

February 19, 1988

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

SEMI-ANNUAL EFFLUENT AND WASTE DISPOSAL REPORT

Addendum to 1st and 2nd

Quarter 1987

Changes to the report are indicated by margin bars

- bar 1 = Carbon-14 is now being Reported as fission and activation gaseous release instead of gaseous particulate
- bar 2 = Computational change

LS0411A.2.19.1

8803070099 880229
PDR AD0CK 05000003
R DCD

CON EDISON
 INDIAN POINT 2
 QUARTER : START DATE
 QUARTER : START DATE

DATE OF REPORT:
 PREPARED BY:
 END DATE
 END DATE

EFFLUENT AND WASTE DISPOSAL REPORT

GASEOUS EFFLUENTS -- SUMMATION OF ALL RELEASES

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

1. TOTAL RELEASE	CI	2.05E 03	3.85E 02	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.63E 02	4.90E 01	
3.				

B. IODINES

1. TOTAL IODINE-131	CI	1.39E-04	5.59E-04	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	1.79E-05	7.11E-05	
3.				

C. PARTICULATES

1. PARTICULATES WITH HALF-LIVES >8 DAYS	CI	2.30E ⁻⁴	5.19E ⁻⁴	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.89E ⁻⁵	6.53E ⁻⁵	
3.				
4. GROSS ALPHA RADIOACTIVITY	CI	0.00E 00	0.00E 00	

D. TRITIUM

1. TOTAL RELEASE	CI	1.95E-01	8.13E-02	5.00E 01
2. AVERAGE RELEASE RATE FOR PERIOD	UCI/SEC	2.51E-02	1.03E-02	
3.				

1

DATE OF REPORT:
 PREPARED BY:

CONTINUOUS MODE

BATCH MODE

NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED		1	2	1	2

1. FISSION AND ACTIVATION GASES (Plant Vent)

H3	CI	1.87E-01	7.33E-02		
AR41	CI			4.79E00	1.51E00
KR85M	CI				
KR85	CI				
KR87	CI				
KR88	CI			2.87E-01	4.02E-01
XE131M	CI				
XE133M	CI			8.34E00	2.38E00
XE133	CI	1.23E02	8.91E01	1.10E03	2.67E02
XE135M	CI				
XE135	CI	7.88E02	1.39E01	2.07E01	5.65E00
XE131	CI				
C14	CI	2.00E00	2.00E00		
TOTAL FOR PERIOD (ABOVE)	CI	9.13E02	1.05E02	1.13E03	2.77E02

1

QUARTER : START DATE

END DATE

DATE OF REPORT:

PREPARED BY:

CONTINUOUS MODE

BATCH MODE

NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED		1	2	1	2

3. PARTICULATES (Plant Vent)

CR51	CI				
MN54	CI				
FE59	CI				
CO58	CI	0.00E 00	2.48E-05	0.00E 00	0.00E 00
CO60	CI	1.63E-05	1.47E-05	0.00E 00	0.00E 00
ZN65	CI				
CS134	CI				
CS137	CI	6.32E-05	5.76E-05	0.00E 00	0.00E 00
RE55	CI	1.00E ⁻⁵	6.09E ⁻⁶	0.00E 00	0.00E 00
NI63	CI	3.07 ⁻⁵	0.00E 00	0.00E 00	0.00E 00
CO57	CI				
TOTAL FOR PERIOD (ABOVE)	CI	1.20E ⁻⁴	1.03E ⁻⁴	0.00E 00	0.00E 00

2

CON EDISON

PREPARED BY:

CONTINUOUS MODE

BATCH MODE

NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED		1	2	1	2
H3	CI	9.36E 00	4.56E 01	1.89E 02	1.09E 02
NA24	CI	0.00E 00	1.14E-02	0.00E 00	0.00E 00
FE55	CI	2.49E-02	2.19E-03	1.65E-02	4.18E-03
CO58	CI	4.18E-03	0.00E 00	1.30E-02	6.02E-03
CO60	CI	6.16E-02	7.90E-05	1.58E-01	6.14E-02
NI63	CI	3.08E-02	0.00E 00	6.20E-02	4.01E-02
SR90	CI	2.21E-04	0.00E 00	4.48E-04	1.40E-04
H131	CI	2.03E-02	1.32E-02	4.34E-02	2.76E-02
H133	CI	1.74E-01	2.24E-01	0.00E 00	0.00E 00
CS134	CI	5.57E-02	1.29E-02	4.62E-02	2.66E-02
CS137	CI	1.37E-01	1.97E-02	1.29E-01	9.48E-02
SB125	CI	0.00E 00	0.00E 00	9.43E-03	4.38E-03
SB124	CI	0.00E 00	0.00E 00	0.00E 00	6.43E-05
TOTAL FOR PERIOD (ABOVE)	CI	9.87E 00	4.59E 01	1.89E 02	1.10E 02

2

QUARTER : START DATE

END DATE

DATE OF REPORT:

PREPARED BY:

CONTINUOUS MODE

BATCH MODE

NUCLIDES	UNITS	QUARTER	QUARTER	QUARTER	QUARTER
RELEASED		1	2	1	2

3. PARTICULATES (Stack Vent Unit #1)

CR51	CI				
MN54	CI				
FES9	CI				
CO58	CI	0.00E 00	1.53E ⁻⁵	0.00E 00	0.00E 00
CO60	CI	1.92E-05	3.59E-06	0.00E 00	0.00E 00
ZN65	CI				
CS134	CI				
CS137	CI	3.51E-05	3.96E ⁻⁴	0.00E 00	0.00E 00
FE55	CI				
NI63	CI	5.57E ⁻⁵	1.45E ⁻⁶	0.00E 00	0.00E 00
CO57	CI				
TOTAL FOR PERIOD (ABOVE)	CI	1.10E ⁻⁴	4.16E ⁻⁴	0.00E 00	0.00E 00

2

QUARTER : START DATE END DATE
 QUARTER : START DATE END DATE

EFFLUENT AND WASTE DISPOSAL REPORT

LIQUID EFFLUENTS -- SUMMATION OF ALL RELEASES

UNITS	QUARTER	QUARTER	EST. TOTAL
	1	2	ERROR, %

A. FISSION AND ACTIVATION PRODUCTS

1. TOTAL RELEASE (EXCL. TRIT., GASES, ALPHA)	CI	9.86E-01	5.48E-01	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	4.03E-09	2.57E-09	
3. PERCENT OF MPC	%	7.75E-03	1.11E-02	

| 2

B. TRITIUM

1. TOTAL RELEASE	CI	1.98E 02	1.55E 02	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	8.08E-07	7.27E-07	
3. PERCENT OF MPC	%	2.69E-02	2.42E-02	

C. DISSOLVED AND ENTRAINED GASES

1. TOTAL RELEASE	CI	5.59E-01	1.19E00	2.50E 01
2. AVERAGE DILUTED CONC. DURING PERIOD	UCI/ML	2.28E-09	5.60E-09	
3. PERCENT OF MPC	%	1.14E-03	2.80E-03	

D. GROSS ALPHA RADIOACTIVITY

1. TOTAL RELEASE	CI	0.00E 00	0.00E 00	2.50E 01
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E. VOLUME WASTE RELEASED (PRIOR TO DILUTION)	LITERS	3.59E 07	1.58E 07	1.00E 01
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F. VOLUME DILUTION WATER USED DURING PERIOD	LITERS	2.45 E 11	2.13E 11	1.00E 01
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ENTER: [RETURN] CONTINUE, [SO] START OVER, [EX] TO EXIT

Indian Point Units 1 & 2

RADIOLOGICAL IMPACT ON MAN

(Reference Regulatory Guide 1.21, Page 12)

A. Maximum Individual Doses

(1) <u>Pathways (Gaseous)</u> mRem	<u>Total Body</u> mRem	<u>Skin</u> mRem	<u>Thyroid</u> mRem	<u>Bone</u>	<u>Source Information</u> (MIDAS File)
a) Noble Gas Immersion	2.69E-1	7.14E-1	N/A	N/A	MIDASDM
(b) Inhalation***	4.17E-3	N/A	2.12E-3	8.72E-3	
(c) Ground Deposition	6.61E-1	7.73E-2	6.61E-1	6.61E-1	
(d) Milk Ingestion*	1.36E-2	N/A	5.68E-3	1.06E-1	MIDASDM
(e) Meat Ingestion***	1.63E-3	N/A	2.91E-5	2.75E-3	
(f) Vegetable Ingestion***	2.21E-1	N/A	4.29E-3	9.26E-1	

2) Pathways (Liquid)

(a) All

See Attached "LADTAP" printout
Attachment I

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

NA = Not Applicable

B. Population

(1) Pathways (Gaseous)

	<u>Total Body</u> (man-rem)	<u>Thyroid</u> (man-thyroid rem)	Source Information (MIDAS File)
(a) Noble Gas Immersion	7.2E+0	7.2E+0	
(b) Inhalation	1.5E-1	1.2E-2	MIDASPP
(c) Ground Deposition	9.8E+0	9.8E+0	
(d) Totals	1.7E+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	1.29E-4 millirem	LADTAP2
(b) Gaseous-Total Body	8.29E-4 millirem	

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

DISCHARGE=2.86E+03 CFS

SOURCE TERM MULTIPLIER=1.00E+00

50-MILE POPULATION=2.05E+07

FRACTION --- CATEGORY I=0.71
CATEGORY II=0.11
CATEGORY III=0.18

FRESHWATER SITE

SOURCE TERM FOLLOWS

GRIFF XE133 5.80E-01

GRIEF XE135 1.17E+00

NO INTERNAL RECONCENTRATION MODEL EMPLOYED

* * * CATEGORY I DOSE FACTORS * * *

NUCLIDE	CURIE/YEAR	INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)			
		BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON	
1H	3	3.53E+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
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
26FE	55	4.78E-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	2.32E-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	2.81E-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	1.33E-01	1.30E-04	9.01E-06	4.36E-05	0.0	0.0	0.0	1.88E-06	0.0	0.0	1.00E+00
38SR	90	8.09E-04	3.84E-03	0.0	1.03E-03	0.0	0.0	0.0	2.19E-04	0.0	0.0	1.00E+00
53I	131	1.05E-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
53I	133	3.98E-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	1.41E-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	3.81E-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	4.63E-07	1.82E-09	0.0	1.38E-06	1.97E-05	3.50E-09	3.10E-09	1.00E+00
51SB	124	6.43E-05	2.80E-06	5.29E-08	1.11E-06	6.79E-09	0.0	2.18E-06	7.95E-05	1.50E-08	1.30E-08	1.00E+00

* * * CATEGORY II DOSE FACTORS * * *

NUCLIDE	CURIE/YEAR	INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)			
		BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON	
1H	3	3.53E+02	0.0	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	1.06E-07	0.0	0.0	1.00E+00
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	0.0	0.0	1.00E+00
26FE	55	4.78E-02	3.78E-06	2.68E-06	6.25E-07	0.0	0.0	1.70E-06	1.16E-06	0.0	0.0	1.00E+00
27CO	58	2.32E-02	0.0	9.72E-07	2.24E-06	0.0	0.0	0.0	1.34E-05	0.0	0.0	1.00E+00
27CO	60	2.81E-01	0.0	2.81E-06	6.33E-06	0.0	0.0	0.0	3.66E-05	0.0	0.0	1.00E+00
28NI	63	1.33E-01	1.77E-04	1.25E-05	6.00E-06	0.0	0.0	0.0	1.99E-06	0.0	0.0	1.00E+00
38SR	90	8.09E-04	4.48E-03	0.0	1.20E-03	0.0	0.0	0.0	2.33E-04	0.0	0.0	1.00E+00
53I	131	1.05E-01	5.85E-06	8.19E-06	4.40E-06	2.39E-03	1.41E-05	0.0	1.62E-06	0.0	0.0	1.00E+00
53I	133	3.98E-01	2.01E-06	3.41E-06	1.04E-06	4.76E-04	5.98E-06	0.0	2.58E-06	0.0	0.0	1.00E+00
55CS	134	1.41E-01	8.37E-05	1.97E-04	9.14E-05	0.0	6.26E-05	2.39E-05	2.45E-06	0.0	0.0	1.00E+00
55CS	137	3.81E-01	1.12E-04	1.49E-04	5.19E-05	0.0	5.07E-05	1.97E-05	2.12E-06	0.0	0.0	1.00E+00
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	0.0	0.0	1.00E+00
51SB	124	6.43E-05	3.87E-06	7.13E-08	1.51E-06	8.78E-09	0.0	3.38E-06	7.80E-05	0.0	0.0	1.00E+00

* * * CATEGORY III DOSE FACTORS * * *

NUCLIDE	CURIE/YEAR	INGESTION DOSE FACTORS (MREM/PCI INTAKE)							SHORELINE (MREM/HR)/(PCI/M**2)			
		BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON	
1H	3	3.53E+02	0.0	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	2.03E-07	0.0	0.0	1.00E+00
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	0.0	0.0	1.00E+00
26FE	55	4.78E-02	1.15E-05	6.10E-06	1.89E-06	0.0	0.0	3.45E-06	1.13E-06	0.0	0.0	1.00E+00
27CO	58	2.32E-02	0.0	1.80E-06	5.51E-06	0.0	0.0	0.0	1.05E-05	0.0	0.0	1.00E+00
27CO	60	2.81E-01	0.0	5.29E-06	1.56E-05	0.0	0.0	0.0	2.93E-05	0.0	0.0	1.00E+00
28NI	63	1.33E-01	5.38E-04	2.88E-05	1.83E-05	0.0	0.0	0.0	1.94E-06	0.0	0.0	1.00E+00
38SR	90	8.09E-04	1.13E-02	0.0	3.03E-03	0.0	0.0	0.0	2.29E-04	0.0	0.0	1.00E+00
53I	131	1.05E-01	1.72E-05	1.73E-05	9.83E-06	5.72E-03	2.84E-05	0.0	1.54E-06	0.0	0.0	1.00E+00
53I	133	3.98E-01	5.92E-06	7.32E-06	2.77E-06	1.36E-03	1.22E-05	0.0	2.95E-06	0.0	0.0	1.00E+00
55CS	134	1.41E-01	2.34E-04	3.84E-04	8.10E-05	0.0	1.19E-04	4.27E-05	2.07E-06	0.0	0.0	1.00E+00
55CS	137	3.81E-01	3.27E-04	3.13E-04	4.62E-05	0.0	1.02E-04	3.67E-05	1.96E-06	0.0	0.0	1.00E+00

51SB 125 3.38E-02 7.16E-06 5.52E-08 1.50E-06 6.63E-09 0.0 6.99E-06 1.71E-05
 51SB 124 6.43E-05 1.11E-05 1.44E-07 3.89E-06 2.45E-08 0.0 6.16E-06 6.94E-05

* * * CATEGORY IV DOSE FACTORS * * *

NUCLIDE	CURIE/YEAR	INGESTION DOSE FACTORS (MREM/PCI INTAKE)								SHORELINE (MREM/HR)/(PCI/M**2)		
		BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN	TOTAL BODY	RECON	
IH	3	3.53E+02	0.0	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07	3.08E-07		
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	1.01E-05		
26FE	55	4.78E-02	1.39E-05	8.98E-06	2.40E-06	0.0	0.0	4.39E-06	1.14E-06			
27CO	58	2.32E-02	0.0	3.60E-06	8.98E-06	0.0	0.0	0.0	8.97E-06			
27CO	60	2.81E-01	0.0	1.08E-05	2.55E-05	0.0	0.0	0.0	2.57E-05			
28NI	63	1.33E-01	6.34E-04	3.92E-05	2.20E-05	0.0	0.0	0.0	1.95E-06			
38SR	90	8.09E-04	1.25E-02	0.0	3.37E-03	0.0	0.0	0.0	2.31E-04			
53I	131	1.05E-01	3.59E-05	4.23E-05	1.86E-05	1.39E-02	4.94E-05	0.0	1.51E-06			
53P	133	3.99E-01	1.25E-05	1.82E-05	5.33E-06	3.31E-03	2.14E-05	0.0	3.08E-06			
55CS	134	1.41E-01	3.77E-04	7.03E-04	7.10E-05	0.0	1.81E-04	7.42E-05	1.91E-06			
55CS	137	3.81E-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			
51SB	124	6.43E-05	2.14E-05	3.15E-07	6.63E-06	5.68E-08	0.0	1.34E-05	6.60E-05			

TOTAL NUMBER IN SOURCE TERM IS 13 TOTAL RELEASE IS 3.5453E+02

TOTAL 3.62E-04 1.79E-01 1.90E-01 5E-02 7.27E-03 6.12E-02 2.23E-02 02E-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		2.01E-02	2.60E-02	2.11E-03	1.12E-03	6.89E-03	2.80E-03	9.83E-05
INVERTEBRATE		2.88E-04	2.80E-04	4.05E-05	7.54E-05	7.00E-05	3.41E-05	1.50E-05
ALGAE		1.07E-07	1.31E-07	1.30E-08	5.98E-08	3.48E-08	1.44E-08	2.06E-09
DRINKING		2.74E-12	3.54E-12	1.17E-12	8.73E-12	1.57E-12	1.13E-12	9.23E-13
SHORELINE	7.76E-05	6.62E-05	6.62E-05	6.62E-05	6.62E-05	6.62E-05	6.62E-05	6.62E-05
SWIMMING	0.0	2.09E-12	2.09E-12	2.09E-12	2.09E-12	2.09E-12	2.09E-12	2.09E-12
BOATING	0.0	5.23E-08	5.23E-08	5.23E-08	5.23E-08	5.23E-08	5.23E-08	5.23E-08
TOTAL	7.76E-05	2.04E-02	2.63E-02	2.22E-03	1.27E-03	7.03E-03	2.90E-03	1.80E-04

	USAGE (KG/YR,HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR=0.2
FISH	0.5	5.0	25.00	
INVERTEBRATE	0.1	5.0	25.00	
ALGAE	0.0	5.0	25.00	
DRINKING	0.0	500.0	112.00	
SHORELINE	3.0	5.0	1.00	
SWIMMING	0.0	5.0	1.00	
BOATING	0.5	5.0	1.00	

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		9.40E-02	1.47E-01	1.04E-01	4.17E-03	4.90E-02	1.63E-02	3.52E-03
INVERTEBRATE		1.78E-03	1.90E-03	1.38E-03	3.37E-04	5.94E-04	2.48E-04	7.53E-04
ALGAE		1.24E-08	1.76E-08	1.28E-08	5.27E-09	5.88E-09	2.00E-09	1.98E-09
DRINKING		3.38E-11	5.73E-11	4.73E-11	1.71E-10	3.34E-11	2.46E-11	2.86E-11
SHORELINE	9.24E-04	7.88E-04	7.88E-04	7.88E-04	7.88E-04	7.88E-04	7.88E-04	7.88E-04
SWIMMING	0.0	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06
BOATING	0.0	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06
TOTAL	9.24E-04	9.66E-02	1.49E-01	1.06E-01	5.31E-03	5.04E-02	1.74E-02	5.07E-03

PATHWAY	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		9.96E-02	1.51E-01	5.86E-02	3.95E-03	5.04E-02	1.95E-02	2.61E-03
INVERTEBRATE		1.86E-03	1.96E-03	8.37E-04	3.17E-04	6.07E-04	2.94E-04	5.30E-04
ALGAE		1.70E-08	2.39E-08	9.68E-09	6.55E-09	7.93E-09	3.13E-09	1.86E-09
DRINKING		4.63E-11	7.05E-11	4.16E-11	2.08E-10	3.81E-11	2.71E-11	2.83E-11
SHORELINE	1.24E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03	1.06E-03
SWIMMING	0.0	1.44E-05	1.44E-05	1.44E-05	1.44E-05	1.44E-05	1.44E-05	1.44E-05
BOATING	0.0	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06
TOTAL	1.24E-03	1.03E-01	1.54E-01	6.05E-02	5.34E-03	5.21E-02	2.09E-02	4.21E-03

PATHWAY	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		1.24E-01	1.34E-01	2.26E-02	4.25E-03	4.30E-02	1.55E-02	1.01E-03

INVERTEBRATE		2.43E-03	1.81E-03	1.2E-04	3.53E-04	5.37E-04	2.47E-04	1.98E-04
ALGAE		4.90E-05	4.90E-05	9.50E-06	1.64E-05	1.57E-05	5.77E-06	1.58E-06
DRINKING		1.35E-07	1.42E-07	6.25E-08	5.14E-07	7.42E-08	5.14E-08	4.62E-08
SHORELINE	2.59E-04	2.21E-04	2.21E-04	2.21E-04	2.21E-04	2.21E-04	2.21E-04	2.21E-04
SWIMMING	0.0	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06	3.61E-06
BOATING	0.0	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06	7.22E-06
TOTAL	2.59E-04	1.27E-01	1.36E-01	2.33E-02	4.85E-03	4.37E-02	1.59E-02	1.44E-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		1.43E-02	1.86E-02	1.51E-03	7.47E-04	4.92E-03	2.00E-03	7.02E-05
INVERTEBRATE		2.05E-04	2.00E-04	2.89E-05	5.02E-05	5.00E-05	2.43E-05	1.07E-05
ALGAE		7.62E-08	9.37E-08	9.28E-09	3.97E-08	2.48E-08	1.03E-08	1.47E-09
DRINKING		1.98E-10	2.56E-10	8.46E-11	1.21E-09	1.15E-10	8.09E-11	6.64E-11
SHORELINE	5.54E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05	4.73E-05
SWIMMING	0.0	1.44E-12	1.44E-12	1.44E-12	1.44E-12	1.44E-12	1.44E-12	1.44E-12
BOATING	0.0	3.61E-08	3.61E-08	3.61E-08	3.61E-08	3.61E-08	3.61E-08	3.61E-08
TOTAL	5.54E-05	1.45E-02	1.88E-02	1.58E-03	8.44E-04	3.02E-03	2.07E-03	1.28E-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-----

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	7.69E+04	3.34E-01	5.21E-01	3.69E-01	7.18E-03	1.74E-01	5.79E-02	1.25E-02
FISH	CATEGORY II	8.87E+03	5.42E-02	8.24E-02	3.19E-02	1.02E-03	2.74E-02	1.06E-02	1.41E-03
FISH	CATEGORY III	6.14E+03	1.09E-01	1.17E-01	1.97E-02	1.69E-03	3.75E-02	1.35E-02	8.77E-04
FISH	TOTAL	9.10E+04	4.97E-01	7.20E-01	4.21E-01	9.90E-03	2.39E-01	8.20E-02	1.47E-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-----

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	1.00E+08	1.55E+00	2.42E+00	1.72E+00	2.59E-02	8.09E-01	2.69E-01	5.79E-02
FISH	CATEGORY II	1.17E+07	2.52E-01	3.83E-01	1.48E-01	3.69E-03	1.27E-01	4.93E-02	6.58E-03
FISH	CATEGORY III	8.12E+06	5.06E-01	5.44E-01	9.18E-02	6.08E-03	1.74E-01	6.28E-02	4.08E-03
FISH	TOTAL	1.20E+08	2.31E+00	3.35E+00	1.96E+00	3.56E-02	1.11E+00	3.81E-01	6.86E-02

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.05E+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

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH	CATEGORY I	2.05E+05	9.02E-01	1.41E+00	9.98E-01	1.66E-02	4.70E-01	1.56E-01	3.36E-02
FISH	CATEGORY II	2.40E+04	1.47E-01	2.22E-01	8.61E-02	2.37E-03	7.40E-02	2.86E-02	3.82E-03
FISH	CATEGORY III	1.66E+04	2.94E-01	3.16E-01	5.33E-02	3.92E-03	1.01E-01	3.65E-02	2.37E-03
FISH	TOTAL	2.46E+05	1.34E+00	1.94E+00	1.14E+00	2.29E-02	6.45E-01	2.21E-01	3.98E-02

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

-----SPORT HARVEST-----

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	8.33E+03	2.92E-03	3.11E-03	2.26E-03	2.73E-04	9.69E-04	4.06E-04	1.23E-03
INVER	CATEGORY II	9.68E+02	4.65E-04	4.90E-04	2.09E-04	3.85E-05	1.51E-04	7.33E-05	1.32E-04
INVER	CATEGORY III	6.97E+02	9.79E-04	7.27E-04	1.78E-04	6.58E-05	2.15E-04	9.91E-05	7.95E-05
INVER	TOTAL	1.00E+04	4.36E-03	4.33E-03	2.64E-03	3.77E-04	1.34E-03	5.78E-04	1.44E-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-----

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	1.46E+07	2.21E-03	2.36E-03	1.71E-03	1.62E-04	7.35E-04	3.08E-04	9.30E-04
INVER	CATEGORY II	1.69E+06	3.53E-04	3.72E-04	1.59E-04	2.28E-05	1.15E-04	5.56E-05	1.00E-04
INVER	CATEGORY III	1.22E+06	7.43E-04	5.52E-04	1.35E-04	3.99E-05	1.63E-04	7.51E-05	6.03E-05
INVER	TOTAL	1.75E+07	3.31E-03	3.28E-03	2.00E-03	2.24E-04	1.01E-03	4.38E-04	1.09E-03

LOCATION DILUTION CATCH TIME(HR)-INCLUDES FOOD PROCESSING TIME OF 2.40E+02 HR POPULATION=2.05E+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.

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

PATHWAY	AGE GROUP	USAGE	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
INVER	CATEGORY I	9.17E+03	3.21E-03	3.42E-03	2.43E-03	2.94E-04	1.07E-03	4.46E-04	1.35E-03
INVER	CATEGORY II	1.07E+03	5.11E-04	5.39E-04	2.30E-04	4.15E-05	1.67E-04	8.06E-05	1.45E-04
INVER	CATEGORY III	7.67E+02	1.08E-03	8.00E-04	1.95E-04	7.09E-05	2.37E-04	1.09E-04	8.74E-05
INVER	TOTAL	1.10E+04	4.79E-03	4.76E-03	2.91E-03	4.07E-04	1.47E-03	5.36E-04	1.58E-03

LOCATION- DOWNSTREAM

DILUTION=0.70E+01

TRANSIT TIME=0.40E+01 HR

SWF=0.2

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

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SHORELINE	TOTAL POPUL	1.66E+07	3.07E-01	2.62E-01	2.62E-01

LOCATION- 0.200

DILUTION=0.70E+01

TRANSIT TIME=0.40E+01 HR

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

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
SWIMMING	TOTAL POPUL	1.66E+07	0.0	2.43E-03	2.43E-03

LOCATION- 0.200

DILUTION=0.70E+01

TRANSIT TIME=0.40E+01 HR

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

PATHWAY	AGE GROUP	USAGE	SKIN	TOTAL BODY	THYROID
BOATING	TOTAL POPUL	1.66E+07	0.0	1.22E-03	1.22E-03

* * DOSE TO BIOTA * *

MRADS PER YEAR

DILUTION= 7.00E+00

TRANSIT TIME= 4.00E+00 HR

	INTERNAL	EXTERNAL	TOTAL
FISH	2.98E-01	6.92E-01	9.90E-01
INVERTEBRATE	3.33E-02	1.38E+00	1.42E+00
ALGAE	1.02E-01	1.28E-03	1.04E-01
MUSKRAT	1.76E+00	4.61E-01	2.22E+00
RACCOON	7.33E-02	3.45E-01	4.19E-01
HERON	1.01E+01	4.61E-01	1.06E+01
DUCK	1.56E+00	6.91E-01	2.26E+00

* * * COST-BENEFIT ANALYSIS * * *

NUCLIDE	RELEASE CI/YR	MAN-REM DOSE		MAN-REM PER CURIE	
		TOTAL BODY	THYROID	TOTAL BODY	THYROID
IH 3	3.53E+02	1.04E-03	1.04E-03	2.94E-06	2.94E-06
11NA 24	1.14E-02	7.13E-05	7.13E-05	6.25E-03	6.26E-03
26FE 55	4.78E-02	1.58E-04	2.84E-09	3.30E-03	5.94E-03
27CO 58	2.32E-02	3.16E-04	2.49E-04	1.36E-02	1.07E-02
27CO 60	2.81E-01	1.43E-01	1.45E-01	5.26E-01	5.17E-01
28NI 63	1.33E-01	2.12E-03	0.0	1.60E-02	0.0
38SR 90	8.09E-04	9.03E-04	4.05E-10	1.12E+00	5.01E-07
53I 131	1.05E-01	1.96E-04	4.51E-02	1.87E-03	4.30E-01
53I 133	3.98E-01	3.31E-04	4.02E-04	8.31E-04	1.01E-03
55CS 134	1.41E-01	9.37E-01	2.34E-02	6.65E+00	1.66E-01
55CS 137	3.81E-01	1.56E+00	9.40E-02	4.09E+00	2.47E-01
51SB 125	1.38E-02	7.80E-04	7.80E-04	5.65E-02	5.65E-02
51SB 124	6.43E-05	1.14E-06	1.13E-06	1.77E-02	1.76E-02
TOTAL		2.65E+00	3.10E-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)

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