		4.74E-05	9.71E-05	3.45E-05	4.94E-06	1.40E-05	5.57E-05	2.67E-05
ALGAE		4.50E-10	7.48E-10	3.00E-10	1.02E-10	1.82E-10	4.13E-10	6.85E-11
DRINKING		1.01E-14	1.48E-14	6.06E-15	1.43E-14	3.66E-15	4.08E-15	1.53E-15
SHORELINE	2.97E-05	2.53E-05	2.53E-05	2.53E-05	2.53E-05	2.53E-05	2.53E-05	2.53E-05
SWIMMING	0.0	6.03E-07	6.03E-07	6.03E-07	6.03E-07	6.03E-07	6.03E-07	6.03E-07
BOATING	0.0	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07
TOTAL	2.97E-05	2.84E-03	4.68E-03	1.89E-03	9.19E-05	1.19E-03	6.69E-04	1.21E-04

  

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
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	

CATEGORY III DOSES

		DOSE (MREM PER YEAR INTAKE)						
PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		3.41E-03	3.99E-03	7.00E-04	6.50E-05	4.97E-04	4.60E-04	2.75E-05
INVERTEBRATE		4.86E-05	6.86E-05	1.53E-05	5.40E-06	6.27E-06	2.75E-05	1.14E-05
ALGAE		1.26E-06	1.48E-06	2.75E-07	2.52E-07	1.82E-07	4.88E-07	6.52E-08
DRINKING		2.63E-11	2.95E-11	5.77E-12	3.44E-11	3.66E-12	5.58E-12	1.38E-12
SHORELINE	6.20E-06	5.29E-06	5.29E-06	5.29E-06	5.29E-06	5.29E-06	5.29E-06	5.29E-06
SWIMMING	0.0	1.51E-07	1.51E-07	1.51E-07	1.51E-07	1.51E-07	1.51E-07	1.51E-07
BOATING	0.0	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07	3.02E-07
TOTAL	6.20E-06	3.47E-03	4.06E-03	7.21E-04	7.64E-05	5.09E-04	4.94E-04	4.47E-05

	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		5.13E-04	6.71E-04	4.58E-05	1.14E-05	3.60E-05	7.95E-05	1.98E-06
INVERTEBRATE		5.53E-06	7.89E-06	9.18E-07	7.61E-07	3.69E-07	2.08E-06	6.59E-07
ALGAE		2.59E-09	3.40E-09	2.58E-10	6.07E-10	1.82E-10	7.19E-10	6.39E-11
DRINKING		5.30E-14	6.80E-14	5.67E-15	8.30E-14	3.66E-15	1.02E-14	1.31E-15
SHORELINE	1.33E-06	1.13E-06	1.13E-06	1.13E-06	1.13E-06	1.13E-06	1.13E-06	1.13E-06
SWIMMING	0.0	6.03E-14	6.03E-14	6.03E-14	6.03E-14	6.03E-14	6.03E-14	6.03E-14
BOATING	0.0	1.51E-09	1.51E-09	1.51E-09	1.51E-09	1.51E-09	1.51E-09	1.51E-09
TOTAL	1.33E-06	5.20E-04	6.80E-04	4.79E-05	1.33E-05	3.75E-05	8.27E-05	3.77E-06

	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

PATHWAY	DOSE (MREM PER YEAR INTAKE)							
	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.96E-03	3.24E-03	2.35E-03	4.49E-05	1.08E-03	3.64E-04	7.19E-05
INVERTEBRATE		3.69E-05	7.89E-05	3.96E-05	3.65E-06	1.31E-05	5.01E-05	2.67E-05
ALGAE		2.45E-10	4.12E-10	2.90E-10	5.72E-11	1.29E-10	2.73E-10	5.26E-11
DRINKING		5.75E-13	8.14E-13	5.85E-13	1.61E-12	2.69E-13	2.50E-13	1.31E-13
SHORELINE	1.58E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05	1.35E-05
SWIMMING	0.0	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07
BOATING	0.0	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07
TOTAL	1.58E-05	2.01E-03	3.34E-03	2.40E-03	6.24E-05	1.11E-03	4.28E-04	1.12E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
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	

LOCATION IS DOWNSTREAM

CATEGORY II DOSES

PATHWAY	DOSE (MREM PER YEAR INTAKE)							
	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.97E-03	3.25E-03	1.30E-03	4.07E-05	8.23E-04	4.20E-04	4.87E-05
INVERTEBRATE		3.38E-05	6.93E-05	2.46E-05	3.29E-06	9.98E-06	3.97E-05	1.90E-05
ALGAE		3.21E-10	5.34E-10	2.14E-10	6.80E-11	1.29E-10	2.95E-10	4.88E-11
DRINKING		7.28E-13	1.06E-12	4.37E-13	1.93E-12	2.69E-13	2.94E-13	1.14E-13
SHORELINE	2.12E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05	1.81E-05
SWIMMING	0.0	3.65E-07	3.65E-07	3.65E-07	3.65E-07	3.65E-07	3.65E-07	3.65E-07
BOATING	0.0	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07
TOTAL	2.12E-05	2.03E-03	3.34E-03	1.35E-03	6.26E-05	8.51E-04	4.78E-04	8.64E-05

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
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	

LOCATION IS DOWNSTREAM

CATEGORY III DOSES

PATHWAY	DOSE (MREM PER YEAR INTAKE)							
	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.44E-03	2.85E-03	5.00E-04	4.34E-05	3.55E-04	3.28E-04	1.96E-05
INVERTEBRATE		3.47E-05	4.90E-05	1.09E-05	3.59E-06	4.47E-06	1.96E-05	8.16E-06

ALGAE		8.98E-07	1.06E-06	1.96E-07	1.68E-07	1.29E-07	3.49E-07	4.64E-08
DRINKING		1.89E-09	2.12E-09	4.20E-10	4.82E-09	2.69E-10	4.01E-10	1.03E-10
SHORELINE	4.43E-06	3.78E-06	3.78E-06	3.78E-06	3.78E-06	3.78E-06	3.78E-06	3.78E-06
SWIMMING	0.0	9.12E-08	9.12E-08	9.12E-08	9.12E-08	9.12E-08	9.12E-08	9.12E-08
BOATING	0.0	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07	1.82E-07
TOTAL	4.43E-06	2.48E-03	2.90E-03	5.15E-04	5.12E-05	3.63E-04	3.52E-04	3.19E-05

	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		3.66E-04	4.79E-04	3.27E-05	7.59E-06	2.57E-05	5.68E-05	1.41E-06
INVERTEBRATE		3.95E-06	5.64E-06	6.55E-07	5.08E-07	2.63E-07	1.48E-06	4.70E-07
ALGAE		1.85E-09	2.43E-09	1.84E-10	4.05E-10	1.29E-10	5.13E-10	4.54E-11
DRINKING		3.81E-12	4.89E-12	4.16E-13	1.16E-11	2.69E-13	7.31E-13	9.87E-14
SHORELINE	9.48E-07	8.10E-07	8.10E-07	8.10E-07	8.10E-07	8.10E-07	8.10E-07	8.10E-07
SWIMMING	0.0	3.65E-14	3.65E-14	3.65E-14	3.65E-14	3.65E-14	3.65E-14	3.65E-14
BOATING	0.0	9.12E-10	9.12E-10	9.12E-10	9.12E-10	9.12E-10	9.12E-10	9.12E-10
TOTAL	9.48E-07	3.71E-04	4.86E-04	3.42E-05	8.91E-06	2.68E-05	5.90E-05	2.69E-06

	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

		-----DOSE (MAN-REM)-----									
PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BCDY	THYROID	KIDNEY	LUNG	GI-LLI		
FISH	CATEGORY I	7.24E+04	6.63E-03	1.10E-02	7.95E-03	7.53E-05	3.65E-03	1.23E-03	2.42E-04		
FISH	CATEGORY II	1.16E+04	1.40E-03	2.31E-03	9.24E-04	1.40E-05	5.84E-04	2.98E-04	3.44E-05		
FISH	CATEGORY III	7.00E+03	2.42E-03	2.83E-03	4.97E-04	2.03E-05	3.53E-04	3.27E-04	1.94E-05		
FISH	TOTAL	9.10E+04	1.05E-02	1.61E-02	9.37E-03	1.10E-04	4.59E-03	1.85E-03	2.96E-04		
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 DOSES \* \* \*  
MAN-REM

COMMERCIAL HARVEST

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	9.15E+07	2.95E-02	4.88E-02	3.53E-02	2.58E-04	1.62E-02	5.47E-03	1.08E-03
FISH	CATEGORY II	1.46E+07	6.24E-03	1.03E-02	4.11E-03	4.80E-05	2.59E-03	1.32E-03	1.53E-04
FISH	CATEGORY III	8.84E+06	1.08E-02	1.26E-02	2.21E-03	6.94E-05	1.57E-03	1.45E-03	8.62E-05
FISH	TOTAL	1.15E+08	4.65E-02	7.16E-02	4.16E-02	3.75E-04	2.04E-02	8.25E-03	1.32E-03

DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.01E+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--TOTAL 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	CATEGORY I	1.23E+05	1.13E-02	1.87E-02	1.35E-02	9.87E-05	6.21E-03	2.09E-03	4.12E-04
FISH	CATEGORY II	1.97E+04	2.39E-03	3.93E-03	1.57E-03	1.84E-05	9.93E-04	5.06E-04	5.85E-05
FISH	CATEGORY III	1.19E+04	4.12E-03	4.82E-03	8.45E-04	2.65E-05	6.00E-04	5.56E-04	3.30E-05
FISH	TOTAL	1.55E+05	1.78E-02	2.74E-02	1.59E-02	1.44E-04	7.80E-03	3.16E-03	5.04E-04

\* \* \* 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	CATEGORY I	7.94E+03	5.73E-05	1.23E-04	6.15E-05	2.75E-06	2.03E-05	7.77E-05	4.13E-05
INVER	CATEGORY II	1.26E+03	1.10E-05	2.26E-05	7.99E-06	5.10E-07	3.22E-06	1.29E-05	6.16E-06
INVER	CATEGORY III	7.94E+02	1.59E-05	2.24E-05	4.99E-06	7.67E-07	2.03E-06	8.95E-06	3.71E-06
INVER	TOTAL	1.00E+04	8.42E-05	1.68E-04	7.45E-05	4.03E-06	2.55E-05	9.96E-05	5.12E-05

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

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	1.33E+07	4.15E-05	8.89E-05	4.46E-05	1.54E-06	1.47E-05	5.63E-05	2.99E-05
INVER	CATEGORY II	2.11E+06	7.98E-06	1.64E-05	5.79E-06	2.85E-07	2.34E-06	9.36E-06	4.47E-06
INVER	CATEGORY III	1.33E+06	1.15E-05	1.63E-05	3.62E-06	4.28E-07	1.47E-06	6.49E-06	2.69E-06
INVER	TOTAL	1.67E+07	6.10E-05	1.21E-04	5.40E-05	2.25E-06	1.85E-05	7.22E-05	3.71E-05

DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.01E+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	CATEGORY I	7.94E+02	5.72E-06	1.22E-05	6.14E-06	2.12E-07	2.02E-06	7.75E-06	4.12E-06
INVER	CATEGORY II	1.26E+02	1.10E-06	2.25E-06	7.97E-07	3.92E-08	3.22E-07	1.29E-06	6.15E-07
INVER	CATEGORY III	7.94E+01	1.59E-06	2.24E-06	4.98E-07	5.90E-08	2.02E-07	8.93E-07	3.70E-07
INVER	TOTAL	1.00E+03	8.41E-06	1.67E-05	7.44E-06	3.10E-07	2.55E-06	9.94E-06	5.10E-06

\* \* \* POPULATION WATER CONSUMPTION DOSES \* \* \*

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	CATEGORY I	2.44E+02	1.15E-10	5.93E-11	3.81E-11	0.0	1.84E-11	6.11E-12	2.14E-12
DRINKING	CATEGORY II	3.64E+01	1.92E-11	1.14E-11	4.14E-12	0.0	2.75E-12	1.41E-12	3.06E-13
DRINKING	CATEGORY III	5.20E+01	4.92E-11	3.30E-11	5.35E-12	0.0	3.92E-12	3.74E-12	4.29E-13
DRINKING	TOTAL	3.33E+02	1.84E-10	1.04E-10	4.76E-11	0.0	2.51E-11	1.13E-11	2.87E-12

POPULATION=1.00E+00    DILUTION=1.00E+02    TRANSIT TIME=1.00E+05 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	1.84E-10	1.04E-10	4.76E-11	0.0	2.51E-11	1.13E-11	2.87E-12

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
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\* \* \* RECREATION POPULATION DOSES \* \* \*

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DOSE(MAN-REM)

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PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	5.25E-03	4.48E-03	4.48E-03
LOCATION- DOWNSTREAM					
DILUTION=0.70E+01		TRANSIT TIME=0.40E+01 HR		SWF=0.2	

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DOSE(MAN-REM)

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PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.0	6.52E-05	6.52E-05
LOCATION- DOWNSTREAM					
DILUTION=0.70E+01		TRANSIT TIME=0.40E+01 HR			

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DOSE(MAN-REM)

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PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.0	3.26E-05	3.26E-05
LOCATION- DOWNSTREAM					
DILUTION=0.70E+01		TRANSIT TIME=0.40E+01 HR			

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\* \* \* DOSE TO BIOTA \* \* \*

MRADS PER YEAR

ILUTION= 7.00E+00

TRANSIT TIME= 4.00E+00 HR

	INTERNAL	EXTERNAL	TOTAL
FISH	6.56E-03	1.19E-02	1.84E-02
INVERTEBRATE	1.08E-03	2.37E-02	2.48E-02
ALGAE	3.30E-03	3.44E-05	3.33E-03
MUSKRAT	3.88E-02	7.90E-03	4.67E-02
RACCOON	2.38E-03	5.92E-03	8.29E-03
HERON	2.23E-01	7.90E-03	2.31E-01
DUCK	3.42E-02	1.18E-02	4.61E-02

\* \* \* COST-BENEFIT ANALYSIS \* \* \*

NUCLIDE	RELEASE CI/YR	MAN-REM DOSE		MAN-REM PER CURIE	
		TOTAL BODY	THYROID	TOTAL BODY	THYROID
11NA 24	5.16E-02	2.33E-05	2.33E-05	4.52E-04	4.52E-04
25MN 54	6.30E-05	5.32E-07	1.57E-07	8.44E-03	2.48E-03
26FE 55	2.16E-02	6.55E-05	9.26E-11	3.03E-03	4.29E-09
27CO 58	3.08E-03	3.05E-06	2.40E-06	9.90E-04	7.80E-04
27CO 60	5.38E-02	2.05E-03	2.01E-03	3.80E-02	3.74E-02
28NI 63	1.85E-02	1.64E-05	0.0	8.88E-04	0.0
38SR 90	1.27E-05	1.79E-06	4.60E-13	1.41E-01	3.62E-08
53I 131	1.63E-02	2.25E-06	4.92E-04	1.38E-04	3.02E-02
53I 132	1.04E-02	9.19E-07	9.19E-07	8.83E-05	8.83E-05
53I 133	3.83E-02	2.30E-06	2.96E-06	6.00E-05	7.73E-05
53I 135	2.55E-02	3.78E-06	3.78E-06	1.48E-04	1.48E-04
55CS 134	5.54E-02	2.54E-02	6.63E-04	4.58E-01	1.20E-02
55CS 137	1.00E-01	2.81E-02	1.78E-03	2.81E-01	1.78E-02
51SB 125	1.43E-02	5.76E-05	5.76E-05	4.03E-03	4.03E-03
TOTAL		5.57E-02	5.04E-03		

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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: A

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0.	5.	19.	1.	0.	0.	25.
NNE	0.	0.	0.	0.	0.	0.	0.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	0.	0.	0.	0.	0.	0.
E	0.	0.	0.	0.	0.	0.	0.
ESE	1.	0.	0.	0.	0.	0.	1.
SE	6.	2.	0.	0.	0.	0.	8.
SSE	6.	9.	0.	0.	0.	0.	15.
S	0.	16.	2.	0.	0.	0.	18.
SSW	0.	6.	5.	0.	0.	0.	11.
SW	0.	6.	0.	0.	0.	0.	6.
WSW	2.	7.	0.	0.	0.	0.	9.
W	0.	20.	3.	0.	0.	0.	23.
WNW	0.	16.	7.	1.	0.	0.	24.
NW	1.	7.	11.	2.	0.	0.	21.
NNW	0.	13.	12.	0.	0.	0.	25.

## VARIABLE

Total	16.	107.	59.	4.	0.	0.	186.
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Periods of calm (hours): 0.

Hours of missing data: Total missing hours during first quarter = 10

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: B

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	2.	10.	3.	0.	0.	0.	15.
NNE	0.	0.	0.	0.	0.	0.	0.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	0.	1.	0.	0.	0.	0.	1.
E	0.	1.	0.	0.	0.	0.	1.
ESE	1.	2.	0.	0.	0.	0.	3.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	1.	2.	0.	0.	0.	0.	3.
S	1.	3.	1.	0.	0.	0.	5.
SSW	0.	1.	0.	0.	0.	0.	1.
SW	2.	2.	0.	0.	0.	0.	4.
WSW	2.	4.	1.	0.	0.	0.	7.
W	1.	4.	2.	0.	0.	0.	7.
WNW	1.	6.	8.	2.	0.	0.	17.
NW	0.	6.	15.	2.	0.	0.	23.
NNW	0.	4.	4.	0.	0.	0.	8.

VARIABLE

Total	13.	46.	34.	4.	0.	0.	97.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: C

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	0.	10.	2.	0.	0.	0.	12.
NNE	0.	4	0.	0.	0.	0.	4.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	1.	1.	0.	0.	0.	0.	2.
E	1.	0.	0.	0.	0.	0.	1.
ESE	1.	0.	0.	0.	0.	0.	1.
SE	4.	1.	0.	0.	0.	0.	5.
SSE	3.	1.	0.	0.	0.	0.	4.
S	3.	2.	0.	0.	0.	0.	5.
SSW	0.	4.	0.	0	0.	0.	4.
SW	3.	6.	1.	0.	0.	0.	10.
WSW	1.	4.	1.	0.	0.	0.	6.
W	1.	3.	0.	0.	0.	0.	4.
WNW	0.	9.	3.	2.	0.	0.	14.
NW	0.	7.	9.	3.	0.	0.	19.
NNW	3.	9.	7.	0.	0.	0.	19.
<b>VARIABLE</b>							
Total	21.	61.	23.	5.	0.	0.	110.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: D

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	24.	122.	60.	3.	0.	0.	209.
NNE	37.	58.	18.	0.	0.	0.	113.
NE	21.	13.	0.	0.	0.	0.	34.
ENE	14.	3.	0.	0.	0.	0.	17.
E	11.	5.	0.	0.	0.	0.	16.
ESE	9.	2.	0.	0.	0.	0.	11.
SE	19.	2.	0.	0.	0.	0.	21.
SSE	15.	12.	0.	0.	0.	0.	27.
S	14.	18.	1.	0.	0.	0.	33.
SSW	3.	16.	1.	0.	0.	0.	20.
SW	10.	13.	0.	0.	0.	0.	23.
WSW	5.	16.	3.	0.	0.	0.	24.
W	10.	33.	8.	0.	0.	0.	51.
WNW	3.	59.	18.	1.	0.	0.	81.
NW	3.	81.	105.	12.	0.	0.	201.
NNW	9.	90.	37.	5.	0.	0.	141.
<b>VARIABLE</b>							
Total	207.	543.	251.	21.	0.	0.	1022.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: E

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	20.	16.	5.	0.	0.	0.	41.
NNE	35.	16.	3.	0.	0.	0.	54.
NE	58.	8.	0.	0.	0.	0.	66.
ENE	42.	4.	4.	0.	0.	0.	50.
E	34.	0.	1.	1.	0.	0.	36.
ESE	27.	0.	0.	0.	0.	0.	27.
SE	34.	2.	0.	0.	0.	0.	36.
SSE	25.	20.	0.	0.	0.	0.	45.
S	26.	33.	1.	0.	0.	0.	60.
SSW	11.	10.	1.	0.	0.	0.	22.
SW	8.	9.	0.	0.	0.	0.	17.
WSW	7.	8.	0.	0.	0.	0.	15.
W	5.	8.	5.	0.	0.	0.	18.
WNW	6.	20.	3.	0.	0.	0.	29.
NW	3.	6.	1.	0.	0.	0.	10.
NNW	10.	7.	0.	0.	0.	0.	17.
<b>VARIABLE</b>							
Total	351.	167.	24.	1.	0.	0.	543.
Periods of calm (hours):	0.						
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: F

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	5.	2.	4.	0.	0.	0.	11.
NNE	23.	10.	0.	0.	0.	0.	33.
NE	35.	13.	0.	0.	0.	0.	48.
ENE	8.	0.	0.	0.	0.	0.	8.
E	15.	0.	0.	0.	0.	0.	15.
ESE	4.	1.	0.	0.	0.	0.	5.
SE	7.	0.	0.	0.	0.	0.	7.
SSE	7.	0.	0.	0.	0.	0.	7.
S	2.	0.	0.	0.	0.	0.	2.
SSW	0.	1.	0.	0.	0.	0.	1.
SW	0.	1.	0.	0.	0.	0.	1.
WSW	1.	2.	0.	0.	0.	0.	3.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	2.	1.	0.	0.	0.	0.	3.
NNW	1.	0.	0.	0.	0.	0.	1.
<b>VARIABLE</b>							
Total	110.	31.	4.	0.	0.	0.	145.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: JAN-MAR 1985

STABILITY CLASS: G

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	3.	1.	4.	0.	0.	0.	8.
NNE	13.	5.	2.	0.	0.	0.	20.
NE	6.	0.	0.	0.	0.	0.	6.
ENE	5.	0.	0.	0.	0.	0.	5.
E	3.	0.	0.	0.	0.	0.	3.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	2.	0.	0.	0.	0.	0.	2.
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	1.	0.	0.	0.	0.	0.	1.
WNW	0.	0.	0.	0.	0.	0.	0.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	0.	0.	0.	0.	0.	0.
<b>VARIABLE</b>							
Total	35.	6.	6.	0.	0.	0.	47.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: A

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	12.	48.	21.	0.	0.	0.	81.
NNE	3.	8.	5.	0.	0.	0.	16.
NE	0.	0.	0.	0.	0.	0.	0.
ENE	1.	0.	0.	0.	0.	0.	1.
E	1.	0.	0.	0.	0.	0.	1.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	9.	10.	0.	0.	0.	0.	19.
SSE	26.	46.	0.	0.	0.	0.	72.
S	26.	60.	2.	0.	0.	0.	88.
SSW	4.	23.	12.	0.	0.	0.	39.
SW	5.	9.	3.	1.	0.	0.	18.
WSW	1.	13.	1.	0.	0.	0.	15.
W	2.	40.	1.	0.	0.	0.	43.
WNW	1.	24.	9.	0.	0.	0.	34.
NW	4.	16.	12.	0.	0.	0.	32.
NNW	2.	24.	8.	0.	0.	0.	34.
<b>VARIABLE</b>							
Total	99.	321.	74.	1.	0.	0.	495.
Periods of calm (hours):	0.						
Hours of missing data:	Total missing hours during second quarter = 0						

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: B

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	5.	12.	2.	0.	0.	0.	19.
NNE	3.	2.	2.	0.	0.	0.	7.
NE	2.	2.	0.	0.	0.	0.	4.
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	7.	0.	0.	0.	0.	0.	7.
SSE	7.	4.	0.	0.	0.	0.	11.
S	8.	7.	0.	0.	0.	0.	15.
SSW	2.	1.	2.	0.	0.	0.	5.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	2.	2.	0.	0.	0.	0.	4.
W	2.	7.	0.	0.	0.	0.	9.
WNW	0.	3.	2.	0.	0.	0.	5.
NW	0.	3.	1.	0.	0.	0.	4.
NNW	0.	8.	1.	0.	0.	0.	9.
<b>VARIABLE</b>							
Total	40.	51.	10.	0.	0.	0.	101.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: C

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	7.	8.	8.	0.	0.	0.	23.
NNE	2.	2.	1.	0.	0.	0.	5.
NE	2.	0.	0.	0.	0.	0.	2.
ENE	1.	0.	0.	0.	0.	0.	1.
E	2.	0.	0.	0.	0.	0.	2.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	5.	0.	0.	0.	0.	0.	5.
SSE	5.	3.	0.	0.	0.	0.	8.
S	6.	6.	1.	0.	0.	0.	13.
SSW	3.	3.	1.	0.	0.	0.	7.
SW	0.	1.	1.	0.	0.	0.	2.
WSW	3.	1.	0.	0.	0.	0.	4.
W	0.	6.	0.	0.	0.	0.	6.
WNW	0.	3.	0.	0.	0.	0.	3.
NW	0.	2.	3.	0.	0.	0.	5.
NNW	0.	3.	2.	0.	0.	0.	5.
<b>VARIABLE</b>							
Total	38.	38.	17.	0.	0.	0.	93.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: D

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	23.	62.	16.	0.	0.	0.	101.
NNE	37.	61.	26.	0.	0.	0.	124.
NE	29.	14.	0.	0.	0.	0.	43.
ENE	33.	3.	0.	0.	0.	0.	36.
E	33.	2.	0.	0.	0.	0.	35.
ESE	17.	1.	0.	0.	0.	0.	18.
SE	32.	3.	0.	0.	0.	0.	35.
SSE	19.	16.	0.	0.	0.	0.	35.
S	15.	26.	1.	0.	0.	0.	42.
SSW	6.	15.	3.	0.	0.	0.	24.
SW	4.	2.	1.	0.	0.	0.	7.
WSW	6.	6.	2.	0.	0.	0.	14.
W	7.	25.	2.	0.	0.	0.	34.
WNW	1.	12.	1.	0.	0.	0.	14.
NW	4.	18.	10.	0.	0.	0.	32.
NNW	5.	24.	12.	0.	0.	0.	41.
<b>VARIABLE</b>							
Total	271.	290.	74.	0.	0.	0.	635.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: E

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	21.	34.	2.	0.	0.	0.	57.
NNE	54.	25.	0.	0.	0.	0.	79.
NE	74.	17.	0.	0.	0.	0.	91.
ENE	60.	2.	0.	0.	0.	0.	62.
E	28.	1.	0.	0.	0.	0.	29.
ESE	13.	0.	0.	0.	0.	0.	13.
SE	26.	4.	0.	0.	0.	0.	30.
SSE	28.	8.	0.	0.	0.	0.	36.
S	39.	50.	0.	0.	0.	0.	89.
SSW	12.	18.	0.	0.	0.	0.	30.
SW	3.	5.	1.	0.	0.	0.	9.
WSW	4.	9.	2.	0.	0.	0.	15.
W	3.	23.	2.	0.	0.	0.	28.
WNW	1.	11.	1.	0.	0.	0.	13.
NW	2.	5.	2.	1.	0.	0.	10.
NNW	2.	12.	1.	2.	0.	0.	17.
<b>VARIABLE</b>							
Total	370.	224.	11.	3.	0.	0.	608.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: F

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	10.	1.	0.	0.	0.	0.	11.
NNE	36.	9.	0.	0.	0.	0.	45.
NE	36.	6.	0.	0.	0.	0.	42.
ENE	23.	0.	0.	0.	0.	0.	23.
E	27.	0.	0.	0.	0.	0.	27.
ESE	15.	0.	0.	0.	0.	0.	15.
SE	10.	0.	0.	0.	0.	0.	10.
SSE	6.	1.	0.	0.	0.	0.	7.
S	8.	3.	0.	0.	0.	0.	11.
SSW	4.	1.	0.	0.	0.	0.	5.
SW	1.	0.	0.	0.	0.	0.	1.
WSW	0.	0.	0.	0.	0.	0.	0.
W	3.	2.	0.	0.	0.	0.	5.
WNW	1.	0.	0.	0.	0.	0.	1.
NW	3.	0.	0.	0.	0.	0.	3.
NNW	4.	0.	0.	0.	0.	0.	4.
<b>VARIABLE</b>							
Total	187.	23.	0.	0.	0.	0.	210.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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 <sup>a</sup>

PERIOD OF RECORD: APR-JUN 1985

STABILITY CLASS: G

ELEVATION: 10 Meter

Wind Direction	Wind Speed (mph) at 10m Level						TOTAL
	1-3	4-7	8-12	13-18	19-24	>24	
N	2.	0.	0.	0.	0.	0.	2.
NNE	10.	0.	0.	0.	0.	0.	10.
NE	15.	0.	0.	0.	0.	0.	15.
ENE	7.	0.	0.	0.	0.	0.	7.
E	3.	0.	0.	0.	0.	0.	3.
ESE	1.	0.	0.	0.	0.	0.	1.
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	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	1.	0.	0.	0.	0.	0.	1.
NW	0.	0.	0.	0.	0.	0.	0.
NNW	0.	1.	0.	0.	0.	0.	1.
<b>VARIABLE</b>							
Total	41.	1.	0.	0.	0.	0.	42.
Periods of calm (hours):		0.					
Hours of missing data:							

<sup>a</sup> 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

G - REPORTABLE ITEMS

FIRST HALF - 1985

### 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

For the period reported there were no changes made to the Offsite Dose Calculation Manual.

C. Radioactive Waste Systems

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

### Reportable Items

A. Radioactive Liquid Effluent Monitoring Instrumentation

The steam generator blowdown effluent line flow rate measurement device has been inoperable for greater than 30 days and is being reported pursuant to Indian Point 2 Technical Specification 3.9.A.2.C. Prior to the issuance at the radiological effluent technical specifications, Amendment 90 to Indian Point Facility Operating License No. DPR-26 on June 20, 1984, the provisions to measure steam generator blowdown flow had been disconnected to establish sampling connections outside containment. Engineering has been underway to provide this capability. This new flow measurement equipment is expected to be operable by the end of the 1987 Refueling Outage.