August 31, 1988

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

SEMI-ANNUAL

EFFLUENT AND WASTE DISPOSAL REPORT

JANUARY 1, 1988 - JUNE 30, 1988

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 fourth 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 1988. 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 Appendix A to Facility Operating Licenses DPR-5 and DPR-26 entitled "Technical Specifications and Bases".

2. Maximum Permissible Concentrations (MPC)

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 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 liquid effluents due to 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 .049 Mev/Dis. for E and .194 Mev/Dis. for E . The corresponding values for the second quarter were .051 Mev/Dis., and .195 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. 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.

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b&c. Iodines and Particulates

Iodine-131 and particulate releases are quantified by collecting a continuous sample of ventilation air on a potassium-iodine 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 and 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 amount of each isotope discharged.

The above concentrations are used in conjunction with the dilution flow to calculate the fraction of maximum permissible concentration.

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5. Batch Releases:

| a. Liquid | 1st Qtr. | 2nd Qtr. |
|---|---|---|
| Number of Batch Releases | 42 | 23 |
| Total Time Period Batch Releases (Minutes) | 12969 | 2157 |
| Maximum Time Period Batch Release (Minutes) | 5400 | 203 |
| Average Time Period Batch Release (Minutes) | 309 | 94 |
| Minimum Time Period Batch Release (Minutes) | 50 | 18 |
| Average Stream Flow cfs (1) | N/A | N/A |
| **b. Gaseous** | | |
| Number of Batch Releases | 115 | 137 |
| Total Time Period Batch Release (Minutes) | 13423 | 22232 |
| Maximum Time Period Batch Release (Minutes) | 365 | 1440 |
| Average Time Period Batch Release (Minutes) | 117 | 162 |
| Minimum Time Period Batch Release (Minutes) | 1 | 10 |

6. ABNORMAL RELEASES

a. Liquid - One

b. Gaseous - None

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

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# SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

## B - GASEOUS EFFLUENTS

## FIRST HALF 1988

DATE OF REPORT: AUGUST 31, 1988

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 | 3.22E 01 | 6.39E 01 | 5.00E 01 |
| 2. AVERAGE DILUTED CONC. DURING PERIOD | UCI/SEC | 4.10E 00 | 8.13E 00 | |
| **B. IODINES** | | | | |
| 1. TOTAL IODINE-131 | CI | 6.98E-06 | 9.58E-06 | 5.00E 01 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | UCI/SEC | 8.88E-07 | 1.22E-06 | |
| **C. PARTICULATES** | | | | |
| 1. PARTICULATES WITH HALF-LIVES >8 DAYS | CI | 1.18E-03 | 5.00E-03 | 5.00E 01 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | UCI/SEC | 1.50E-04 | 4.24E-04 | |
| 3. GROSS ALPHA RADIOACTIVITY | CI | 3.55E-09 | | |
| **D. TRITIUM** | | | | |
| 1. TOTAL RELEASE | CI | 4.34E-02 | 9.98E-01 | 5.00E 01 |
| 2. AVERAGE RELEASE RATE FOR PERIOD | UCI/SEC | 5.53E-03 | 1.27E-01 | |

| 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 | 4.34E-02 | 9.98E-01 | | |
| AR41 | CI | 8.43E-02 | 3.58E-02 | 3.57E-02 | 8.17E-02 |
| KR85M | CI | | 1.80E-03 | | 2.87E-03 |
| KR87 | CI | 5.21E-03 | 4.62E-03 | | 1.77E-03 |
| KR88 | CI | 1.05E-02 | 1.10E-02 | | 7.91E-03 |
| XE133 | CI | 2.89E 01 | 2.88E 01 | 9.14E-01 | 3.20E 01 |
| XE135M | CI | 1.22E-01 | 1.13E-01 | | 5.07E-02 |
| XE135 | CI | 9.95E-02 | 1.14E-01 | 7.87E-02 | 6.35E-01 |
| C14 | CI | 2.00E 00 | 2.00E 00 | | |
| TOTAL FOR PERIOD (ABOVE) | CI | 3.13E 01 | 3.20E 01 | 1.03E 00 | 3.29E 01 |
| 2. IODINES | | | | | |
| I131 | CI | 6.98E-06 | 9.58E-06 | | |
| I133 | CI | 8.08E-05 | 2.68E-03 | | |
| TOTAL FOR PERIOD (ABOVE) | CI | 8.78E-05 | 2.69E-03 | | |
| 3. PARTICULATES | | | | | |
| MN54 | CI | 3.80E-04 | 1.01E-03 | | |
| CO58 | CI | 5.42E-05 | 9.63E-05 | | |
| CO60 | CI | 6.87E-04 | 2.29E-03 | | |
| SR90 | CI | 1.09E-08 | | | |
| CS137 | CI | 5.51E-05 | 1.60E-03 | | |
| FE55 | CI | 2.16E-06 | | | |
| NI63 | CI | 5.95E-07 | 1.88E-08 | | |
| TOTAL FOR PERIOD (ABOVE) | CI | 1.18E-03 | 5.00E-03 | | |

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# SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

## C - LIQUID EFFLUENTS

## FIRST HALF 1988

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 | 1.17E 00 | 4.08E-01 | 2.50E 01 |
| 2. AVERAGE DILUTED CONC. DURING PERIOD | UCI/ML | 5.02E-09 | 1.48E-09 | |
| 3. PERCENT OF MPC | % | 1.32E-03 | 9.93E-04 | |
| **B. TRITIUM** | | | | |
| 1. TOTAL RELEASE | CI | 1.98E 01 | 7.37E 01 | 2.50E 01 |
| 2. AVERAGE DILUTED CONC. DURING PERIOD | UCI/ML | 8.46E-08 | 2.67E-07 | |
| 3. PERCENT OF MPC | % | 2.82E-03 | 8.90E-03 | |
| **C. DISSOLVED AND ENTRAINED GASES** | | | | |
| 1. TOTAL RELEASE | CI | 8.73E-03 | 1.01E-02 | 2.50 01 |
| 2. AVERAGE DILUTED CONC. DURING PERIOD | UCI/ML | 3.73E-11 | 3.66E-11 | |
| 3. PERCENT OF MPC | % | 1.87E-05 | 1.83E-05 | |
| **D. GROSS ALPHA RADIOACTIVITY** | | | | |
| 1. TOTAL RELEASE | CI | | | 2.50E-01 |
| **E. VOLUME WASTE RELEASED (PRIOR TO DILUTION)** | LITERS | 4.86E 07 | 3.57E 07 | 1.00E 01 |
| VOLUME DILUTION WATER USED DURING PERIOD | LITERS | 2.34E 11 | 2.76E 11 | 1.00E 01 |

| NUCLIDES RELEASED | UNITS | CONTINUOUS MODE QUARTER 1 | CONTINUOUS MODE QUARTER 2 | BATCH MODE QUARTER 1 | BATCH MODE QUARTER 2 |
|---|---|---|---|---|---|
| LIQUID EFFLUENTS | | | | | |
| H3 | CI | 1.32E 00 | 4.71E 00 | 1.85E 01 | 6.90E 01 |
| CR51 | CI | | 1.66E-02 | 4.85E-02 | 4.59E-03 |
| MN54 | CI | 3.41E-03 | 1.34E-03 | 1.07E-03 | 4.07E-04 |
| FE55 | CI | 6.12E-02 | | 3.26E-01 | 1.18E-02 |
| FE59 | CI | 7.73E-04 | | 5.73E-04 | |
| CO58 | CI | 2.29E-02 | 1.93E-02 | 1.21E-01 | 2.95E-02 |
| CO60 | CI | 1.58E-02 | 2.31E-02 | 1.59E-01 | 4.40E-02 |
| NI63 | CI | | | 1.63E-01 | 4.69E-03 |
| SR89 | CI | 1.18E-04 | | | |
| SR90 | CI | | | 1.27E-05 | |
| ZR95 | CI | | | 6.02E-04 | 3.27E-04 |
| NB95 | CI | | | 5.66E-03 | 1.25E-03 |
| RU106 | CI | | | 1.17E-04 | |
| AG110M | CI | | | 5.44E-03 | 1.03E-04 |
| I131 | CI | 2.19E-03 | 2.54E-02 | | |
| I132 | CI | 5.28E-04 | 1.13E-02 | | |
| I133 | CI | 1.47E-02 | 1.15E-01 | | |
| I135 | CI | 2.04E-03 | 7.43E-02 | | |
| CS134 | CI | 5.91E-03 | | 4.85E-03 | 1.40E-03 |
| CS137 | CI | 9.02E-03 | | 2.92E-02 | 1.14E-02 |
| CE144 | CI | | | | 1.32E-04 |

| NUCLIDES RELEASED | UNITS | CONTINUOUS MODE QUARTER 1 | CONTINUOUS MODE QUARTER 2 | BATCH MODE QUARTER 1 | BATCH MODE QUARTER 2 |
|---|---|---|---|---|---|
| LIQUID EFFLUENTS CONTINUED | | | | | |
| CO57 | CI | | | 1.02E-04 | 1.03E-04 |
| SB125 | CI | | | 1.57E-01 | 1.18E-02 |
| SB124 | CI | | | 1.27E-02 | |
| TOTAL FOR: PERIOD (ABOVE) | CI | 1.46E 00 | 5.00E 00 | 1.95E 01 | 6.91E 01 |
| XE133 | CI | | | 3.89E-03 | 2.08E-03 |
| XE135 | CI | 1.17E-04 | 1.30E-03 | | |
| XE135M | CI | 4.73E-03 | 6.73E-03 | | |

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Docket Nos. 50-03 and 50-247

# SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

## D - SOLID WASTE

## FIRST HALF 1988

August 31, 1988

Re: Indian Point Unit No. 1 & 2
Docket Nos. 50-3 and 50-247

Solid Radwaste Disposal Report January 1, 1988 through June 30, 1988.

Solid Radwaste Shipped Offsite for Burial or Disposal (No irradiated fuel).

6 MONTH PERIOD

| 1. | Type of Waste | Units | Class A | Class B | Class C | Total Error, % |
|---|---|---|---|---|---|---|
| a. | Spent Resins, sludges, etc. | $m^3$ | 11.65 | 3.41 | -- | -- |
| | | Ci | 49.02 | 338.3 | -- | 1.00E+2 |
| b. | DAW | $m^3$ | 130.66 | -- | -- | -- |
| | | Ci | 9.8263 | -- | -- | 1.00E+2 |
| c. | Irradiated components control rods, etc. | $m^3$ | -- | -- | -- | -- |
| | | Ci | -- | -- | -- | -- |

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

| | | | | | | |
|---|---|---|---|---|---|---|
| a. | Co-58 | - | 31% | OTHER | | 1.6% |
| | Co-60 | - | 34% | | | |
| | Cs-137 | - | 3% | | | |
| | Fe-55 | - | 19% | | | |
| | NI-63 | - | 10% | | | |
| | Cs-134 | - | 1.4% | | | |
| b. | Cs-137 | - | 17.8% | Co-60 | - | 26.45% |
| | Cs-134 | - | 8.0 | Co-58 | - | 6.32% |
| | Mn-54 | - | 3.04% | Cr-51 | - | |
| | Fe-55 | - | 8.0% | Ni-63 | - | 8.58% |
| | Other* | | 10.0% | H3 | - | 10.9% |
| c. | $Cr^{51}$ | - | - | | | |
| | Co-60 | - | - | | | |
| | $Fe^{59}$ | - | - | | | |
| | Co-58 | - | - | | | |
| | Mn-54 | - | - | | | |
| | Fe-55 | - | - | | | |
| | Ni-63 | - | - | | | |
| | Other | - | - | | | |

* Other in Section 2.b includes I-129, $Sr^{90}$, $Pu^{241}$, Tc-99, c-14.

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3. Solid Waste Disposition

| Number of Shipments | Mode of Transportation | Destination |
|---|---|---|
| 11 | Truck | Barnwell, SC<br>Channahon, Ill.<br>Oakridge, Tenn. |

4. Solid Waste Containers

a. Four High Integrity Containers
Carbon Steel Containers - cement used for solidification

b. 423 Drums
26 Boxes

5. Waste Class

| Container | Class A | Class B | Class C |
|---|---|---|---|
| High Integrity Container | 3 | 1 | -- |
| Steel Liners | -- | -- | -- |
| Steel Drums | 423 | -- | -- |

August 31, 1988

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 1988

August 31, 1988

Re: Indian Point Unit No. 2
Docket No. 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 calculation 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.

This impact evaluation demonstrates that the dose commitment to man from the operation of Indian Point Unit No. 2 is negligible, and is well below the levels set forth in 10 CFR 20, 10 CFR 50 and the Indian Point Unit No. 2 Technical Specifications.

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 |
|---|---|---|---|---|
| a) Noble Gas Immersion | 3.87E-3 | 1.04E-2 | N/A | N/A |
| b) Inhalation | 1.27E-4 | N/A | 7.91E-4 | 1.09E-4 |
| c) Ground Deposition | 4.77E-2 | 5.60E-2 | 4.77E-2 | 4.77E-2 |
| d) Milk Ingestion | 2.20E-4 | N/A | 4.26E-4 | 1.67E-3 |
| e) Meat Ingestion | 3.39E-5 | N/A | 4.05E-6 | 4.33E-5 |
| f) Vegetable Ingestion | 6.31E-3 | N/A | 8.82E-4 | 2.41E-2 |

(2) Pathways (Liquid)

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

NA = Not Applicable

RE-304L/1

B. Population

(1) Pathways (Gaseous)

| | Total Body (man-rem) | Thyroid (man-rem) |
|---|---|---|
| a) Noble Gas Immersion | 1.3E-1 | 1.3E-1 |
| b) Inhalation | 1.1E-2 | 1.3E-2 |
| c) Ground Deposition | 8.4E-1 | 8.4E-1 |
| d) Totals | 9.8E-1 | 9.8E-1 |

(2) Pathways (Liquid)

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

C. Average Doses to Individuals

(1) Pathways

a) Liquid-Total Body 2.65E-5 millirem

b) Gaseous-Total Body 1.01E-5 millirem

IP2 SEMI-ANNUAL EFFLUENT REPORT 1ST HALF 1988 - USNRC LADTAP II CODE

DISCHARGE=2.25E+03 CFS SOURCE TERM MULTIPLIER=1.00E+00

50-MILE POPULATION=2.07E+07 FRACTION --- CATEGORY I=0.71
CATEGORY II=0.11
CATEGORY III=0.18

FRESHWATER SITE

SOURCE TERM FOLLOWS
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 | 9.35E+01 | 0.00E+00 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 1.05E-07 | 0.00E+00 | 0.00E+00 | 1.00E+00 |
| 24CR 51 | 6.97E-02 | 0.00E+00 | 0.00E+00 | 2.66E-09 | 1.59E-09 | 5.86E-10 | 3.53E-09 | 6.69E-07 | 2.60E-10 | 2.20E-10 | 1.00E+00 |
| 25MN 54 | 6.23E-03 | 0.00E+00 | 4.57E-06 | 8.72E-07 | 0.00E+00 | 1.36E-06 | 0.00E+00 | 1.40E-05 | 6.80E-09 | 5.80E-09 | 1.00E+00 |
| 26FE 55 | 3.99E-01 | 2.75E-06 | 1.90E-06 | 4.43E-07 | 0.00E+00 | 0.00E+00 | 1.06E-06 | 1.09E-06 | 0.00E+00 | 0.00E+00 | 1.00E+00 |
| 26FE 59 | 1.35E-03 | 4.34E-06 | 1.02E-05 | 3.91E-06 | 0.00E+00 | 0.00E+00 | 2.85E-06 | 3.40E-05 | 9.40E-09 | 8.00E-09 | 1.00E+00 |
| 27CO 57 | 2.05E-04 | 0.00E+00 | 1.75E-07 | 2.91E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.44E-06 | 1.00E-09 | 9.10E-10 | 1.00E+00 |
| 27CO 58 | 1.93E-01 | 0.00E+00 | 7.45E-07 | 1.67E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.51E-05 | 8.20E-09 | 7.00E-09 | 1.00E+00 |
| 27CO 60 | 2.42E-01 | 0.00E+00 | 2.14E-06 | 4.72E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.02E-05 | 2.00E-08 | 1.70E-08 | 1.00E+00 |
| 28NI 63 | 1.68E-01 | 1.30E-04 | 9.01E-06 | 4.36E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.88E-06 | 0.00E+00 | 0.00E+00 | 1.00E+00 |
| 38SR 89 | 1.18E-04 | 3.08E-04 | 0.00E+00 | 8.84E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.94E-05 | 6.50E-13 | 5.60E-13 | 1.00E+00 |
| 38SR 90 | 1.27E-05 | 3.84E-03 | 0.00E+00 | 1.03E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.19E-04 | 0.00E+00 | 0.00E+00 | 1.00E+00 |
| 40ZR 95 | 9.29E-04 | 3.04E-08 | 9.75E-09 | 6.60E-09 | 0.00E+00 | 1.53E-08 | 0.00E+00 | 3.09E-05 | 5.80E-09 | 5.00E-09 | 1.00E+00 |
| 41NB 95 | 6.91E-03 | 6.22E-09 | 3.46E-09 | 1.86E-09 | 0.00E+00 | 3.42E-09 | 0.00E+00 | 2.10E-05 | 5.10E-09 | 6.00E-09 | 1.00E+00 |
| 44RU 106 | 1.17E-04 | 2.75E-06 | 0.00E+00 | 3.48E-07 | 0.00E+00 | 5.31E-06 | 0.00E+00 | 1.78E-04 | 1.50E-09 | 1.80E-09 | 1.00E+00 |
| 47AG 110M | 5.54E-03 | 1.60E-07 | 1.48E-07 | 8.79E-08 | 0.00E+00 | 2.91E-07 | 0.00E+00 | 6.04E-05 | 2.10E-08 | 1.80E-08 | 1.00E+00 |
| 53I 131 | 2.76E-02 | 4.16E-06 | 5.95E-06 | 3.41E-06 | 1.95E-03 | 1.02E-05 | 0.00E+00 | 1.57E-06 | 3.40E-09 | 2.80E-09 | 1.00E+00 |
| 53I 132 | 1.18E-02 | 2.03E-07 | 5.43E-07 | 1.90E-07 | 1.90E-05 | 8.65E-07 | 0.00E+00 | 1.02E-07 | 1.70E-08 | 2.00E-08 | 1.00E+00 |
| 53I 133 | 1.30E-01 | 1.42E-06 | 2.47E-06 | 7.53E-07 | 3.63E-04 | 4.31E-06 | 0.00E+00 | 2.22E-06 | 4.50E-09 | 3.70E-09 | 1.00E+00 |
| 53I 135 | 7.63E-02 | 4.43E-07 | 1.16E-06 | 4.28E-07 | 7.85E-05 | 1.86E-06 | 0.00E+00 | 1.31E-06 | 1.20E-08 | 1.40E-08 | 1.00E+00 |
| 55CS 134 | 1.22E-02 | 6.22E-05 | 1.48E-04 | 1.21E-04 | 0.00E+00 | 4.79E-05 | 1.59E-05 | 2.59E-06 | 1.40E-08 | 1.20E-08 | 1.00E+00 |
| 55CS 137 | 4.96E-02 | 7.97E-05 | 1.09E-04 | 7.14E-05 | 0.00E+00 | 3.70E-05 | 1.23E-05 | 2.11E-06 | 4.90E-09 | 4.20E-09 | 1.00E+00 |
| 58CE 144 | 1.32E-04 | 4.88E-07 | 2.04E-07 | 2.82E-08 | 0.00E+00 | 1.21E-07 | 0.00E+00 | 1.65E-04 | 3.70E-10 | 3.20E-10 | 1.00E+00 |
| 51SB 124 | 1.27E-02 | 2.80E-06 | 5.29E-08 | 1.11E-06 | 6.79E-09 | 0.00E+00 | 2.18E-06 | 7.95E-05 | 1.50E-08 | 1.30E-08 | 1.00E+00 |
| 51SB 125 | 1.69E-01 | 1.79E-06 | 2.00E-08 | 4.26E-07 | 1.82E-09 | 0.00E+00 | 1.33E-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 | 9.35E+01 | 0.00E+00 | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 | 1.06E-07 | | | |
| 24CR 51 | 6.97E-02 | 0.00E+00 | 0.00E+00 | 3.60E-09 | 2.00E-09 | 7.89E-10 | 5.14E-09 | 6.05E-07 | | | |
| 25MN 54 | 6.23E-03 | 0.00E+00 | 5.90E-06 | 1.17E-06 | 0.00E+00 | 1.76E-06 | 0.00E+00 | 1.21E-05 | | | |
| 26FE 55 | 3.99E-01 | 3.78E-06 | 2.68E-06 | 6.25E-07 | 0.00E+00 | 0.00E+00 | 1.70E-06 | 1.16E-06 | | | |
| 26FE 59 | 1.35E-03 | 5.87E-06 | 1.37E-05 | 5.29E-06 | 0.00E+00 | 0.00E+00 | 4.32E-06 | 3.24E-05 | | | |
| 27CO 57 | 2.05E-04 | 0.00E+00 | 2.38E-07 | 3.99E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.44E-06 | | | |
| 27CO 58 | 1.93E-01 | 0.00E+00 | 9.72E-07 | 2.24E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.34E-05 | | | |
| 27CO 60 | 2.42E-01 | 0.00E+00 | 2.81E-06 | 6.33E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.66E-05 | | | |
| 28NI 63 | 1.68E-01 | 1.77E-04 | 1.25E-05 | 6.00E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.99E-06 | | | |
| 38SR 89 | 1.18E-04 | 4.40E-04 | 0.00E+00 | 1.26E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.24E-05 | | | |
| 38SR 90 | 1.27E-05 | 4.48E-03 | 0.00E+00 | 1.20E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.33E-04 | | | |
| 40ZR 95 | 9.29E-04 | 4.12E-08 | 1.30E-08 | 8.94E-09 | 0.00E+00 | 1.91E-08 | 0.00E+00 | 3.00E-05 | | | |
| 41NB 95 | 6.91E-03 | 8.22E-09 | 4.56E-09 | 2.51E-09 | 0.00E+00 | 4.42E-09 | 0.00E+00 | 1.95E-05 | | | |
| 44RU 106 | 1.17E-04 | 3.92E-06 | 0.00E+00 | 4.94E-07 | 0.00E+00 | 7.56E-06 | 0.00E+00 | 1.83E-04 | | | |
| 47AG 110M | 5.54E-03 | 2.05E-07 | 1.94E-07 | 1.16E-07 | 0.00E+00 | 3.70E-07 | 0.00E+00 | 5.45E-05 | | | |
| 53I 131 | 2.76E-02 | 5.85E-06 | 3.19E-06 | 4.40E-06 | 2.39E-03 | 1.41E-05 | 0.00E+00 | 1.62E-06 | | | |
| 53I 132 | 1.18E-02 | 2.79E-07 | 7.30E-07 | 2.62E-07 | 2.46E-05 | 1.15E-06 | 0.00E+00 | 3.18E-07 | | | |
| 53I 133 | 1.30E-01 | 2.01E-06 | 3.41E-06 | 1.04E-06 | 4.76E-04 | 5.98E-06 | 0.00E+00 | 2.58E-06 | | | |
| 53I 135 | 7.63E-02 | 6.10E-07 | 1.57E-06 | 5.82E-07 | 1.01E-04 | 2.40E-06 | 0.00E+00 | 1.74E-06 | | | |
| 55CS 134 | 1.22E-02 | 8.37E-05 | 1.97E-04 | 9.14E-05 | 0.00E+00 | 6.26E-05 | 2.39E-05 | 2.45E-06 | | | |
| 55CS 137 | 4.96E-02 | 1.12E-04 | 1.49E-04 | 5.19E-05 | 0.00E+00 | 5.07E-05 | 1.97E-05 | 2.12E-06 | | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 58CE 14 | [illegible] | .32E-04 | 2.98E-06 | 1.22E-06 | 1.67E-07 | 0.00E+00 | 4.93E-0[illegible] | [illegible]0E+00 | 1.71E-04 | |
| 51SB 124 | | 1.27E-02 | 2.14E-05 | 3.15E-07 | 6.53E-06 | 5.63E-08 | 0.00E+00 | 1.34E-05 | 6.60E-05 | |
| 51SB 125 | | 1.69E-01 | 1.23E-05 | 1.19E-07 | 2.53E-06 | 1.54E-08 | 0.00E+00 | 7.12E-06 | 1.64E-05 | |

TOTAL NUMBER IN SOURCE TERM IS 24 TOTAL RELEASE IS 9.5082E+01

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 58CE | 144 | 1.32E-04 | 6.96E-07 | 2.83E-07 | 3.74E-08 | 0.00E+00 | 1.72E-0[illegible] | [illegible]0E+00 | 1.75E-04 | | |
| 51SB | 124 | 1.27E-02 | 3.87E-06 | 7.13E-08 | 1.51E-06 | 6.78E-09 | 0.00E+00 | 3.38E-06 | 7.80E-05 | | |
| 51SB | 125 | 1.69E-01 | 2.48E-06 | 2.71E-08 | 5.80E-07 | 2.37E-09 | 0.00E+00 | 2.16E-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 | 9.35E+01 | 0.00E+00 | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 | 2.03E-07 | | | |
| 24CR 51 | 6.97E-02 | 0.00E+00 | 0.00E+00 | 8.90E-09 | 4.94E-09 | 1.35E-09 | 9.02E-09 | 4.72E-07 | | | |
| 25MN 54 | 6.23E-03 | 0.00E+00 | 1.07E-05 | 2.85E-06 | 0.00E+00 | 3.00E-06 | 0.00E+00 | 8.98E-06 | | | |
| 26FE 55 | 3.99E-01 | 1.15E-05 | 6.10E-06 | 1.89E-06 | 0.00E+00 | 0.00E+00 | 3.45E-06 | 1.13E-06 | | | |
| 26FE 59 | 1.35E-03 | 1.65E-05 | 2.67E-05 | 1.33E-05 | 0.00E+00 | 0.00E+00 | 7.74E-06 | 2.78E-05 | | | |
| 27CO 57 | 2.05E-04 | 0.00E+00 | 4.93E-07 | 9.98E-07 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.04E-06 | | | |
| 27CO 58 | 1.93E-01 | 0.00E+00 | 1.80E-06 | 5.51E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.05E-05 | | | |
| 27CO 60 | 2.42E-01 | 0.00E+00 | 5.29E-06 | 1.56E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.93E-05 | | | |
| 28NI 63 | 1.68E-01 | 5.36E-04 | 2.88E-05 | 1.83E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.94E-06 | | | |
| 38SR 89 | 1.18E-04 | 1.32E-03 | 0.00E+00 | 3.77E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.11E-05 | | | |
| 38SR 90 | 1.27E-05 | 1.13E-02 | 0.00E+00 | 3.03E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.29E-04 | | | |
| 40ZR 95 | 9.29E-04 | 1.16E-07 | 2.55E-08 | 2.27E-08 | 0.00E+00 | 3.65E-08 | 0.00E+00 | 2.66E-05 | | | |
| 41NB 95 | 6.91E-03 | 2.25E-08 | 8.76E-09 | 6.26E-09 | 0.00E+00 | 8.23E-09 | 0.00E+00 | 1.62E-03 | | | |
| 44RU 106 | 1.17E-04 | 1.17E-05 | 0.00E+00 | 1.46E-06 | 0.00E+00 | 1.58E-05 | 0.00E+00 | 1.82E-04 | | | |
| 47AG 110M | 5.54E-03 | 5.39E-07 | 3.64E-07 | 2.91E-07 | 0.00E+00 | 6.78E-07 | 0.00E+00 | 4.33E-05 | | | |
| 53I 131 | 2.76E-02 | 1.72E-05 | 1.73E-05 | 9.83E-06 | 5.72E-03 | 2.84E-05 | 0.00E+00 | 1.54E-06 | | | |
| 53I 132 | 1.18E-02 | 8.00E-07 | 1.47E-06 | 5.76E-07 | 6.82E-05 | 2.25E-06 | 0.00E+00 | 1.73E-06 | | | |
| 53I 133 | 1.30E-01 | 5.92E-06 | 7.32E-06 | 2.77E-06 | 1.36E-03 | 1.22E-05 | 0.00E+00 | 2.95E-06 | | | |
| 53I 135 | 7.63E-02 | 1.75E-06 | 3.15E-06 | 1.49E-06 | 2.79E-04 | 4.83E-06 | 0.00E+00 | 2.40E-06 | | | |
| 55CS 134 | 1.22E-02 | 2.34E-04 | 3.84E-04 | 8.10E-05 | 0.00E+00 | 1.19E-04 | 4.27E-05 | 2.07E-06 | | | |
| 55CS 137 | 4.96E-02 | 3.27E-04 | 3.13E-04 | 4.62E-05 | 0.00E+00 | 1.02E-04 | 3.67E-05 | 1.96E-06 | | | |
| 58CE 144 | 1.32E-04 | 2.08E-06 | 6.52E-07 | 1.11E-07 | 0.00E+00 | 3.61E-07 | 0.00E+00 | 1.70E-04 | | | |
| 51SB 124 | 1.27E-02 | 1.11E-05 | 1.44E-07 | 3.89E-06 | 2.45E-08 | 0.00E+00 | 6.16E-06 | 6.94E-05 | | | |
| 51SB 125 | 1.69E-01 | 7.16E-06 | 5.52E-08 | 1.50E-06 | 6.53E-09 | 0.00E+00 | 3.99E-06 | 1.71E-05 | | | |

## CATEGORY IV 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 | 9.35E+01 | 0.00E+00 | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 | 3.08E-07 | | | |
| 24CR 51 | 6.97E-02 | 0.00E+00 | 0.00E+00 | 1.41E-08 | 9.20E-09 | 2.01E-09 | 1.79E-08 | 4.11E-07 | | | |
| 25MN 54 | 6.23E-03 | 0.00E+00 | 1.99E-05 | 4.51E-06 | 0.00E+00 | 4.41E-06 | 0.00E+00 | 7.31E-06 | | | |
| 26FE 55 | 3.99E-01 | 1.39E-05 | 8.98E-06 | 2.40E-06 | 0.00E+00 | 0.00E+00 | 4.39E-06 | 1.14E-06 | | | |
| 26FE 59 | 1.35E-03 | 3.08E-05 | 5.38E-05 | 2.12E-05 | 0.00E+00 | 0.00E+00 | 1.59E-05 | 2.57E-05 | | | |
| 27CO 57 | 2.05E-04 | 0.00E+00 | 1.15E-06 | 1.87E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 3.92E-06 | | | |
| 27CO 58 | 1.93E-01 | 0.00E+00 | 3.60E-06 | 8.98E-06 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.97E-06 | | | |
| 27CO 60 | 2.42E-01 | 0.00E+00 | 1.08E-05 | 2.55E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.57E-05 | | | |
| 28NI 63 | 1.68E-01 | 5.34E-04 | 3.92E-05 | 2.20E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.95E-06 | | | |
| 38SR 89 | 1.18E-04 | 2.51E-03 | 0.00E+00 | 7.20E-05 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.16E-05 | | | |
| 38SR 90 | 1.27E-05 | 1.25E-02 | 0.00E+00 | 3.37E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.31E-04 | | | |
| 40ZR 95 | 9.29E-04 | 2.06E-07 | 5.02E-08 | 3.56E-08 | 0.00E+00 | 5.41E-08 | 0.00E+00 | 2.50E-05 | | | |
| 41NB 95 | 6.91E-03 | 4.20E-08 | 1.73E-08 | 1.00E-08 | 0.00E+00 | 1.24E-08 | 0.00E+00 | 1.46E-05 | | | |
| 44RU 106 | 1.17E-04 | 2.41E-05 | 0.00E+00 | 3.01E-06 | 0.00E+00 | 2.85E-05 | 0.00E+00 | 1.83E-04 | | | |
| 47AG 110M | 5.54E-03 | 9.96E-07 | 7.27E-07 | 4.81E-07 | 0.00E+00 | 1.04E-06 | 0.00E+00 | 3.77E-05 | | | |
| 53I 131 | 2.76E-02 | 3.59E-05 | 4.23E-05 | 1.86E-05 | 1.39E-02 | 4.94E-05 | 0.00E+00 | 1.51E-06 | | | |
| 53I 132 | 1.18E-02 | 1.68E-06 | 3.37E-06 | 1.20E-06 | 1.58E-04 | 3.76E-06 | 0.00E+00 | 2.73E-06 | | | |
| 53I 133 | 1.30E-01 | 1.25E-05 | 1.82E-05 | 5.33E-06 | 3.31E-03 | 2.14E-05 | 0.00E+00 | 3.08E-06 | | | |
| 53I 135 | 7.63E-02 | 3.64E-06 | 7.24E-06 | 2.64E-06 | 6.49E-04 | 8.07E-06 | 0.00E+00 | 2.62E-06 | | | |
| 55CS 134 | 1.22E-02 | 3.77E-04 | 7.03E-04 | 7.10E-05 | 0.00E+00 | 1.81E-04 | 7.42E-05 | 1.91E-06 | | | |
| 55CS 137 | 4.96E-02 | 5.22E-04 | 6.11E-04 | 4.33E-05 | 0.00E+00 | 1.64E-04 | 6.64E-05 | 1.91E-06 | | | |

AS LOW AS REASONA[illegible]CHIEVABLE

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 | | 2.45E-02 | 3.08E-02 | 2.14E-02 | 2.22E-03 | 1.02E-02 | 3.47E-03 | 1.11E-02 |
| INVERTEBRATE | | 3.09E-03 | 3.01E-03 | 9.71E-04 | 1.79E-04 | 5.06E-04 | 7.26E-04 | 6.17E-03 |
| ALGAE | | 5.09E-09 | 4.88E-09 | 3.21E-09 | 2.81E-09 | 1.32E-09 | 1.22E-09 | 1.09E-08 |
| DRINKING | | 2.80E-13 | 2.00E-13 | 1.73E-13 | 4.68E-13 | 1.24E-13 | 1.13E-13 | 2.81E-13 |
| SHORELINE | 9.46E-04 | 8.07E-04 | 8.07E-04 | 8.07E-04 | 8.07E-04 | 8.07E-04 | 8.07E-04 | 8.07E-04 |
| SWIMMING | 0.00E+00 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 |
| BOATING | 0.00E+00 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 |
| TOTAL | 9.46E-04 | 2.84E-02 | 3.46E-02 | 2.32E-02 | 3.23E-03 | 1.15E-02 | 5.02E-03 | 1.81E-02 |

| | 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 | |

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 | | 2.60E-02 | 3.18E-02 | 1.21E-02 | 2.11E-03 | 1.05E-02 | 4.17E-03 | 7.88E-03 |
| INVERTEBRATE | | 3.22E-03 | 3.09E-03 | 8.90E-04 | 1.70E-04 | 5.02E-04 | 8.81E-04 | 4.21E-03 |
| ALGAE | | 7.03E-09 | 6.64E-09 | 2.81E-09 | 3.51E-09 | 1.78E-09 | 1.94E-09 | 1.05E-08 |
| DRINKING | | 3.84E-13 | 2.35E-13 | 1.70E-13 | 5.53E-13 | 1.34E-13 | 1.22E-13 | 2.69E-13 |
| SHORELINE | 1.27E-03 | 1.08E-03 | 1.08E-03 | 1.08E-03 | 1.08E-03 | 1.08E-03 | 1.08E-03 | 1.08E-03 |
| SWIMMING | 0.00E+00 | 1.90E-05 | 1.90E-05 | 1.90E-05 | 1.90E-05 | 1.90E-05 | 1.90E-05 | 1.90E-05 |
| BOATING | 0.00E+00 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 |
| TOTAL | 1.27E-03 | 3.03E-02 | 3.60E-02 | 1.41E-02 | 3.39E-03 | 1.21E-02 | 6.16E-03 | 1.32E-02 |

| | 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 | |

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 | | 3.28E-02 | 2.84E-02 | 4.96E-03 | 2.31E-03 | 8.98E-03 | 3.33E-03 | 2.84E-03 |
| INVERTEBRATE | | 4.36E-03 | 2.83E-03 | 9.64E-04 | 1.92E-04 | 3.99E-04 | 7.95E-04 | 1.49E-03 |
| ALGAE | | 2.08E-05 | 1.38E-05 | 4.20E-06 | 8.90E-06 | 3.51E-06 | 3.69E-06 | 9.00E-06 |
| DRINKING | | 1.16E-09 | 4.83E-10 | 3.13E-10 | 1.28E-09 | 2.60E-10 | 2.34E-10 | 3.30E-10 |
| SHORELINE | 2.65E-04 | 2.26E-04 | 2.26E-04 | 2.26E-04 | 2.26E-04 | 2.26E-04 | 2.26E-04 | 2.26E-04 |
| SWIMMING | 0.00E+00 | 4.76E-06 | 4.76E-06 | 4.76E-06 | 4.76E-06 | 4.76E-06 | 4.76E-06 | 4.76E-06 |
| BOATING | 0.00E+00 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 | 9.51E-06 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TOTAL | 2.65E-04 | 3.74E-02 | 3.15E-02 | 5[illegible]03 | 2.75E-03 | 9.63E-03 | 4.37E-03 | [illegible]7E-03 |

| | USAGE (KG/YR,HR/YR) | DILUTION | TIME(HR) |
|---|---|---|---|
| FISH | 6.9 | 5.0 | 25.00 |
| INVERTEBRATE | 1.7 | 5.0 | 25.00 |
| ALGAE | 0.0 | 5.0 | 25.00 |
| DRINKING | 0.0 | 500.0 | 112.00 |
| SHORELINE | 14.0 | 5.0 | 1.00 |
| SWIMMING | 25.0 | 5.0 | 1.00 |
| BOATING | 100.0 | 5.0 | 1.00 |

SHOREWIDTH FACTOR=0.2

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

| PATHWAY | DOSE (MREM PER YEAR INTAKE) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | SKIN | BONE | LIVER | TOTAL BODY | THYROID | KIDNEY | LUNG | GI-LLI |
| FISH | | 3.60E-03 | 3.94E-03 | 3.46E-04 | 4.06E-04 | 1.03E-03 | 4.28E-04 | 1.86E-04 |
| INVERTEBRATE | | 3.15E-04 | 2.80E-04 | 7.94E-05 | 2.72E-05 | 3.53E-05 | 6.11E-05 | 7.58E-05 |
| ALGAE | | 2.99E-08 | 2.54E-08 | 5.37E-09 | 2.16E-08 | 5.56E-09 | 5.94E-09 | 8.40E-09 |
| DRINKING | | 1.45E-12 | 8.18E-13 | 4.51E-13 | 2.95E-12 | 4.00E-13 | 3.60E-13 | 4.15E-13 |
| SHORELINE | 5.68E-05 | 4.84E-05 | 4.84E-05 | 4.84E-05 | 4.84E-05 | 4.84E-05 | 4.84E-05 | 4.84E-05 |
| SWIMMING | 0.00E+00 | 1.90E-12 | 1.90E-12 | 1.90E-12 | 1.90E-12 | 1.90E-12 | 1.90E-12 | 1.90E-12 |
| BOATING | 0.00E+00 | 4.76E-08 | 4.76E-08 | 4.76E-08 | 4.76E-08 | 4.76E-08 | 4.76E-08 | 4.76E-08 |
| TOTAL | 5.68E-05 | 3.96E-03 | 4.27E-03 | 4.74E-04 | 4.82E-04 | 1.12E-03 | 5.38E-04 | 3.10E-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

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 | | 1.75E-02 | 2.20E-02 | 1.53E-02 | 1.47E-03 | 7.26E-03 | 2.48E-03 | 7.90E-03 |
| INVERTEBRATE | | 2.20E-03 | 2.15E-03 | 6.93E-04 | 1.19E-04 | 3.61E-04 | 5.18E-04 | 4.40E-03 |
| ALGAE | | 3.63E-09 | 3.48E-09 | 2.29E-09 | 1.86E-09 | 9.41E-10 | 8.74E-10 | 7.81E-09 |
| DRINKING | | 2.01E-11 | 1.45E-11 | 1.24E-11 | 6.12E-11 | 9.13E-12 | 8.05E-12 | 2.03E-11 |
| SHORELINE | 6.76E-04 | 5.77E-04 | 5.77E-04 | 5.77E-04 | 5.77E-04 | 5.77E-04 | 5.77E-04 | 5.77E-04 |
| SWIMMING | 0.00E+00 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 |
| BOATING | 0.00E+00 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 |
| TOTAL | 6.76E-04 | 2.03E-02 | 2.47E-02 | 1.65E-02 | 2.18E-03 | 8.21E-03 | 3.59E-03 | 1.29E-02 |

| | 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

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 | | 1.35E-02 | 2.27E-02 | 8.67E-03 | 1.40E-03 | 7.49E-03 | 2.93E-03 | 5.60E-03 |
| INVERTEBRATE | | 2.30E-03 | 2.20E-03 | 6.35E-04 | 1.12E-04 | 3.59E-04 | 5.29E-04 | 3.01E-03 |
| ALGAE | | 5.02E-09 | 4.74E-09 | 2.00E-09 | 2.32E-09 | 1.27E-09 | 1.38E-09 | 7.46E-09 |
| DRINKING | | 2.75E-11 | 1.73E-11 | 1.22E-11 | 7.50E-11 | 9.97E-12 | 8.74E-12 | 1.95E-11 |
| SHORELINE | 9.06E-04 | 7.73E-04 | 7.73E-04 | 7.73E-04 | 7.73E-04 | 7.73E-04 | 7.73E-04 | 7.73E-04 |
| SWIMMING | 0.00E+00 | 1.34E-05 | 1.34E-05 | 1.34E-05 | 1.34E-05 | 1.34E-05 | 1.34E-05 | 1.34E-05 |
| BOATING | 0.00E+00 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 |
| TOTAL | 9.06E-04 | 2.16E-02 | 2.57E-02 | 1.01E-02 | 2.00E-03 | 8.64E-03 | 4.40E-03 | 9.40E-03 |

| | 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

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 | | 2.34E-02 | 2.03E-02 | 3.54E-03 | 1.52E-03 | 6.42E-03 | 2.38E-03 | 2.02E-03 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTEBRA | | 3.11E-03 | 2.02E-03 | 6.[illegible] | 1.26E-04 | 2.85E-04 | 5.68E-04 | [illegible]-03 |
| ALGAE | | 1.48E-05 | 9.87E-06 | 3.[illegible] | 5.85E-06 | 2.50E-06 | 2.63E-06 | [illegible]-06 |
| DRINKING | | 8.30E-08 | 3.50E-08 | 2.2[illegible]-08 | 1.87E-07 | 1.93E-08 | 1.67E-08 | [illegible]9E-08 |
| SHORELINE | 1.89E-04 | 1.61E-04 | 1.61E-04 | 1.61E-04 | 1.61E-04 | 1.61E-04 | 1.61E-04 | 1.61E-04 |
| SWIMMING | 0.00E+00 | 3.36E-06 | 3.36E-06 | 3.36E-06 | 3.36E-06 | 3.36E-06 | 3.36E-06 | 3.36E-06 |
| BOATING | 0.00E+00 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 | 6.71E-06 |
| TOTAL | 1.89E-04 | 2.67E-02 | 2.25E-02 | 4.41E-03 | 1.82E-03 | 6.87E-03 | 3.12E-03 | 3.26E-03 |

SHOREWIDTH FACTOR=0.2

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

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 | | 2.57E-03 | 2.81E-03 | 2.47E-04 | 2.67E-04 | 7.38E-04 | 3.06E-04 | 1.32E-04 |
| INVERTEBRATE | | 2.25E-04 | 2.00E-04 | 5.67E-05 | 1.79E-05 | 2.52E-05 | 4.36E-05 | 5.41E-05 |
| ALGAE | | 2.13E-08 | 1.81E-08 | 3.83E-09 | 1.42E-08 | 3.96E-09 | 4.24E-09 | 5.99E-09 |
| DRINKING | | 1.05E-10 | 5.96E-11 | 3.26E-11 | 4.43E-10 | 2.99E-11 | 2.57E-11 | 2.99E-11 |
| SHORELINE | 4.06E-05 | 3.46E-05 | 3.46E-05 | 3.46E-05 | 3.46E-05 | 3.46E-05 | 3.46E-05 | 3.46E-05 |
| SWIMMING | 0.00E+00 | 1.34E-12 | 1.34E-12 | 1.34E-12 | 1.34E-12 | 1.34E-12 | 1.34E-12 | 1.34E-12 |
| BOATING | 0.00E+00 | 3.36E-08 | 3.36E-08 | 3.36E-08 | 3.36E-08 | 3.36E-08 | 3.36E-08 | 3.36E-08 |
| TOTAL | 4.06E-05 | 2.83E-03 | 3.05E-03 | 3.38E-04 | 3.20E-04 | 7.98E-04 | 3.84E-04 | 2.21E-04 |

SHOREWIDTH FACTOR=0.2

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

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 58CE 14 | [illegible] | .32E-04 | 2.98E-06 | 1.22E-06 | 1.67E-07 | 0.00E+00 | 4.93E-0[illegible] | [illegible]0E+00 | 1.71E-04 | |
| 51SB 124 | | 1.27E-02 | 2.14E-05 | 3.15E-07 | 6.53E-06 | 5.63E-08 | 0.00E+00 | 1.34E-05 | 6.60E-05 | |
| 51SB 125 | | 1.69E-01 | 1.23E-05 | 1.19E-07 | 2.53E-06 | 1.54E-08 | 0.00E+00 | 7.12E-06 | 1.64E-05 | |

TOTAL NUMBER IN SOURCE TERM IS 24 TOTAL RELEASE IS 9.5082E+01

FISH CONSUMPTION POPU[illegible] 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 | 6.22E-02 | 7.00E-02 | 5.42E-02 | 2.41E-03 | 2.58E-02 | 8.81E-03 | 2.56E-02 |
| FISH | CATEGORY II | 3.87E+03 | 1.01E-02 | 1.24E-02 | 4.72E-03 | 3.44E-04 | 4.07E-03 | 1.62E-03 | 2.79E-03 |
| FISH | CATEGORY III | 6.14E+03 | 2.05E-02 | 1.77E-02 | 3.09E-03 | 5.68E-04 | 5.60E-03 | 2.09E-03 | 1.61E-03 |
| FISH | TOTAL | 9.10E+04 | 9.28E-02 | 1.08E-01 | 6.20E-02 | 3.32E-03 | 3.54E-02 | 1.25E-02 | 3.00E-02 |

POPULATION=1.55E+04

| LOCATION | DILUTION | CATCH | TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 1.68E+02 HR |
|---|---|---|---|
| | 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 POPUL[illegible] DOSES
MAN-REM

COMMERCIAL HARVEST

| PATHWAY | AGE GROUP | USAGE | DOSE (MAN-REM) BONE | LIVER | TOTAL BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---|---|---|---|---|---|---|---|---|---|
| FISH | CATEGORY I | 1.01E+08 | 2.92E-01 | 3.67E-01 | 2.54E-01 | 8.75E-03 | 1.21E-01 | 4.14E-02 | 1.15E-01 |
| FISH | CATEGORY II | 1.18E+07 | 4.74E-02 | 5.81E-02 | 2.22E-02 | 1.25E-03 | 1.91E-02 | 7.61E-03 | 1.25E-02 |
| FISH | CATEGORY III | 8.20E+06 | 9.61E-02 | 8.32E-02 | 1.45E-02 | 2.06E-03 | 2.63E-02 | 9.75E-03 | 7.23E-03 |
| FISH | TOTAL | 1.21E+08 | 4.36E-01 | 5.08E-01 | 2.91E-01 | 1.20E-02 | 1.66E-01 | 5.87E-02 | 1.35E-01 |

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.07E+07
7.00E+00 1.55E+05 2.40E+02

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 | 1.68E-01 | 2.11E-01 | 1.46E-01 | 5.58E-03 | 6.96E-02 | 2.38E-02 | 6.73E-02 |
| FISH | CATEGORY II | 2.40E+04 | 2.73E-02 | 3.34E-02 | 1.27E-02 | 7.95E-04 | 1.10E-02 | 4.38E-03 | 7.31E-03 |
| FISH | CATEGORY III | 1.66E+04 | 5.53E-02 | 4.78E-02 | 8.35E-03 | 1.31E-03 | 1.51E-02 | 5.61E-03 | 4.23E-03 |
| FISH | TOTAL | 2.46E+05 | 2.51E-01 | 2.92E-01 | 1.67E-01 | 7.63E-03 | 9.57E-02 | 3.38E-02 | 7.88E-02 |

* * * INVERTEBRATE CONSUMPT OPULATION 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 | 3.60E-03 | 3.49E-03 | 1.13E-03 | 9.16E-05 | 5.85E-04 | 9.45E-04 | 7.11E-03 |
| INVER | CATEGORY II | 9.68E+02 | 5.74E-04 | 5.48E-04 | 1.58E-04 | 1.29E-05 | 8.88E-05 | 1.57E-04 | 7.43E-04 |
| INVER | CATEGORY III | 6.97E+02 | 1.25E-03 | 3.10E-04 | 2.75E-04 | 2.21E-05 | 1.14E-04 | 2.28E-04 | 4.23E-04 |
| INVER | TOTAL | 1.00E+04 | 5.43E-03 | 4.85E-03 | 1.56E-03 | 1.27E-04 | 7.88E-04 | 1.23E-03 | 8.28E-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 CONSUMPTI PULATION DOSES * * *
MAN-REM

COMMERCIAL HARVEST

| PATHWAY | AGE GROUP | USAGE | DOSE (MAN-REM) BONE | LIVER | TOTAL BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---|---|---|---|---|---|---|---|---|---|
| INVER | CATEGORY I | 1.47E+07 | 2.76E-03 | 2.67E-03 | 8.61E-04 | 5.49E-05 | 4.46E-04 | 6.47E-04 | 5.42E-03 |
| INVER | CATEGORY II | 1.71E+06 | 4.39E-04 | 4.18E-04 | 1.20E-04 | 7.71E-06 | 6.77E-05 | 1.20E-04 | 5.66E-04 |
| INVER | CATEGORY III | 1.23E+06 | 9.59E-04 | 6.19E-04 | 2.10E-04 | 1.31E-05 | 8.67E-05 | 1.74E-04 | 3.22E-04 |
| INVER | TOTAL | 1.76E+07 | 4.16E-03 | 3.70E-03 | 1.19E-03 | 7.57E-05 | 6.01E-04 | 9.41E-04 | 6.30E-03 |

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.07E+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 | 3.96E-03 | 3.84E-03 | 1.24E-03 | 9.87E-05 | 6.43E-04 | 9.30E-04 | 7.82E-03 |
| INVER | CATEGORY II | 1.07E+03 | 6.31E-04 | 6.02E-04 | 1.73E-04 | 1.39E-05 | 9.76E-05 | 1.73E-04 | 8.17E-04 |
| INVER | CATEGORY III | 7.67E+02 | 1.38E-03 | 8.91E-04 | 3.03E-04 | 2.38E-05 | 1.25E-04 | 2.51E-04 | 4.65E-04 |
| INVER | TOTAL | 1.10E+04 | 5.97E-03 | 5.33E-03 | 1.72E-03 | 1.36E-04 | 8.66E-04 | 1.35E-03 | 9.10E-03 |

* * * POPULATION WATER CONSUMPTION DOSES * * *

SUPPLIER-

| PATHWAY | AGE GROUP | USAGE | BONE | LIVER | TOTAL BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---|---|---|---|---|---|---|---|---|---|
| | | | DOSE (MAN-REM) | | | | | | |
| DRINKING | CATEGORY I | 2.63E+02 | 1.29E-08 | 1.40E-09 | 7.79E-10 | 2.12E-11 | 1.95E-10 | 7.90E-11 | 2.13E-10 |
| DRINKING | CATEGORY II | 2.86E+01 | 1.92E-09 | 2.10E-10 | 9.20E-11 | 2.33E-12 | 2.83E-11 | 1.24E-11 | 2.43E-11 |
| DRINKING | CATEGORY III | 4.68E+01 | 9.52E-09 | 7.64E-10 | 3.61E-10 | 7.29E-12 | 9.28E-11 | 3.81E-11 | 4.23E-11 |
| DRINKING | TOTAL | 3.38E+02 | 2.43E-08 | 2.38E-09 | 1.23E-09 | 3.08E-11 | 3.16E-10 | 1.30E-10 | 2.79E-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 | 2.43E-08 | 2.38E-09 | 1.23E-09 | 3.08E-11 | 3.16E-10 | 1.30E-10 | 2.79E-10 |

HYDROSPHERE TRITIUM DOSE

| PATHWAY | AGE GROUP | USAGE | BONE | LIVER | TOTAL BODY | THYROID | KIDNEY | LUNG | GI-LLI |
|---|---|---|---|---|---|---|---|---|---|
| WATER | TOTAL | 2.20E+00 | 7.67E-04 | 7.67E-04 | 7.67E-04 | 7.67E-04 | 7.67E-04 | 7.67E-04 | 7.67E-04 |

* DOSE TO BIOTA *

MRADS PER YEAR

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

| | INTERNAL | EXTERNAL | TOTAL |
|---|---|---|---|
| FISH | 7.69E-02 | 5.06E-01 | 5.83E-01 |
| INVERTEBRATE | 7.71E-02 | 1.01E+00 | 1.09E+00 |
| ALGAE | 9.89E-02 | 1.18E-03 | 1.00E-01 |
| MUSKRAT | 3.25E-01 | 3.37E-01 | 6.62E-01 |
| RACCOON | 4.02E-02 | 2.53E-01 | 2.93E-01 |
| HERON | 1.52E+00 | 3.37E-01 | 1.86E+00 |
| DUCK | 2.92E-01 | 5.06E-01 | 7.98E-01 |

## * * * COST-BENEFIT ANALYSIS * * *

| NUCLIDE | | RELEASE CI/YR | MAN-REM DOSE TOTAL BODY | MAN-REM DOSE THYROID | MAN-REM PER CURIE TOTAL BODY | MAN-REM PER CURIE THYROID |
|---|---|---|---|---|---|---|
| 1H | 3 | 9.35E+01 | 3.52E-04 | 3.52E-04 | 3.77E-06 | 3.77E-06 |
| 24CR | 51 | 6.97E-02 | 1.58E-05 | 1.51E-05 | 2.27E-04 | 2.16E-04 |
| 25MN | 54 | 6.23E-03 | 1.07E-03 | 2.73E-04 | 1.72E-01 | 4.38E-02 |
| 26FE | 55 | 3.99E-01 | 1.68E-03 | 3.02E-08 | 4.22E-03 | 7.56E-08 |
| 26FE | 59 | 1.35E-03 | 5.65E-05 | 1.46E-05 | 4.18E-02 | 1.09E-02 |
| 27CO | 57 | 2.05E-04 | 1.37E-06 | 1.23E-06 | 6.69E-03 | 5.99E-03 |
| 27CO | 58 | 1.93E-01 | 3.36E-03 | 2.63E-03 | 1.74E-02 | 1.36E-02 |
| 27CO | 60 | 2.42E-01 | 1.62E-01 | 1.59E-01 | 6.70E-01 | 6.58E-01 |
| 28NI | 63 | 1.68E-01 | 3.44E-03 | 0.00E+00 | 2.05E-02 | 0.00E+00 |
| 38SR | 89 | 1.13E-04 | 1.41E-06 | 7.17E-10 | 1.19E-02 | 6.08E-06 |
| 38SR | 90 | 1.27E-05 | 1.82E-05 | 8.10E-12 | 1.43E+00 | 6.38E-07 |
| 40ZR | 95 | 9.29E-04 | 8.56E-06 | 8.55E-06 | 9.21E-03 | 9.21E-03 |
| 41NB | 95 | 5.91E-03 | 4.76E-05 | 3.38E-05 | 6.89E-03 | 4.89E-03 |
| 44RU | 106 | 1.17E-04 | 1.34E-06 | 1.80E-06 | 1.57E-02 | 1.54E-02 |
| 47AG | 110M | 5.54E-03 | 6.13E-04 | 6.12E-04 | 1.11E-01 | 1.11E-01 |
| 53I | 131 | 2.76E-02 | 6.59E-05 | 1.52E-02 | 2.39E-03 | 5.52E-01 |
| 53I | 132 | 1.18E-02 | 1.57E-07 | 1.57E-07 | 1.33E-05 | 1.33E-05 |
| 53I | 133 | 1.30E-01 | 1.38E-04 | 1.67E-04 | 1.06E-03 | 1.29E-03 |
| 53I | 135 | 7.63E-02 | 4.48E-06 | 4.48E-06 | 5.87E-05 | 5.87E-05 |
| 55CS | 134 | 1.22E-02 | 1.04E-01 | 2.57E-03 | 8.53E+00 | 2.11E-01 |
| 55CS | 137 | 4.96E-02 | 2.60E-01 | 1.56E-02 | 5.24E+00 | 3.14E-01 |
| 58CE | 144 | 1.32E-04 | 2.98E-07 | 2.92E-07 | 2.26E-03 | 2.21E-03 |
| 51SB | 124 | 1.27E-02 | 2.85E-04 | 2.85E-04 | 2.25E-02 | 2.24E-02 |
| 51SB | 125 | 1.69E-01 | 1.22E-02 | 1.22E-02 | 7.20E-02 | 7.20E-02 |
| TOTAL | | | 5.49E-01 | 2.09E-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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 0. | 10. | 3. | 0. | 0. | 0. | 13. |
| NNE | 1. | 1. | 0. | 0. | 0. | 0. | 2. |
| 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. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSE | 0. | 13. | 8. | 0. | 0. | 0. | 21. |
| S | 0. | 3. | 3. | 0. | 0. | 0. | 6. |
| SSW | 0. | 0. | 1. | 1. | 0. | 0. | 2. |
| SW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WSW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| W | 0. | 6. | 0. | 0. | 0. | 0. | 6. |
| WNW | 0. | 13. | 8. | 0. | 0. | 0. | 21. |
| NW | 0. | 31. | 33. | 0. | 0. | 0. | 64. |
| NNW | 0. | 13. | 3. | 0. | 0. | 0. | 16. |
| TOTAL | 1. | 90. | 59. | 1. | 0. | 0. | 151. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 1. | 10. | 0. | 0. | 0. | 0. | 11. |
| NNE | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| NE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| 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 | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSE | 1. | 3. | 2. | 0. | 0. | 0. | 6. |
| S | 0. | 5. | 3. | 1. | 0. | 0. | 9. |
| SSW | 1. | 2. | 0. | 0. | 0. | 0. | 3. |
| SW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WSW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| W | 0. | 5. | 4. | 0. | 0. | 0. | 9. |
| WNW | 1. | 6. | 3. | 0. | 0. | 0. | 10. |
| NW | 0. | 15. | 11. | 0. | 0. | 0. | 26. |
| NNW | 1. | 7. | 2. | 0. | 0. | 0. | 10. |
| TOTAL | 6. | 55. | 25. | 1. | 0. | 0. | 87. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

| WIND DIRECTION | WIND SPEED (MPH) 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 2. | 14. | 0. | 0. | 0. | 0. | 16. |
| NNE | 1. | 2. | 0. | 0. | 0. | 0. | 3. |
| NE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ENE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SE | 2. | 0. | 0. | 0. | 0. | 0. | 2. |
| SSE | 3. | 8. | 2. | 0. | 0. | 0. | 13. |
| S | 2. | 7. | 6. | 0. | 0. | 0. | 15. |
| SSW | 1. | 5. | 2. | 0. | 0. | 0. | 8. |
| SW | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| WSW | 0. | 1. | 1. | 0. | 0. | 0. | 2. |
| W | 1. | 5. | 5. | 0. | 0. | 0. | 11. |
| WNW | 0. | 13. | 3. | 0. | 0. | 0. | 16. |
| NW | 2. | 17. | 7. | 0. | 0. | 0. | 26. |
| NNW | 0. | 3. | 1. | 0. | 0. | 0. | 4. |
| TOTAL | 15. | 75. | 27. | 0. | 0. | 0. | 117. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 17. | 106. | 20. | 0. | 0. | 0. | 143. |
| NNE | 32. | 59. | 12. | 0. | 0. | 0. | 103. |
| NE | 18. | 8. | 0. | 0. | 0. | 0. | 26. |
| ENE | 8. | 4. | 0. | 0. | 0. | 0. | 12. |
| E | 10. | 1. | 0. | 0. | 0. | 0. | 11. |
| ESE | 9. | 0. | 0. | 0. | 0. | 0. | 9. |
| SE | 3. | 1. | 0. | 0. | 0. | 0. | 4. |
| SSE | 18. | 35. | 4. | 0. | 0. | 0. | 57. |
| S | 19. | 38. | 15. | 1. | 0. | 0. | 73. |
| SSW | 17. | 22. | 3. | 1. | 0. | 0. | 43. |
| SW | 8. | 9. | 1. | 0. | 0. | 0. | 18. |
| WSW | 12. | 7. | 2. | 0. | 0. | 0. | 21. |
| W | 10. | 21. | 8. | 0. | 0. | 0. | 39. |
| WNW | 12. | 50. | 16. | 0. | 0. | 0. | 78. |
| NW | 7. | 103. | 49. | 1. | 0. | 0. | 160. |
| NNW | 15. | 89. | 9. | 0. | 0. | 0. | 113. |
| TOTAL | 215. | 553. | 139. | 3. | 0. | 0. | 910. |

Periods of calm (hours): 3
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 33. | 8. | 9. | 3. | 0. | 0. | 53. |
| NNE | 53. | 12. | 5. | 0. | 0. | 0. | 70. |
| NE | 59. | 7. | 0. | 0. | 0. | 0. | 66. |
| ENE | 16. | 0. | 0. | 0. | 0. | 0. | 16. |
| E | 15. | 0. | 0. | 0. | 0. | 0. | 15. |
| ESE | 8. | 1. | 0. | 0. | 0. | 0. | 9. |
| SE | 17. | 0. | 0. | 0. | 0. | 0. | 17. |
| SSE | 28. | 25. | 4. | 0. | 0. | 0. | 57. |
| S | 35. | 55. | 11. | 2. | 0. | 0. | 103. |
| SSW | 34. | 10. | 0. | 0. | 0. | 0. | 44. |
| SW | 21. | 5. | 0. | 0. | 0. | 0. | 26. |
| WSW | 17. | 6. | 1. | 0. | 0. | 0. | 24. |
| W | 15. | 9. | 1. | 0. | 0. | 0. | 25. |
| WNW | 13. | 15. | 0. | 0. | 0. | 0. | 28. |
| NW | 15. | 18. | 0. | 0. | 0. | 0. | 33. |
| NNW | 16. | 10. | 3. | 0. | 0. | 0. | 29. |
| TOTAL | 395. | 181. | 34. | 5. | 0. | 0. | 615. |

Periods of calm (hours): 18
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 33. | 0. | 0. | 0. | 0. | 0. | 33. |
| NNE | 74. | 13. | 0. | 0. | 0. | 0. | 87. |
| NE | 44. | 12. | 0. | 0. | 0. | 0. | 56. |
| ENE | 7. | 1. | 0. | 0. | 0. | 0. | 8. |
| E | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| ESE | 6. | 0. | 0. | 0. | 0. | 0. | 6. |
| SE | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| SSE | 9. | 0. | 0. | 0. | 0. | 0. | 9. |
| S | 7. | 3. | 0. | 0. | 0. | 0. | 10. |
| SSW | 5. | 0. | 0. | 0. | 0. | 0. | 5. |
| SW | 5. | 0. | 0. | 0. | 0. | 0. | 5. |
| WSW | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| W | 2. | 0. | 0. | 0. | 0. | 0. | 2. |
| WNW | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| NW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| NNW | 5. | 0. | 0. | 0. | 0. | 0. | 5. |
| TOTAL | 207. | 29. | 0. | 0. | 0. | 0. | 236. |

Periods of calm (hours): 8
Hours of missing data: NONE

[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]

INDIAN POINT JAN-MAR 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| NNE | 13. | 5. | 0. | 0. | 0. | 0. | 18. |
| NE | 3. | 9. | 0. | 0. | 0. | 0. | 12. |
| ENE | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| S | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SSW | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WSW | 2. | 0. | 0. | 0. | 0. | 0. | 2. |
| W | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WNW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| NW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| NNW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| TOTAL | 24. | 14. | 0. | 0. | 0. | 0. | 38. |

Periods of calm (hours): 1
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS A

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 1. | 21. | 12. | 1. | 0. | 0. | 35. |
| NNE | 0. | 2. | 1. | 0. | 0. | 0. | 3. |
| NE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ENE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| SE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSE | 0. | 14. | 16. | 0. | 0. | 0. | 30. |
| S | 0. | 0. | 4. | 0. | 0. | 0. | 4. |
| SSW | 0. | 2. | 0. | 0. | 0. | 0. | 2. |
| SW | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| WSW | 0. | 3. | 0. | 0. | 0. | 0. | 3. |
| W | 2. | 6. | 0. | 0. | 0. | 0. | 8. |
| WNW | 4. | 4. | 1. | 0. | 0. | 0. | 9. |
| NW | 5. | 12. | 16. | 0. | 0. | 0. | 33. |
| NNW | 7. | 16. | 9. | 0. | 0. | 0. | 32. |
| TOTAL | 19. | 82. | 59. | 1. | 0. | 0. | 161. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS B

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 8. | 18. | 5. | 2. | 0. | 0. | 33. |
| NNE | 0. | 7. | 0. | 1. | 0. | 0. | 8. |
| NE | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| ENE | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SE | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SSE | 0. | 12. | 6. | 0. | 0. | 0. | 18. |
| S | 0. | 2. | 0. | 0. | 0. | 0. | 2. |
| SSW | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| SW | 0. | 3. | 0. | 0. | 0. | 0. | 3. |
| WSW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| W | 2. | 8. | 0. | 0. | 0. | 0. | 10. |
| WNW | 3. | 4. | 1. | 0. | 0. | 0. | 8. |
| NW | 1. | 5. | 6. | 0. | 0. | 0. | 12. |
| NNW | 1. | 7. | 2. | 0. | 0. | 0. | 10. |
| TOTAL | 16. | 69. | 20. | 3. | 0. | 0. | 108. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS C

| WIND DIRECTION | WIND SPEED (MPH) 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
|---|---|---|---|---|---|---|---|
| N | 2. | 20. | 6. | 0. | 0. | 0. | 28. |
| NNE | 1. | 7. | 3. | 0. | 0. | 0. | 11. |
| NE | 1. | 1. | 0. | 0. | 0. | 0. | 2. |
| ENE | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SE | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SSE | 0. | 13. | 1. | 1. | 0. | 0. | 15. |
| S | 1. | 5. | 3. | 0. | 0. | 0. | 9. |
| SSW | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| SW | 1. | 2. | 0. | 0. | 0. | 0. | 3. |
| WSW | 1. | 1. | 0. | 0. | 0. | 0. | 2. |
| W | 4. | 3. | 1. | 0. | 0. | 0. | 8. |
| WNW | 4. | 3. | 3. | 0. | 0. | 0. | 10. |
| NW | 1. | 4. | 4. | 0. | 0. | 0. | 9. |
| NNW | 1. | 4. | 3. | 0. | 0. | 0. | 8. |
| TOTAL | 19. | 65. | 24. | 1. | 0. | 0. | 109. |

Periods of calm (hours): 0
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS D

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 33. | 119. | 34. | 6. | 0. | 0. | 192. |
| NNE | 36. | 114. | 32. | 0. | 0. | 0. | 182. |
| NE | 40. | 19. | 0. | 0. | 0. | 0. | 59. |
| ENE | 28. | 4. | 0. | 0. | 0. | 0. | 32. |
| E | 11. | 1. | 0. | 0. | 0. | 0. | 12. |
| ESE | 16. | 0. | 0. | 0. | 0. | 0. | 16. |
| SE | 29. | 4. | 0. | 0. | 0. | 0. | 33. |
| SSE | 42. | 61. | 9. | 0. | 0. | 0. | 112. |
| S | 23. | 76. | 24. | 0. | 0. | 0. | 123. |
| SSW | 13. | 17. | 2. | 0. | 0. | 0. | 32. |
| SW | 8. | 3. | 0. | 0. | 0. | 0. | 11. |
| WSW | 11. | 5. | 0. | 0. | 0. | 0. | 16. |
| W | 15. | 13. | 1. | 0. | 0. | 0. | 29. |
| WNW | 7. | 25. | 17. | 0. | 0. | 0. | 49. |
| NW | 7. | 31. | 10. | 0. | 0. | 0. | 48. |
| NNW | 12. | 51. | 17. | 0. | 0. | 0. | 80. |
| TOTAL | 331. | 543. | 146. | 6. | 0. | 0. | 1026. |

Periods of calm (hours): 8
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS E

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 13. | 13. | 5. | 0. | 0. | 0. | 31. |
| NNE | 66. | 31. | 2. | 0. | 0. | 0. | 99. |
| NE | 52. | 15. | 0. | 0. | 0. | 0. | 67. |
| ENE | 36. | 0. | 0. | 0. | 0. | 0. | 36. |
| E | 19. | 1. | 0. | 0. | 0. | 0. | 20. |
| ESE | 26. | 0. | 0. | 0. | 0. | 0. | 26. |
| SE | 22. | 0. | 0. | 0. | 0. | 0. | 22. |
| SSE | 29. | 12. | 1. | 0. | 0. | 0. | 42. |
| S | 29. | 33. | 2. | 0. | 0. | 0. | 64. |
| SSW | 20. | 12. | 5. | 0. | 0. | 0. | 37. |
| SW | 11. | 2. | 0. | 0. | 0. | 0. | 13. |
| WSW | 7. | 0. | 0. | 0. | 0. | 0. | 7. |
| W | 4. | 2. | 0. | 0. | 0. | 0. | 6. |
| WNW | 3. | 4. | 1. | 0. | 0. | 0. | 8. |
| NW | 10. | 8. | 0. | 0. | 0. | 0. | 18. |
| NNW | 6. | 10. | 3. | 0. | 0. | 0. | 19. |
| TOTAL | 353. | 143. | 19. | 0. | 0. | 0. | 515. |

Periods of calm (hours): 46
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS F

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 6. | 1. | 0. | 0. | 0. | 0. | 7. |
| NNE | 42. | 1. | 0. | 0. | 0. | 0. | 43. |
| NE | 34. | 12. | 0. | 0. | 0. | 0. | 46. |
| ENE | 14. | 0. | 0. | 0. | 0. | 0. | 14. |
| E | 7. | 0. | 0. | 0. | 0. | 0. | 7. |
| ESE | 8. | 0. | 0. | 0. | 0. | 0. | 8. |
| SE | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| SSE | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| S | 4. | 1. | 0. | 0. | 0. | 0. | 5. |
| SSW | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| SW | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| WSW | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| W | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WNW | 3. | 0. | 0. | 0. | 0. | 0. | 3. |
| NW | 0. | 1. | 0. | 0. | 0. | 0. | 1. |
| NNW | 2. | 1. | 0. | 0. | 0. | 0. | 3. |
| TOTAL | 131. | 17. | 0. | 0. | 0. | 0. | 148. |

Periods of calm (hours): 19
Hours of missing data: NONE

[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]

INDIAN POINT APR-JUNE 1988
10 METER WIND SPEED & DIR. WITH 61-10 METER DELTA T
PASQUILL CLASS G

| WIND DIRECTION | WIND SPEED (MPH) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 01-03 | 04-07 | 08-12 | 13-18 | 19-24 | >24 | TOTAL |
| N | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| NNE | 19. | 0. | 0. | 0. | 0. | 0. | 19. |
| NE | 5. | 2. | 1. | 0. | 0. | 0. | 8. |
| ENE | 1. | 0. | 0. | 0. | 0. | 0. | 1. |
| E | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| ESE | 4. | 0. | 0. | 0. | 0. | 0. | 4. |
| SE | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSE | 2. | 0. | 0. | 0. | 0. | 0. | 2. |
| S | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SSW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| SW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WSW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| W | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| WNW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| NW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| NNW | 0. | 0. | 0. | 0. | 0. | 0. | 0. |
| TOTAL | 32. | 2. | 1. | 0. | 0. | 0. | 35. |

Periods of calm (hours): 9
Hours of missing data: NONE

[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, 1988

Re: Indian Point Unit Nos. 1 and 2
Docket No. 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 - 1988

August 31, 1988

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

## SECTION F

### Reportable Changes

A. Process Control Program (PCP)

Section 6.14.1 of the Indian Point Unit No. 2 Technical Specifications require that licensee initiated changes to PCP be reported to the Commission in the Semi-Annual Radioactive Effluent Release Report. During the 1st half of 1988, there were no changes made.

B. Offsite Dose Calculation Manual (ODCM)

Section 6.15.2 of the Indian Point Unit No. 2 Technical Specifications require that changes to ODCM be reported to the Commission in the Semi-Annual Radioactive Effluent Release Report. During the 1st half of 1988, there were no changes made.

C. Radioactive Waste Systems (RWS)

Section 6.16.1 of the Indian Point Unit No. 2 Technical Specifications require that major changes to RWS be reported to the Commission in the Semi-Annual Radioactive Effluent Release Report. During the 1st half of 1988, there were no changes made.

August 31, 1988

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

## SECTION G

### Reportable Items

A. Radioactive Liquid Effluent Monitoring Instrumentation

The Pre-operational testing of the steam generator blowdown effluent flow rate measuring device* was completed in the second quarter of 1988. Therefore it had been inoperable for greater than 30 days and is being reported pursuant to Indian Point Technical Specifications 3.9.A.2.c.

B. Radioactive Gaseous Effluent Monitoring Instrumentation

Radiation monitor R-20 for the Waste Gas Decay Tanks has been out of service since March 21, 1988. It is not receiving sample flow due to a defective pressure control valve PCV-1069. A new valve has been ordered, and the expected date of return to service is November 21, 1988.

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* In the last Semi-Annual Report it was indicated that this device was newly installed.

August 31, 1988

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

## SECTION H

## Unplanned Releases

### A. Unplanned Liquid Releases

There was one unplanned liquid release during the 1st quarter of 1988. This was due to a steam coil leak in the Refueling Water Storage Tank. The contaminated steam condensate was returned to the service boilers and discharged via blowdown. The values have been integrated into the releases reported for this period. This release was less than 0.1% of MPC as per 10 CFR 20 Appendix B, Table II, Column 2.

### B. Unplanned Gaseous Releases

During this reporting period there were no unplanned gaseous releases.