Murray Selman
Vice President

Consolidated Edison Company of New York, Inc.
Indian Point Station
Broadway & Bleakley Avenue
Buchanan, NY 10511
Telephone (914) 737-8116

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Semi-Annual Effluent and Waste Disposal Report

Attached is the Semi-Annual Effluent and Waste Disposal Report for the period January 1, 1987 through June 30, 1987.

Please contact us if you have questions concerning this submittal.

Very truly yours,

Murray Selman

Attachment

cc: Mr. William Russell
Regional Administrator - Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Ms. Marylee M. Slosson, Project Manager
Project Directorate I-1
Division of Reactor Projects - I/II
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 38
Buchanan, NY 10511

IE48
1/1

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL

EFFLUENT AND WASTE DISPOSAL REPORT

JANUARY 1, 1987 - JUNE 30, 1987

FACILITY: Indian Point Station (Units 1 and 2)

LICENSEE: Consolidated Edison Company of New York, Inc.

This information is provided pursuant to 10 CFR 50.36a(a)(2), and employs certain guidance as set forth in Regulatory Guide 1.21, Revision 1. The numbered sections of this part of the report reference corresponding sections of the subject Regulatory Guide, pages 1.21-10 through 1.21-12. This Semi-Annual Effluent and Waste Disposal Report for Indian Point Units 1 and 2 covers discharges for the first and second quarters of 1987. The New York Power Authority, licensee of Indian Point Unit 3, has chosen to issue a separate semi-annual report.

A. Supplemental Information

1. Regulatory Limits

Indian Point Units 1 and 2 are presently subject to radioactive waste release specifications 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".

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.

8709100307 870831
PDR ADOCK 05000003
R PDR

IE48
1/1

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

The tritium limit has been established in the same manner as the other isotopes in liquid effluents. A derived MPC of $2X10^{-4}$ uCi/ml for dissolved noble gases has been conservatively adopted for the swimming pathway.

3. Average Energy

The average energy (E) of the radionuclide mixture in releases of fission and activation gases for the first quarter was 0.242 Mev/Dis. for E_β and 0.126 Mev/Dis. for E_γ. The corresponding values for the second quarter were 0.200 Mev/Dis. and 0.060 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.

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

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.

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

5. Batch Releases

	1987	
a. Liquid	1st Qtr.	2nd Qtr.
Number of Batch Releases	47	40
Total Time Period of Batch Release (Minutes)	7100	4110
Maximum Time Period Batch Release (Minutes)	840	250
Average Time Period Batch Release (Minutes)	151	103
Minimum Time Period Batch Release (Minutes)	45	45
Average Stream Flow cfs (1)		
b. Gaseous (2)		
Number of Batch Release	14	97
Total Time Period Batch Release (Minutes)	129000	26600
Maximum Time Period Batch Release (Minutes)	10000	11500
Average Time Period Batch Release (Minutes)	9220	274
Minimum Time Period Batch Release (Minutes)	137	10

6. Abnormal Releases

a. Liquid - None

b. Gaseous - None

(1) This information is obtained from the U.S. Department of Interior. It is not available at this time.

(2) During the First Quarter 1987, the Gaseous Batch Releases were run on a week to week basis. There was a more conservative view taken as all were batch releases but were compiled on a weekly basis versus a daily basis. This was changed to a batch by batch release method in the Second Quarter as previously used and will be continued in that mode for future reporting. There is no affect on the level of releases reported.

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

B - GASEOUS EFFLUENTS

FIRST HALF - 1987

CONSOLIDATED EDISON CO. OF N.Y. DATE OF REPORT: AUG. 7, 1987
INDIAN POINT UNITS 1 & 2 PREPARED BY: CON EDISON
QUARTER 1 : START DATE 87010101 END DATE 87033124
QUARTER 2 : START DATE 87040101 END DATE 87063024

EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS -- SUMMATION OF ALL RELEASES

	UNITS	QUARTER 1	QUARTER 2	EST. TOTAL ERROR, %
A. FISSION AND ACTIVATION GASES				
1. TOTAL RELEASE	CI	2.05E 03	3.84E 02	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.63E 02	4.89E 01	
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	NA	NA	
B. IODINES				
1. TOTAL IODINE-131	CI	1.39E-04	5.56E-04	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	1.79E-05	7.08E-05	
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	NA	NA	
C. PARTICULATES				
1. PARTICULATES WITH HALF-LIVES >8 DAYS	CI	2.06E 00	2.30E 00	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.64E-01	2.93E-01	
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	NA	NA	
4. GROSS ALPHA RADIOACTIVITY	CI	0.00E 00	0.00E 00	
D. TRITIUM				
1. TOTAL RELEASE	CI	1.95E-01	7.98E-02	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.51E-02	1.01E-02	
3. PERCENT OF TECHNICAL SPECIFICATION LIMIT	%	NA	NA	

DATE OF REPORT: AUG. 31, 1987
PREPARED BY:

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE QUARTER 1	CONTINUOUS MODE QUARTER 2	BATCH MODE QUARTER 1	BATCH MODE QUARTER 2
1. FISSION AND ACTIVATION GASES					
H3	CI	1.95E-01	8.13E-02	0.00E 00	0.00E 00
AR41	CI	8.57E-02	7.43E-02	4.79E 00	1.51E 00
KR85M	CI	9.24E-02	7.21E-02	0.00E 00	0.00E 00
KR85	CI	0.00E 00	0.00E 00	0.00E 00	0.00E 00
KR87	CI	3.53E-02	3.46E-02	0.00E 00	0.00E 00
KR88	CI	1.29E-01	1.12E-01	2.87E-01	4.02E-01
XE133M	CI	6.43E-02	5.43E-02	8.34E 00	2.38E 00
XE133	CI	1.27E 02	9.17E 01	1.10E 03	2.67E 02
XE135M	CI	7.11E-01	7.51E-01	0.00E 00	0.00E 00
XE135	CI	7.89E 02	1.48E 01	2.07E 01	5.65E 00
TOTAL FOR PERIOD (ABOVE)	CI	9.17E 02	1.08E 02	1.13E 03	2.77E 02

* DENOTES SUPPLEMENTAL ISOTOPES

DATE OF REPORT: AUG. 31, 1987
PREPARED BY:

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE QUARTER 1	CONTINUOUS MODE QUARTER 2	BATCH MODE QUARTER 1	BATCH MODE QUARTER 2
2. IODINES					
I131	CI	1.39E-04	5.59E-04	0.00E 00	0.00E 00
I133	CI	2.93E-04	2.09E-03	0.00E 00	0.00E 00
TOTAL FOR PERIOD (ABOVE)	CI	4.33E-04	2.65E-03	0.00E 00	0.00E 00

* DENOTES SUPPLEMENTAL ISOTOPES

DATE OF REPORT: AUG. 31, 1987
PREPARED BY:

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE QUARTER 1	CONTINUOUS MODE QUARTER 2	BATCH MODE QUARTER 1	BATCH MODE QUARTER 2
3. PARTICULATES					
C14	CI	2.00E 00	2.00E 00	0.00E 00	0.00E 00
CO58	CI	0.00E 00	1.48E-02	0.00E 00	0.00E 00
CO60	CI	3.54E-05	1.82E-05	0.00E 00	0.00E 00
CS137	CI	9.83E-05	8.86E-02	0.00E 00	0.00E 00
* FE55	CI	1.61E-02	2.00E-01	0.00E 00	0.00E 00
* NI63	CI	3.96E-02	4.45E-08	0.00E 00	0.00E 00
TOTAL FOR PERIOD (ABOVE)	CI	2.06E 00	2.30E 00	0.00E 00	0.00E 00

* DENOTES SUPPLEMENTAL ISOTOPES

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

C - LIQUID EFFLUENTS

FIRST HALF - 1987

INDIAN POINT UNITS 1 & 2 PREPARED BY: CON EDISON
QUARTER 1 : START DATE 87010101 END DATE 87033124
QUARTER 2 : START DATE 87040101 END DATE 87063024

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	9.64E-01	6.66E-01	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	1.26E-09	1.03E-09	
3. PERCENT OF MPC	%	1.26E 00	1.49E 00	
B. TRITIUM				
1. TOTAL RELEASE	CI	2.37E 02	2.31E 02	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	3.10E-07	3.57E-07	
3. PERCENT OF MPC	%	5.68E-01	7.85E-01	
C. DISSOLVED AND ENTRAINED GASES				
1. TOTAL RELEASE	CI	5.59E-01	1.19E 00	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	7.31E-10	1.84E-09	
3. PERCENT OF MPC	%	3.65E-04	9.20E-04	
D. GROSS ALPHA RADIOACTIVITY				
1. TOTAL RELEASE	CI	0.00E 00	0.00E 00	2.50E 01
E. VOLUME WASTE RELEASED (PRIOR TO DILUTION)	LITERS	3.50E 07	1.82E 07	1.00E 01
F. VOLUME DILUTION WATER USED DURING PERIOD	LITERS	7.66E 11	6.48E 11	1.00E 01

NDIAN POINT UNITS 1 & 2

FFLUENT AND WASTE DISPOSAL REPORT

IQUID EFFLUENTS FOR RELEASE POINT: 1

QUARTER 1 : START DATE 87010101 END DATE 87033124
QUARTER 2 : START DATE 87040101 END DATE 87063024
DATE OF REPORT: AUG. 28, 1987
PREPARED BY: CON EDISON- D.BRUNETTI

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNITS	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
H3	CI	9.34E 00	4.57E 01	2.28E 02	1.86E 02
NA24	CI	0.00E 00	1.14E-02	0.00E 00	0.00E 00
FE55	CI	2.49E-02	2.19E-03	1.16E-02	6.60E-03
CO58	CI	4.18E-03	0.00E 00	1.30E-02	7.90E-03
CO60	CI	6.16E-02	7.90E-05	1.58E-01	8.75E-02
NI63	CI	3.03E-02	0.00E 00	5.50E-02	4.53E-02
SR90	CI	5.82E-04	0.00E 00	3.50E-04	1.67E-04
I131	CI	1.96E-02	1.55E-02	4.34E-02	2.88E-02
I133	CI	1.66E-01	2.41E-01	0.00E 00	0.00E 00
CS134	CI	5.54E-02	1.44E-02	4.62E-02	5.66E-02
CS137	CI	1.37E-01	2.19E-02	1.29E-01	1.58E-01
* SB125	CI	0.00E 00	0.00E 00	9.43E-03	4.38E-03
TOTAL FOR PERIOD (ABOVE)	CI	9.84E 00	4.60E 01	2.28E 02	1.86E 02

DENOTES SUPPLEMENTAL ISOTOPES

INDIAN POINT UNITS 1 & 2

EFFLUENT AND WASTE DISPOSAL REPORT

LIQUID EFFLUENTS FOR RELEASE POINT: 1

QUARTER 1 : START DATE 87010101 END DATE 87033124
QUARTER 2 : START DATE 87040101 END DATE 87063024
DATE OF REPORT: AUG. 28, 1987
PREPARED BY: CON EDISON- D.BRUNETTI

		CONTINUOUS MODE		BATCH MODE	
NUCLIDES RELEASED	UNITS	QUARTER 1	QUARTER 2	QUARTER 1	QUARTER 2
* XE133	CI	4.83E-01	3.33E-03	7.63E-02	1.70E-02
* XE135	CI	3.67E-04	1.17E 00	0.00E 00	0.00E 00

* DENOTES SUPPLEMENTAL ISOTOPES

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

D - SOLID WASTE

FIRST HALF - 1987

Solid Radwaste Disposal Report

Solid Waste Shipped Offsite for Burial Or Disposal (Not Irradiated Fuel)

1. Type of Waste	Unit	6 Month Period Class A	Class B	Class C	Est. Total
a. Spent Resins, Sludges, etc.	m^3	19.2	5.47	-	24.8
	Ci	1.09	45.0	-	46.09
b. DAW	m^3	-	-	-	-
	Ci	-	-	-	-
c. Irradiated Components control rods, etc.	m^3	-	-	-	-
	Ci	-	-	-	-

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

a.	Cs-137	%	34.4
	Co-60	%	33.1
	Cs-134	%	17.1
	Co-58	%	1.0
	Sb-125	%	1.0
	H-3	%	1.0
	Fe-55	%	7.6
	Ni-63	%	4.3

Other (I129, Tc99, Do241, C14,) 0.5

3. Solid Waste Disposition

Number of Shipment	Mode of Transportation	Destination
3	Truck	Barnwell, S.C.

4. Solid Waste Containers

a. 8 - Drums - Cement used for solidification
0 - Fiberglass reinforced pressure vessels
0 - Pressure Vessel
1 - High integrity Containers
3 - Carbon steel containers - cement used for solidification

Solid Radwaste Disposal Report

5. Waste Class

No. irradiated fuel shipments

Container	Class A	Class B	Class C
Pressure Vessel/FRP-Hic	-	-	-
High Intergrity Container	-	1	-
Steel Liners	3	-	-
Steel Drums	8	-	-
Steel Crates	-	-	-

(87-92 ehsrw5)

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

E - RADIOLOGICAL IMPACT ON MAN

FIRST HALF - 1987

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

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. Calculations were performed for members of the public on site for this reporting period. Doses to such individuals were found to be significantly less than one percent of the maximum individual offsite dose. Doses were also evaluated for an individual ingesting milk and meat from a cow located at a 5.0 mile distance, for all sectors. In all cases, these evaluations were performed using the models presented in Regulatory Guide 1.109.

All releases were evaluated using actual meteorological conditions existing during the release period.

Integrated doses from the population within 50 miles of Indian Point from gaseous effluents were computed based on the most current population data.

Dose calculations for liquid pathways to individuals and populations are computed for a year. The LADTAP II 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 8.0 Ci/yr of Carbon-14. Therefore, to be consistent with NUREG-0017, a release of 4.0 Curies of Carbon-14 was assumed for the six month period in addition to the radioactive materials measured in Indian Point gaseous effluents.

Indian Point Units 1 & 2

RADIOLOGICAL IMPACT ON MAN

(Reference Regulatory Guide 1.21, Page 12)

A. Maximum Individual Doses

(1) Pathways (Gaseous)

	Total Body mRem	Skin mRem	Thyroid mRem	Bone mRem	Source Information (MIDAS File)
a) Noble Gas Immersion	2.70E-1	7.15E-1	N/A	N/A	MIDASDM
b) Inhalation***	1.93E-2	N/A	5.50-3	1.21E-2	
c) Ground Deposition	6.61E-1	7.73E-1	N/A	N/A	
d) Milk Ingestion*	2.2E-2	N/A	2.43E-2	1.48E-1	MIDASDM
e) Meat Ingestion***	3.07E-3	N/A	2.96E-3	1.56E-2	
f) Vegetable Ingestion***	2.51E-1	N/A	2.05E-1	1.36E+0	

(2) Pathways (Liquid)

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

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

NA = Not Applicable

B. Population

(1) Pathways (Gaseous)

	Total Body (man-rem)	Thyroid (man-rem)	Source Information (MIDAS File)
(a) Noble Gas Immersion	7.2E+0	N/A	
(b) Inhalation	3.1E-1	1.7E-1	MIDASPP
(c) Ground Deposition	9.8E+0	N/A	
(d) Totals	1.73E+1	1.7E-1	

(2) Pathways (Liquid)

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

C. Average Doses to Individuals

(1) Pathways

(a) Liquid-Total Body	2.13E-4 millirem	LADTAP2
(b) Gaseous-Total Body	8.52E-4 millirem	

IP2 SEMI-ANNUAL EFFLUENT REPORT 1ST HALF 1987 - USNRC LADTAP II CODE

DISCHARGE=2.06E+03 CFS SOURCE TERM MULTIPLIER=1.00E+00

50-MILE POPULATION=2.03E+07 FRACTION --- CATEGORY I=0.71
                                CATEGORY II=0.11
                                CATEGORY III=0.18

FRESHWATER SITE

SOURCE TERM FOLLOWS
GRIEF XE133 5.80E-01
GRIEF XE135 1.17E+00
NO INTERNAL RECONCENTRATION MODEL EMPLOYED

* * * CATEGORY I DOSE FACTORS * * *

			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	4.69E+02	0.0	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	1.05E-07	0.0	0.0	1.00E+00
26FE	55	4.53E-02	2.75E-06	1.90E-06	4.43E-07	0.0	0.0	1.06E-06	1.09E-06	0.0	0.0	1.00E+00
27CO	58	2.51E-02	0.0	7.45E-07	1.67E-06	0.0	0.0	0.0	1.51E-05	8.20E-09	7.00E-09	1.00E+00
27CO	60	3.07E-01	0.0	2.14E-06	4.72E-06	0.0	0.0	0.0	4.02E-05	2.00E-08	1.70E-08	1.00E+00
28NI	63	1.31E-01	1.30E-04	9.01E-06	4.36E-06	0.0	0.0	0.0	1.88E-06	0.0	0.0	1.00E+00
11NA	24	1.14E-02	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	1.70E-06	2.90E-08	2.50E-08	1.00E+00
38SR	90	1.01E-03	3.84E-03	0.0	1.03E-03	0.0	0.0	0.0	2.19E-04	0.0	0.0	1.00E+00
531	131	1.07E-01	4.16E-06	5.95E-06	3.41E-06	1.95E-03	1.02E-05	0.0	1.57E-06	3.40E-09	2.80E-09	1.00E+00
531	133	4.07E-01	1.42E-06	2.47E-06	7.53E-07	3.63E-04	4.31E-06	0.0	2.22E-06	4.50E-09	3.70E-09	1.00E+00
55CS	134	1.73E-01	6.22E-05	1.48E-04	1.21E-04	0.0	4.79E-05	1.59E-05	2.59E-06	1.40E-08	1.20E-08	1.00E+00
55CS	137	4.46E-01	7.97E-05	1.09E-04	7.14E-05	0.0	3.70E-05	1.23E-05	2.11E-06	4.90E-09	4.20E-09	1.00E+00
51SB	125	1.38E-02	1.79E-06	2.00E-08	4.26E-07	1.82E-09	0.0	1.38E-06	1.97E-05	3.50E-09	3.10E-09	1.00E+00

* * * CATEGORY II DOSE FACTORS * * *

			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	4.69E+02	0.0	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07			
26FE	55	4.53E-02	3.78E-06	2.68E-06	6.25E-07	0.0	0.0	1.70E-06	1.16E-06			
27CO	58	2.51E-02	0.0	5.72E-07	2.24E-06	0.0	0.0	0.0	1.34E-05			
27CO	60	3.07E-01	0.0	2.81E-06	6.33E-06	0.0	0.0	0.0	3.66E-05			
28NI	63	1.31E-01	1.77E-04	1.25E-05	6.00E-06	0.0	0.0	0.0	1.99E-06			
11NA	24	1.14E-02	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06	2.30E-06			
38SR	90	1.01E-03	4.48E-03	0.0	1.20E-03	0.0	0.0	0.0	2.33E-04			
531	131	1.07E-01	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	0.0	1.62E-06			
531	133	4.07E-01	2.01E-06	3.41E-06	1.04E-06	4.76E-04	5.98E-06	0.0	2.58E-06			
55CS	134	1.73E-01	8.37E-05	1.97E-04	9.14E-05	0.0	6.26E-05	2.39E-05	2.45E-06			
55CS	137	4.46E-01	1.12E-04	1.49E-04	5.19E-05	0.0	5.07E-05	1.97E-05	2.12E-06			
51SB	125	1.38E-02	2.48E-06	2.71E-08	5.80E-07	2.37E-09	0.0	2.18E-06	1.93E-05			

* * * CATEGORY III DOSE FACTORS * * *

			INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)		
NUCLIDE		CURIE/YEAR	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON
1H	3	4.69E+02	0.0	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07			
26FE	55	4.53E-02	1.15E-05	6.10E-06	1.89E-06	0.0	0.0	3.45E-06	1.13E-06			
27CO	58	2.51E-02	0.0	1.80E-06	5.51E-06	0.0	0.0	0.0	1.05E-05			
27CO	60	3.07E-01	0.0	5.29E-06	1.56E-05	0.0	0.0	0.0	2.93E-05			
28NI	63	1.31E-01	5.38E-04	2.88E-05	1.83E-05	0.0	0.0	0.0	1.94E-06			
11NA	24	1.14E-02	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06	5.80E-06			
38SR	90	1.01E-03	1.13E-02	0.0	3.03E-03	0.0	0.0	0.0	2.29E-04			
531	131	1.07E-01	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	0.0	1.54E-06			
531	133	4.07E-01	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	0.0	2.95E-06			
55CS	134	1.73E-01	2.34E-04	3.54E-04	8.10E-05	0.0	1.19E-04	4.27E-05	2.07E-06			
55CS	137	4.46E-01	3.27E-04	3.13E-04	4.62E-05	0.0	1.02E-04	3.67E-05	1.96E-06			
51SB	125	1.38E-02	7.10E-06	5.52E-08	1.50E-06	6.63E-09	0.0	3.59E-06	1.71E-05			

* * * CATEGORY IV DOSE FACTORS * * *

INGESTION DOSE FACTORS SHORELINE

NUCLIDE		CURIE/YEAR	(MREM/PCI INTAKE) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	(MREM/HR)/(PCI/M**2) SKIN	TOTAL BODY	RECON
1H	3	4.69E+02	0.0	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07			
26FE	55	4.53E-02	1.39E-05	8.98E-06	2.40E-06	0.0	0.0	4.39E-06	1.14E-06			
27CO	58	2.51E-02	0.0	3.60E-06	8.98E-06	0.0	0.0	0.0	8.97E-06			
27CO	60	3.07E-01	0.0	1.08E-05	2.55E-05	0.0	0.0	0.0	2.57E-05			
28NI	63	1.31E-01	6.34E-04	3.92E-05	2.20E-05	0.0	0.0	0.0	1.95E-06			
11NA	24	1.14E-02	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05	1.01E-05			
38SR	90	1.01E-03	1.25E-02	0.0	3.37E-03	0.0	0.0	0.0	2.31E-04			
53I	131	1.07E-01	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.0	1.51E-06			
53I	133	4.07E-01	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	0.0	3.08E-06			
55CS	134	1.73E-01	3.77E-04	7.03E-04	7.10E-05	0.0	1.81E-04	7.42E-05	1.91E-06			
55CS	137	4.46E-01	5.22E-04	6.11E-04	4.33E-05	0.0	1.64E-04	6.64E-05	1.91E-06			
51SB	125	1.38E-02	1.23E-05	1.19E-07	2.53E-06	1.54E-08	0.0	7.12E-06	1.64E-05			

TOTAL NUMBER IN SOURCE TERM IS 12 TOTAL RELEASE IS 4.7067E+02

* * * AS LOW AS REASONABLY ACHIEVABLE * * *

C A T E G O R Y I D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.15E-01	3.39E-01	2.41E-01	8.83E-03	1.13E-01	3.77E-02	7.99E-03
INVERTEBRATE		3.87E-03	4.34E-03	3.18E-03	7.17E-04	1.38E-03	5.55E-04	1.60E-03
ALGAE		2.84E-08	4.07E-08	2.97E-08	1.11E-08	1.36E-08	4.61E-09	4.22E-09
DRINKING		7.35E-13	1.37E-12	1.14E-12	2.09E-12	8.12E-13	6.25E-13	6.97E-13
SHORELINE	2.03E-03	1.73E-03	1.73E-03	1.73E-03	1.73E-03	1.73E-03	1.73E-03	1.73E-03
SWIMMING	0.0	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05
BOATING	0.0	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05
TOTAL	2.03E-03	2.21E-01	3.45E-01	2.46E-01	1.13E-02	1.16E-01	4.00E-02	1.14E-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

C A T E G O R Y I I D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.28E-01	3.50E-01	1.36E-01	8.37E-03	1.16E-01	4.50E-02	5.93E-03
INVERTEBRATE		4.03E-03	4.47E-03	1.91E-03	6.76E-04	1.40E-03	6.54E-04	1.12E-03
ALGAE		3.90E-08	5.51E-08	2.24E-08	1.39E-08	1.83E-08	7.20E-09	3.97E-09
DRINKING		1.01E-12	1.67E-12	1.01E-12	2.45E-12	9.14E-13	6.81E-13	6.90E-13
SHORELINE	2.72E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03
SWIMMING	0.0	3.22E-05	3.22E-05	3.22E-05	3.22E-05	3.22E-05	3.22E-05	3.22E-05
BOATING	0.0	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05
TOTAL	2.72E-03	2.35E-01	3.57E-01	1.40E-01	1.14E-02	1.20E-01	4.80E-02	9.42E-03

	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

C A T E G O R Y I I I D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.85E-01	3.09E-01	5.24E-02	9.06E-03	9.92E-02	3.57E-02	2.30E-03
INVERTEBRATE		5.20E-03	4.12E-03	9.90E-04	7.56E-04	1.24E-03	5.48E-04	4.21E-04
ALGAE		1.12E-04	1.13E-04	2.20E-05	3.49E-05	3.62E-05	1.33E-05	3.39E-06
DRINKING		2.93E-09	3.34E-09	1.53E-09	5.62E-09	1.77E-09	1.29E-09	1.16E-09
SHORELINE	5.69E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04	4.86E-04
SWIMMING	0.0	8.04E-06	8.04E-06	8.04E-06	8.04E-06	8.04E-06	8.04E-06	8.04E-06
BOATING	0.0	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05	1.61E-05
TOTAL	5.69E-04	2.91E-01	3.14E-01	5.39E-02	1.04E-02	1.01E-01	3.68E-02	3.23E-03

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

C A T E G O R Y I V D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		3.29E-02	4.29E-02	3.48E-03	1.59E-03	1.14E-02	4.62E-03	1.60E-04
INVERTEBRATE		4.50E-04	4.57E-04	6.40E-05	1.07E-04	1.15E-04	5.45E-05	2.28E-05
ALGAE		1.74E-07	2.16E-07	2.14E-08	8.47E-08	5.73E-08	2.36E-08	3.16E-09
DRINKING		4.31E-12	5.98E-12	2.08E-12	1.27E-11	2.74E-12	2.03E-12	1.68E-12
SHORELINE	1.22E-04	1.04E-04	1.04E-04	1.04E-04	1.04E-04	1.04E-04	1.04E-04	1.04E-04
SWIMMING	0.0	3.22E-12	3.22E-12	3.22E-12	3.22E-12	3.22E-12	3.22E-12	3.22E-12
BOATING	0.0	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08	8.04E-08
TOTAL	1.22E-04	3.34E-02	4.34E-02	3.65E-03	1.80E-03	1.16E-02	4.78E-03	2.87E-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 * * *

LOCATION IS DOWNSTREAM

CATEGORY I DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.54E-01	2.42E-01	1.72E-01	5.92E-03	8.09E-02	2.69E-02	5.71E-03
INVERTEBRATE		2.76E-03	3.10E-03	2.27E-03	4.82E-04	9.82E-04	3.97E-04	1.14E-03
ALGAE		2.03E-08	2.91E-08	2.12E-08	7.46E-09	9.70E-09	3.29E-09	3.01E-09
DRINKING		5.28E-11	9.82E-11	8.20E-11	2.50E-10	5.90E-11	4.47E-11	5.03E-11
SHORELINE	1.45E-03	1.24E-03	1.24E-03	1.24E-03	1.24E-03	1.24E-03	1.24E-03	1.24E-03
SWIMMING	0.0	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05
BOATING	0.0	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05
TOTAL	1.45E-03	1.58E-01	2.47E-01	1.76E-01	7.67E-03	8.31E-02	2.86E-02	8.11E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	21.0	7.0	31.00
INVERTEBRATE	5.0	7.0	31.00
ALGAE	0.0	7.0	31.00
DRINKING	0.0	7.0	19.00
SHORELINE	50.0	7.0	7.00
SWIMMING	50.0	7.0	7.00
BOATING	100.0	7.0	7.00

SHOREWIDTH FACTOR=0.2

LOCATION IS DOWNSTREAM

CATEGORY II DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		1.63E-01	2.50E-01	9.70E-02	5.60E-03	8.31E-02	3.21E-02	4.23E-03
INVERTEBRATE		2.88E-03	3.19E-03	1.37E-03	4.53E-04	1.00E-03	4.67E-04	8.02E-04
ALGAE		2.78E-08	3.94E-08	1.60E-08	9.28E-09	1.31E-08	5.14E-09	2.83E-09
DRINKING		7.25E-11	1.20E-10	7.25E-11	3.04E-10	6.66E-11	4.87E-11	4.98E-11
SHORELINE	1.95E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03	1.66E-03
SWIMMING	0.0	2.23E-05	2.23E-05	2.23E-05	2.23E-05	2.23E-05	2.23E-05	2.23E-05
BOATING	0.0	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05
TOTAL	1.95E-03	1.68E-01	2.55E-01	1.00E-01	7.75E-03	8.58E-02	3.43E-02	6.73E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)
FISH	16.0	7.0	31.00
INVERTEBRATE	3.0	7.0	31.00
ALGAE	0.0	7.0	31.00
DRINKING	0.0	7.0	19.00
SHORELINE	67.0	7.0	7.00
SWIMMING	100.0	7.0	7.00
BOATING	100.0	7.0	7.00

SHOREWIDTH FACTOR=0.2

LOCATION IS DOWNSTREAM

CATEGORY III DOSES

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.03E-01	2.21E-01	3.74E-02	6.03E-03	7.08E-02	2.55E-02	1.64E-03
INVERTEBRATE		3.76E-03	2.94E-03	7.07E-04	5.03E-04	8.86E-04	3.91E-04	3.01E-04
ALGAE		9.00E-08	8.07E-08	1.57E-08	2.32E-08	2.58E-08	9.47E-09	2.42E-09
DRINKING		2.11E-07	2.41E-07	1.19E-07	7.46E-07	1.29E-07	9.25E-08	8.32E-08

SHORELINE	4.07E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04	3.47E-04
SWIMMING	0.0	5.57E-06	5.57E-06	5.57E-06	5.57E-06	5.57E-06	5.57E-06	5.57E-06
BOATING	0.0	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05	1.11E-05
TOTAL	4.07E-04	2.08E-01	2.24E-01	3.85E-02	6.92E-03	7.21E-02	2.62E-02	2.31E-03

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	6.9	7.0	31.00	
INVERTEBRATE	1.7	7.0	31.00	
ALGAE	0.0	7.0	31.00	
DRINKING	0.0	7.0	19.00	
SHORELINE	14.0	7.0	7.00	
SWIMMING	25.0	7.0	7.00	
BOATING	100.0	7.0	7.00	

LOCATION IS DOWNSTREAM

C A T E G O R Y I V D O S E S

DOSE (MREM PER YEAR INTAKE)

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.35E-02	3.06E-02	2.49E-03	1.06E-03	8.11E-03	3.30E-03	1.14E-04
INVERTEBRATE		3.21E-04	3.26E-04	4.57E-05	7.13E-05	8.24E-05	3.89E-05	1.63E-05
ALGAE		1.25E-07	1.54E-07	1.52E-08	5.63E-08	4.09E-08	1.68E-08	2.25E-09
DRINKING		3.11E-10	4.31E-10	1.50E-10	1.75E-09	2.01E-10	1.45E-10	1.21E-10
SHORELINE	8.71E-05	7.43E-05	7.43E-05	7.43E-05	7.43E-05	7.43E-05	7.43E-05	7.43E-05
SWIMMING	0.0	2.23E-12	2.23E-12	2.23E-12	2.23E-12	2.23E-12	2.23E-12	2.23E-12
BOATING	0.0	5.57E-08	5.57E-08	5.57E-08	5.57E-08	5.57E-08	5.57E-08	5.57E-08
TOTAL	8.71E-05	2.39E-02	3.10E-02	2.61E-03	1.20E-03	8.27E-03	3.41E-03	2.05E-04

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

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

SPORT HARVEST

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
			DOSE (MAN-REM)						
FISH	CATEGORY I	7.60E+04	5.46E-01	8.59E-01	6.11E-01	1.02E-02	2.87E-01	9.55E-02	2.02E-02
FISH	CATEGORY II	8.87E+03	8.87E-02	1.36E-01	5.28E-02	1.46E-03	4.52E-02	1.75E-02	2.30E-03
FISH	CATEGORY III	6.14E+03	1.78E-01	1.93E-01	3.27E-02	2.41E-03	6.18E-02	2.23E-02	1.43E-03
FISH	TOTAL	9.10E+04	8.13E-01	1.19E+00	6.97E-01	1.41E-02	3.94E-01	1.35E-01	2.39E-02

LOCATION	DILUTION	CATCH	TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR	POPULATION=1.55E+04
	7.00E+00	9.10E+04	1.68E+02	

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) CATEGORY I=6.90E+00 CATEGORY II=5.20E+00 CATEGORY IV=2.20E+00

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

_____COMMERCIAL HARVEST_____

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	9.94E+07	2.52E+00	3.96E+00	2.82E+00	3.65E-02	1.32E+00	4.40E-01	9.31E-02
FISH	CATEGORY II	1.16E+07	4.09E-01	6.26E-01	2.43E-01	5.20E-03	2.08E-01	8.05E-02	1.06E-02
FISH	CATEGORY III	8.04E+06	8.19E-01	8.88E-01	1.50E-01	8.56E-03	2.85E-01	1.03E-01	6.57E-03
FISH	TOTAL	1.19E+08	3.75E+00	5.47E+00	3.21E+00	5.03E-02	1.81E+00	6.23E-01	1.10E-01

LOCATION	DILUTION	CATCH	TIME(HR)
	7.00E+00	1.55E+05	2.40E+02

-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.03E+07

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) CATEGORY I=6.90E+00 CATEGORY II=5.20E+00 CATEGORY IV=2.20E+00

_____NEPA DOSES_____

NOTE--TOTAL NEPA DOSE INCLUDES SPORT CATCH

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	2.05E+05	1.48E+00	2.32E+00	1.65E+00	2.37E-02	7.75E-01	2.58E-01	5.46E-02
FISH	CATEGORY II	2.40E+04	2.40E-01	3.67E-01	1.43E-01	3.38E-03	1.22E-01	4.72E-02	6.20E-03
FISH	CATEGORY III	1.66E+04	4.80E-01	5.21E-01	8.82E-02	5.57E-03	1.67E-01	6.01E-02	3.85E-03
FISH	TOTAL	2.46E+05	2.20E+00	3.21E+00	1.88E+00	3.27E-02	1.06E+00	3.65E-01	6.47E-02

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

SPORT HARVEST

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	8.33E+03	4.52E-03	5.07E-03	3.71E-03	3.93E-04	1.60E-03	6.48E-04	1.86E-03
INVER	CATEGORY II	9.68E+02	7.20E-04	7.98E-04	3.41E-04	5.52E-05	2.50E-04	1.17E-04	2.00E-04
INVER	CATEGORY III	6.97E+02	1.51E-03	1.18E-03	2.84E-04	9.41E-05	3.56E-04	1.57E-04	1.21E-04
INVER	TOTAL	1.00E+04	6.75E-03	7.05E-03	4.33E-03	5.42E-04	2.21E-03	9.22E-04	2.18E-03

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR POPULATION=1.17E+04
7.00E+00 1.00E+04 1.68E+02

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) CATEGORY I=1.00E+00 CATEGORY II=7.50E-01 CATEGORY IV=3.30E-01

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

COMMERCIAL HARVEST

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	1.44E+07	3.40E-03	3.81E-03	2.78E-03	2.32E-04	1.20E-03	4.87E-04	1.39E-03
INVER	CATEGORY II	1.67E+06	5.41E-04	5.99E-04	2.56E-04	3.25E-05	1.88E-04	8.76E-05	1.50E-04
INVER	CATEGORY III	1.21E+06	1.14E-03	8.88E-04	2.13E-04	5.51E-05	2.67E-04	1.18E-04	9.05E-05
INVER	TOTAL	1.73E+07	5.08E-03	5.30E-03	3.25E-03	3.19E-04	1.66E-03	6.92E-04	1.64E-03

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.03E+07
7.00E+00 1.00E+03 2.40E+02

AVERAGE INDIVIDUAL CONSUMPTION (KG/YR) CATEGORY I=1.00E+00 CATEGORY II=7.50E-01 CATEGORY IV=3.30E-01

NEPA DOSES

NOTE--TOTAL NEPA DOSE INCLUDES SPORT CATCH

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	9.17E+03	4.97E-03	5.58E-03	4.08E-03	4.23E-04	1.76E-03	7.13E-04	2.04E-03
INVER	CATEGORY II	1.07E+03	7.92E-04	8.78E-04	3.75E-04	5.95E-05	2.75E-04	1.28E-04	2.20E-04
INVER	CATEGORY III	7.67E+02	1.66E-03	1.30E-03	3.12E-04	1.01E-04	3.91E-04	1.73E-04	1.33E-04
INVER	TOTAL	1.10E+04	7.43E-03	7.76E-03	4.76E-03	5.84E-04	2.43E-03	1.01E-03	2.40E-03

* * * POPULATION WATER CONSUMPTION DOSES * * *

SUPPLIER-

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	CATEGORY I	2.63E+02	1.47E-08	5.88E-09	3.86E-09	1.16E-10	1.82E-09	6.83E-10	3.87E-10
DRINKING	CATEGORY II	2.86E+01	2.19E-09	8.73E-10	3.39E-10	1.27E-11	2.67E-10	1.12E-10	4.34E-11
DRINKING	CATEGORY III	4.68E+01	1.07E-08	3.03E-09	7.35E-10	3.99E-11	8.78E-10	3.41E-10	8.80E-11
DRINKING	TOTAL	3.38E+02	2.76E-08	9.79E-09	4.93E-09	1.68E-10	2.97E-09	1.14E-09	5.18E-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) CATEGORY I =3.70E+02 CATEGORY II=2.60E+02 CATEGORY III=2.60E+02

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
DRINKING	CUMUL TOTAL	3.38E+02	2.76E-08	9.79E-09	4.93E-09	1.68E-10	2.97E-09	1.14E-09	5.18E-10

HYDROSPHERE TRITIUM DOSE

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
WATER	TOTAL	2.20E+00	3.85E-03	3.85E-03	3.85E-03	3.85E-03	3.85E-03	3.85E-03	3.85E-03

* * * RECREATION POPULATION DOSES * * *

LOCATION- DOWNSTREAM

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

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	4.82E-01	4.11E-01	4.11E-01

LOCATION- 0.2D0

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

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.0	3.75E-03	3.75E-03

LOCATION- 0.2D0

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

PATHWAY	AGE GROUP	USAGE	DOSE (MAN-REM) SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.0	1.88E-03	1.88E-03

* * * DOSE TO BIOTA * * *

MRADS PER YEAR

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

	INTERNAL	EXTERNAL	TOTAL
FISH	4.89E-01	1.09E+00	1.58E+00
INVERTEBRATE	5.19E-02	2.17E+00	2.22E+00
ALGAE	1.63E-01	1.98E-03	1.65E-01
MUSKRAT	2.90E+00	7.25E-01	3.62E+00
RACCOON	1.20E-01	5.43E-01	6.63E-01
HERON	1.67E+01	7.24E-01	1.74E+01
DUCK	2.58E+00	1.09E+00	3.66E+00

* * * COST-BENEFIT ANALYSIS * * *

NUCLIDE	RELEASE CI/YR	MAN-REM DOSE TOTAL BODY	MAN-REM DOSE THYROID	MAN-REM PER CURIE TOTAL BODY	MAN-REM PER CURIE THYROID
1H 3	4.69E+02	1.90E-03	1.90E-03	4.04E-06	4.04E-06
26FE 55	4.53E-02	2.06E-04	3.73E-09	4.55E-03	8.24E-08
27CO 58	2.51E-02	4.74E-04	3.73E-04	1.89E-02	1.49E-02
27CO 60	3.07E-01	2.24E-01	2.20E-01	7.30E-01	7.18E-01
28NI 63	1.31E-01	2.88E-03	0.0	2.20E-02	0.0
11NA 24	1.14E-02	9.90E-05	9.90E-05	8.69E-03	8.69E-03
38SR 90	1.01E-03	1.55E-03	7.03E-10	1.54E+00	6.96E-07
53I 131	1.07E-01	2.77E-04	6.34E-02	2.59E-03	5.92E-01
53I 133	4.07E-01	4.70E-04	5.71E-04	1.15E-03	1.40E-03
55CS 134	1.73E-01	1.58E+00	3.98E-02	9.16E+00	2.30E-01
55CS 137	4.46E-01	2.51E+00	1.53E-01	5.63E+00	3.43E-01
51SB 125	1.38E-02	1.08E-03	1.08E-03	7.85E-02	7.85E-02
TOTAL		4.33E+00	4.80E-01		

NOTE ON AGE GROUP:

CATEGORY I (17 YEARS OLD OR OLDER)
CATEGORY II (11 TO 17 YEARS OLD)
CATEGORY III (1 TO 11 YEARS OLD)
CATEGORY IV (0 TO 1 YEAR OLD)

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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.	37.	36.	0.	0.	0.	73.
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	0.	0.	0.	0.	0.	0.	0.
SE	0.	1.	0.	0.	0.	0.	1.
SSE	0.	3.	6.	0.	0.	0.	9.
S	0.	1.	0.	0.	0.	0.	1.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	1.	0.	0.	0.	0.	0.	1.
W	0.	0.	0.	0.	0.	0.	0.
WNW	0.	2.	0.	0.	0.	0.	2.
NW	0.	2.	2.	0.	0.	0.	4.
NNW	0.	10.	8.	0.	0.	0.	18.
VARIABLE							
Total	1.	56.	52.	0.	0.	0.	109.

Periods of calm (hours): 0
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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	4.	25.	15.	3.	0.	0.	47.
NNE	11.	1.	2.	0.	0.	0.	4.
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	0.	0.	0.	0.	0.	0.	0.
SE	1.	0.	0.	0.	0.	0.	1.
SSE	0.	1.	4.	0.	0.	0.	5.
S	0.	4.	0.	0.	0.	0.	4.
SSW	0.	1.	0.	0.	0.	0.	1.
SW	0.	0.	0.	0.	0.	0.	0.
WSW	0.	2.	0.	0.	0.	0.	2.
W	1.	2.	0.	0.	0.	0.	3.
WNW	1.	1.	1.	0.	0.	0.	3.
NW	0.	6.	3.	0.	1.	0.	10.
NNW	3.	13.	2.	0.	0.	0.	18.
VARIABLE							
Total	11.	56.	27.	3.	1.	0.	987

Periods of calm (hours): 0
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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.	21.	12.	3.	0.	0.	36.
NNE	2.	1.	2.	1.	0.	0.	6.
NE	0.	0.	1.	0.	0.	0.	1.
ENE	0.	0.	0.	0.	0.	0.	0.
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.	5.	0.	0.	0.	0.	5.
S	1.	7.	0.	0.	0.	0.	8.
SSW	1.	0.	0.	0.	0.	0.	1.
SW	1.	0.	2.	0.	0.	0.	3.
WSW	0.	0.	2.	0.	0.	0.	2.
W	1.	5.	2.	0.	0.	0.	8.
WNW	0.	8.	4.	0.	0.	0.	12.
NW	2.	7.	4.	0.	0.	0.	13.
NNW	0.	6.	6.	1.	0.	0.	13.
VARIABLE							
Total	8.	60.	35.	5.	0.	0.	108.

Periods of calm (hours): 0
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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	24.	154.	101.	23.	2.	0.	304.
NNE	30.	97.	71.	18.	0.	1.	217.
NE	15.	19.	1.	0.	0.	0.	35.
ENE	11.	1.	0.	0.	0.	0.	2.
E	1.	0.	0.	0.	0.	0.	1.
ESE	2.	0.	0.	0.	0.	0.	2.
SE	1.	0.	0.	0.	0.	0.	1.
SSE	8.	16.	13.	3.	4.	0.	44.
S	16.	15.	3.	0.	0.	0.	34.
SSW	3.	5.	2.	0.	0.	0.	10.
SW	5.	4.	1.	0.	0.	0.	10.
WSW	5.	12.	2.	0.	0.	0.	19.
W	12.	47.	5.	1.	0.	0.	65.
WNW	5.	38.	34.	2.	0.	0.	79.
NW	6.	59.	63.	13.	0.	0.	141.
NNW	13.	58.	40.	0.	0.	0.	111.
VARIABLE							
Total	147.	525.	336.	60.	6.	1.	1075

Periods of calm (hours): 0
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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	34.	41.	4.	0.	1.	0.	80.
NNE	46.	37.	2.	0.	2.	0.	87.
NE	40.	27.	0.	0.	0.	0.	67.
ENE	15.	3.	0.	0.	0.	0.	18.
E	9.	1.	0.	0.	0.	0.	10.
ESE	4.	0.	0.	0.	0.	0.	4.
SE	13.	0.	0.	0.	0.	0.	13.
SSE	19.	10.	2.	0.	0.	0.	31.
S	36.	11.	2.	0.	0.	0.	49.
SSW	20.	7.	0.	0.	0.	0.	27.
SW	13.	5.	0.	0.	0.	0.	18.
WSW	9.	2.	0.	0.	0.	0.	11.
W	16.	10.	0.	0.	0.	0.	26.
WNW	9.	19.	1.	0.	0.	0.	29.
NW	12.	24.	8.	1.	0.	0.	45.
NNW	13.	16.	7.	1.	0.	0.	37.
VARIABLE							
Total	308.	213.	26.	2.	3.	0.	552.

Periods of calm (hours): 1
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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	14.	0.	0.	0.	0.	0.	14.
NNE	37.	6.	0.	0.	0.	0.	43.
NE	29.	14.	1.	0.	0.	0.	44.
ENE	6.	0.	0.	0.	0.	0.	6.
E	1.	0.	0.	0.	0.	0.	1.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	6.	0.	0.	0.	0.	0.	6.
SSE	4.	0.	0.	0.	0.	0.	4.
S	11.	1.	0.	0.	0.	0.	12.
SSW	5.	0.	0.	0.	0.	0.	5.
SW	6.	0.	0.	0.	0.	0.	6.
WSW	8.	0.	0.	0.	0.	0.	8.
W	4.	0.	0.	0.	0.	0.	4.
WNW	3.	0.	0.	0.	0.	0.	3.
NW	3.	0.	0.	0.	0.	0.	3.
NNW	4.	0.	0.	0.	0.	0.	4.
VARIABLE							
Total	144.	21.	1.	0.	0.	0.	166.

Periods of calm (hours): 2
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: January - March 1987

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	9.	0.	0.	0.	0.	0.	9.
NNE	12.	0.	0.	0.	0.	0.	12.
NE	14.	2.	0.	0.	0.	0.	16.
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	1.	0.	0.	0.	0.	0.	1
S	2.	0.	0.	0.	0.	0.	2.
SSW	3.	0.	0.	0.	0.	0.	3.
SW	1.	0.	0.	0.	0.	0.	1.
WSW	1.	0.	0.	0.	0.	0.	1.
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	1.	0.	0.	0.	0.	0.	1.
VARIABLE							
Total	46.	3.	0.	0.	0.	0.	49.

Periods of calm (hours): 0
Hours of missing data: 0

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

TABLE 4A

HOURS AT EACH WIND SPEED AND DIRECTION [a]

PERIOD OF RECORD: April - June 1987

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	12.	41.	10.	0.	0.	0.	63.
NNE	4.	9.	4.	0.	0.	0.	17.
NE	1.	5.	4.	0.	0.	0.	10.
ENE	1.	5.	0.	0.	0.	0.	6.
E	0.	1.	0.	0.	0.	0.	1.
ESE	0.	0.	0.	0.	0.	0.	0.
SE	1.	1.	0.	0.	0.	0.	2.
SSE	7.	33.	9.	0.	0.	0.	49.
S	11.	36.	17.	0.	0.	0.	64.
SSW	8.	15.	7.	0.	0.	0.	30.
SW	3.	22.	0.	0.	0.	0.	25.
WSW	3.	14.	1.	0.	0.	0.	18.
W	4.	22.	1.	0.	0.	0.	27.
WNW	6.	10.	0.	0.	0.	0.	16.
NW	7.	19.	9.	0.	0.	0.	35.
NNW	10.	16.	0.	0.	0.	0.	26.
VARIABLE							
Total	78.	249.	62.	0.	0.	0.	389.

Periods of calm (hours): 0
Hours of missing data: 2

[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 1987

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.	4.	0.	0.	0.	0.	6.
NNE	3.	1.	4.	0.	0.	0.	8.
NE	1.	5.	2.	0.	0.	0.	8.
ENE	1.	3.	0.	0.	0.	0.	4.
E	0.	1.	0.	0.	0.	0.	1.
ESE	0.	1.	0.	0.	0.	0.	1.
SE	7.	0.	0.	0.	0.	0.	7.
SSE	3.	9.	1.	0.	0.	0.	13.
S	5.	9.	1.	0.	0.	0.	15.
SSW	3.	2.	0.	0.	0.	0.	5.
SW	2.	1.	0.	0.	0.	0.	3.
WSW	1.	1.	0.	0.	0.	0.	2.
W	3.	2.	1.	0.	0.	0.	6.
WNW	0.	1.	0.	0.	0.	0.	1.
NW	0.	4.	1.	0.	0.	0.	5.
NNW	2.	10.	0.	0.	0.	0.	12.
VARIABLE							
Total	33.	54.	10.	0.	0.	0.	97.

Periods of calm (hours): 0
Hours of missing data: 2

[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 1987

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	5.	8.	2.	0.	0.	0.	15.
NNE	3.	5.	4.	0.	0.	0.	12.
NE	0.	3.	4.	0.	0.	0.	7.
ENE	1.	1.	0.	0.	0.	0.	2.
E	5.	3.	0.	0.	0.	0.	8.
ESE	5.	0.	0.	0.	0.	0.	5.
SE	8.	0.	0.	0.	0.	0.	8.
SSE	11.	5.	2.	0.	0.	0.	18.
S	10.	13.	1.	0.	0.	0.	24.
SSW	6.	7.	1.	0.	0.	0.	14.
SW	4.	0.	0.	0.	0.	0.	4.
WSW	1.	3.	0.	0.	0.	0.	4.
W	1.	5.	0.	0.	0.	0.	6.
WNW	0.	1.	1.	0.	0.	0.	2.
NW	2.	1.	0.	0.	0.	0.	3.
NNW	1.	2.	0.	0.	0.	0.	3.
VARIABLE							
Total	63.	57.	15.	0.	0.	0.	135.

Periods of calm (hours): 0
Hours of missing data: 2

[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 1987

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	35.	55.	13.	3.	0.	0.	106.
NNE	50.	113.	34.	0.	0.	0.	197.
NE	53.	53.	4.	0.	0.	0.	110.
ENE	39.	11.	0.	0.	0.	0.	50.
E	40.	3.	5.	0.	0.	0.	48.
ESE	36.	1.	0.	0.	0.	0.	37.
SE	36.	6.	0.	0.	0.	0.	42.
SSE	29.	25.	5.	0.	0.	0.	59.
S	33.	68.	3.	0.	0.	0.	104.
SSW	21.	11.	0.	0.	0.	0.	32.
SW	4.	4.	0.	0.	0.	0.	8.
WSW	8.	4.	0.	0.	0.	0.	12.
W	3.	5.	0.	0.	0.	0.	8.
WNW	3.	7.	3.	0.	0.	0.	13.
NW	11.	11.	4.	0.	0.	0.	26.
NNW	14.	22.	0.	0.	0.	0.	36.
VARIABLE							
Total	415.	399.	71.	3.	0.	0.	888.

Periods of calm (hours): 5
Hours of missing data: 2

[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 1987

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	16.	16.	0.	0.	0.	0.	32.
NNE	42.	27.	2.	0.	0.	0.	71.
NE	42.	7.	0.	0.	0.	0.	49.
ENE	23.	1.	0.	0.	0.	0.	24.
E	20.	3.	0.	0.	0.	0.	23.
ESE	16.	2.	0.	0.	0.	0.	18.
SE	23.	2.	0.	0.	0.	0.	25.
SSE	19.	17.	1.	0.	0.	0.	37.
S	32.	23.	1.	0.	0.	0.	56.
SSW	18.	2.	0.	0.	0.	0.	20.
SW	12.	1.	0.	0.	0.	0.	13.
WSW	12.	2.	0.	0.	0.	0.	14.
W	8.	3.	1.	0.	0.	0.	12.
WNW	11.	4.	0.	0.	0.	0.	15.
NW	8.	3.	0.	0.	0.	0.	11.
NNW	3.	6.	0.	0.	0.	0.	9.
VARIABLE							
Total	305.	119.	5.	0.	0.	0.	429.

Periods of calm (hours): 8

Hours of missing data: 2

[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 1987

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	17.	0.	0.	0.	0.	0.	17.
NNE	42.	5.	0.	0.	0.	0.	47.
NE	29.	14.	0.	0.	0.	0.	43.
ENE	5.	0.	0.	0.	0.	0.	5.
E	4.	0.	0.	0.	0.	0.	4.
ESE	3.	0.	0.	0.	0.	0.	3.
SE	2.	0.	0.	0.	0.	0.	2.
SSE	10.	1.	0.	0.	0.	0.	11.
S	21.	3.	0.	0.	0.	0.	24.
SSW	7.	0.	0.	0.	0.	0.	7.
SW	4.	0.	0.	0.	0.	0.	4.
WSW	2.	0.	0.	0.	0.	0.	2.
W	1.	0.	0.	0.	0.	0.	1.
WNW	3.	0.	0.	0.	0.	0.	3.
NW	3.	0.	0.	0.	0.	0.	3.
NNW	6.	0.	0.	0.	0.	0.	6.
VARIABLE							
Total	159.	23.	0.	0.	0.	0.	182.

Periods of calm (hours): 2
Hours of missing data: 2

[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 1987

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	1.	0.	0.	0.	0.	0.	1.
NNE	9.	6.	0.	0.	0.	0.	15.
NE	7.	16.	0.	0.	0.	0.	23.
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	1.	0.	0.	0.	0.	0.	1.
SSE	1.	0.	0.	0.	0.	0.	1.
S	0.	0.	0.	0.	0.	0.	0.
SSW	0.	0.	0.	0.	0.	0.	0.
SW	1.	0.	0.	0.	0.	0.	1.
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	1.	0.	0.	0.	0.	0.	1.
NNW	0.	0.	0.	0.	0.	0.	0.
VARIABLE							
Total	25.	22.	0.	0.	0.	0.	47.

Periods of calm (hours): 0

Hours of missing data: 2

[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.

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

F - REPORTABLE CHANGES

TO THE PROCESS CONTROL ROOM (PCP)

OFFSITE DOSE CALCULATION MANUAL (ODCM)

AND RADIOACTIVE WASTE SYSTEMS

G - REPORTABLE ITEMS

THE RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

H - UNPLANNED RELEASES

FIRST HALF - 1987

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

Reportable Changes

A. Process Control Program (PCP)

Section 6.14.1 of the Indian Point Unit No. 2 Technical Specifications addresses licensee initiated changes to a Process Control Program (PCP). During the 1st half of 1987, there were no changes made.

B. Offsite Dose Calculation Manual (ODCM)

In reference to the reportable changes to the Offsite Dose Calculation Manual and pursuant to Indian Point Unit No. 2 Technical Specifications 6.15.2 (1A, B and C), the following information is submitted. As previously reported, one change added Section 3.4 on contractor quality assurance stating the vendors' commitment to quality control. Also, pages 21 and 22 of the ODCM were revised merely to correct typos which did not in any way change the original intent. A copy of these changes are attached, (pages 21, 22 and 34 of the ODCM), as per 6.15.2 (1A). The copies have been stamped, approved, revised, and dated by SNSC, only as required per 6.15.2 (1C).

C. Radioactive Waste Systems

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

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

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 of 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.

B. Radioactive Gaseous Effluent Monitoring Instrumentation

The Waste Gas Hold-up System Explosive Oxygen Recorder (ALARM) Monitor, Table 3.9-2.2B of the Technical Specifications has been out of service and inoperable in excess of thirty days. This recorder is obsolete equipment. Currently, a temporary manual sampler box is in place for manual samples to be taken. It is being replaced by new instrumentation and should be in service by the end of 1987, under Project #IP-30783.

August 31, 1987

Re: Indian Point Unit Nos. 1 and 2
Docket Nos. 50-03 and 50-247

Unplanned Releases

A. Unplanned Liquid Release

During this reporting period there were no unplanned liquid release.

B. Unplanned Gaseous Release

During this reporting period there were no unplanned gaseous releases.

DR_{SKIN}	Dose rate to skin from the i[illegible]nuclide noble gas beta and gamma radiation mRem/sec.]
Li	The skin dose factor due to beta emmisions from noble gas radiocuclide 'i' [mrem-m³/Ci-sec.]
Mi	The air dose factor due to gamma emissions from noble gas radionuclide 'i' [mRad-m³/Ci-sec.]
1.1	Conversion factor for Mi from mrad to mRem.
$\overline{X/Q}$	As defined above.
Q_i	As defined above.

The dose rate contribution of this release source shall be added to all other simultaneous gaseous release sources, if any, to determine overall Total Dose Rate to the Total Body and Skin form noble gas effluents.

2.3 Determining the Radioiodine and 8 Day Particulate Dose Rate to any Organ from Instantaneous Gaseous Releases

Technical Specification 3.9.B.1.a (u) limits the dose rate from radioiodines and particulates with half lives greater than 8 days to 1,500 mrem/yr to any organ. The following calculational method is provided for determining the dose rate from radioiodines and particulates. It is based on NUREG-0133, November, 1978; Sections 5.2.1, and 5.2.1.1 through 5.2.1.3.

The infant is the controlling age group for the contaminated forage/cow/milk pathway. There is no controlling age group for the ground plane deposition pathway. Children is the controlling age group for the inhalation pathway. These three pathways are the only ones considered for instantaneous releases. The table of P_i's are the highest dose conversion factors from the R_i's tables for each pathway, for all age groups, for each organ. The long term (X/Q) Depleted and (D/Q) values are based on historical meteorological data. Only those nuclides that appear on Table 6-4 will be considered. The equations are:

APPROVED
Alice Hayes
#1089, 4/9/87

Inhalation Pathway

EQUATION 2.3-1 $$^{DR}I\&BDP_t = \sum_i Pi_t \; (\overline{X/Q})_D \; \dot{Q}_i$$

Ground Plane Deposition Pathway

EQUATION 2.3-2 $$^{DR}I\&BDP_t = \sum_i Pi_t \; (\overline{D/Q}) \; \dot{Q}_i$$

Contaminated Forage/Cow/Milk Pathway

EQUATION 2.3-3 $$^{DR}I\&BDP_t = \sum_i Pi_t \; (\overline{D/Q}) \; \dot{Q}_i$$

Total Dose Rate From I&BDP

EQUATION 2.3-4 $$DR = {}^{DR}I\&BDP_t$$

where:

t	The organ of interest for the age group of interest.
z	All the applicable pathways.
$^{DR}I\&BDP_t$	Dose rate to the organ for the age group of interest from iodines and 8 day particulates via the pathway of interest in [mrem/yr].
DR_t	Total dose rate to organ from all applicable pathways for the age group of interest in [mrem/yr].
Pi_t	The dose factor for nuclide (i) for organ for the pathway specified [units vary-see tables].
$\overline{(D/Q)}$	A long term D over Q - a factor with units $1/m^2$ which describes the deposition of particulate matter from the plume at a point down range from the source. It can be thought of as the part of the cloud that will fall out and deposit over one square meter of ground.

of food (eg, milk). Data obtained from the latest land use census (Technical Specification 3.12.2) should be used to determine locations for evaluating doses. Also, the results of the Radiological Environmental Monitoring program will be included in determining more realistic doses to these real people by providing data on actual measured levels of radioactivity and radiation at locations of interest.

3.4 Contractor Quality Assurance Program

The vendor maintains its own comprehensive quality assurance program and has made a commitment to quality control. Quality assurance requirements specified in 10CFR50 Appendix B and Regulatory Guide 4.15 were met by the quality assurance program at TI. This program included stability, operational, and accuracy checks throughout the analysis procedures.

Checks were performed on analytical equipment using standards to monitor the stability and reproducibility of counting instruments. Operational checks were performed by laboratory personnel. Accuracy checks were performed by laboratory participation in the Environmental Protection Agency (EPA) and other laboratory intercomparison programs and by maintaining equipment calibrations with standards from the National Bureau of Standards (NBS), Amersham, or IAEA.

APPROVED
Alice Hayes

APPROVED
SNSC # 1069
1/20/87
REV #1