



**Entergy Nuclear Northeast**  
Indian Point Energy Center  
295 Broadway, Suite 1  
P.O. Box 249  
Buchanan, NY 10511-0249  
Tel 914 734 5340  
Fax 914 734 5718

**Fred Dacimo**  
Vice President, Operations

NL-03-074  
April 29, 2003  
U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Mail Stop O-P1-17  
Washington, D.C. 20555

**SUBJECT: Indian Point 3 Nuclear Power Plant**  
Docket No. 50-286  
License No. DPR-64  
**Annual Radioactive Effluent Release Report -**  
**For The Period January 1, 2002 Through December 31, 2002**

Dear Sir:

Enclosed is the Annual Report of Radioactivity in Solid Wastes and Releases of Radioactive Material in Liquid and Gaseous Effluents for Indian Point 3 as required by Technical Specifications Section 5.6.3. The enclosed report covers the period January 1, 2002 through December 31, 2002 for Indian Point 3. It would include those releases from Indian Point 1 or 2 resulting from processing waste from Indian Point 3, if this pathway were utilized. During this reporting period, no waste was transferred from Indian Point 3 to Indian Point 1 or 2.

Entergy is making no new commitments in this letter.

Should you have any questions regarding this matter, please contact Mr. John McCann, Manager, Nuclear Licensing at (914) 734-5074.

Very truly yours,

A handwritten signature in black ink, appearing to read "Fred R. Dacimo", written over a horizontal line.

Fred R. Dacimo  
Vice President, Operations  
Indian Point Energy Center

Enclosure

IE48

cc: Mr. Hubert J. Miller  
Regional Administrator, Region I  
U.S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, Pennsylvania 19406-1415

Mr. P. Milano, Project Manager  
Project Directorate I-1  
Division of Reactor Projects I/II  
U.S. Nuclear Regulatory Commission  
Mail Stop O 8 C2  
Washington, DC 20555

U.S. Nuclear Regulatory Commission  
Resident Inspectors' Office  
Indian Point 3 Nuclear Power Plant

Mr. Paul Kolakowski  
Division of Water  
Department of Environmental Conservation  
50 Wolf Road  
Albany, New York 12233-3505

Mr. Joseph Marcogliese  
Regional Water Engineer, Region 3  
Department of Environmental Conservation  
5th Floor  
200 White Plains Road  
Tarrytown, New York 10591-5805

Mr. Robert A. Oliveira  
American Nuclear Insurers  
Town Center, Suite 300S  
29 South Main Street  
West Hartford, Connecticut 06107-2445

## **Radioactive Effluent Release Report: 2002**

Facility                    Indian Point 3

Licensee                 Entergy Nuclear Northeast

This information is provided in accordance with the requirements of Regulatory Guide 1.21. The numbered sections of this report reference corresponding sections of the subject Regulatory Guide, pages 10 to 12.

### A.     Supplemental Information

#### 1.     Regulatory Limits

Indian Point 3 is presently subject to limits on radioactive waste releases that are set forth in the Offsite Dose Calculation Manual, Parts I and II, per the Technical Specifications. ODCM Part I, also known as the Radiological Effluent Controls (or RECS) is prescribed by Technical Specification Section 5.5.1, while the ODCM Part II is defined in Section 5.5.4. The percentages of the Technical Specification limits reported in Tables 1A and 2A are the percent of the ODCM quarterly limits. If more than one limit applies to the release, the most restrictive limit is reported.

#### 2.     Maximum Permissible Concentration

##### a)     Airborne Releases

Maximum concentrations and compliance with 10CFR20 release rate limits are controlled by the application of Radiation Monitor setpoints, preliminary grab sampling, and conservative procedural guidance for batch and continuous releases. These measures, in conjunction with plant design, preclude approaching release rate limits, per the ODCM.

##### b)     Liquid Effluents

Proximity to the 10 CFR 20 release rate limits is controlled for each release by the application of a calculated Allowed Diluted Concentration (ADC) and Radiation Monitor setpoints. The ADC is calculated as a function of the "10 times EC" limit, and includes limitations from Beta emitters. These measures, along with an administrative activity limit for effluent waste tanks, preclude approaching release rate limits, per the ODCM.

3. Average Energy

The average energies ( $\bar{E}$ ) of the radionuclide mixtures in releases of fission and activation gases were as follows:

1st Quarter	$\bar{E}_\beta =$	2.07E-01 Mev/dis	$\bar{E}_\gamma =$	3.13E-01 Mev/dis
2nd Quarter	$\bar{E}_\beta =$	1.78E-01 Mev/dis	$\bar{E}_\gamma =$	1.75E-01 Mev/dis
3rd Quarter	$\bar{E}_\beta =$	1.53E-01 Mev/dis	$\bar{E}_\gamma =$	6.42E-02 Mev/dis
4th Quarter	$\bar{E}_\beta =$	1.96E-01 Mev/dis	$\bar{E}_\gamma =$	3.86E-02 Mev/dis

4. Measurements and Approximations of Total Radioactivity

a) Fission and Activation Gases

Analyses of effluent gases have been performed in compliance with the requirements of Table 3.4.1-1 of the RECS (ODCM Part I). In the case of isolated tanks (batch releases), the total activity discharged is based on an isotopic analysis of each batch with the volume of gas in the batch corrected to standard temperature and pressure.

Vapor containment purge and pressure relief (vent) discharges routinely total less than 150 hours/quarter in duration have been treated as batch releases. However, both types of releases from the Vapor Containment are performed randomly with regard to time of day and duration (release periods were not dependant solely on time of day or atmospheric condition). Therefore, determination of doses due to Vapor Containment releases includes the use of annual average dispersion data, as defined in NUREG 0133, Section 3.3.

At least one complete isotopic concentration analysis of containment air is performed monthly. This analysis is used in conjunction with a process monitor to obtain the isotopic mixture and quantification of each pressure relief. Isotopic analyses for each vapor containment purge are taken prior to and during the purge. This information is combined with the volume of air in each discharge to calculate the quantity of activity released from these discharges.

The continuous building discharges are based on weekly samples of ventilation air analyzed for isotopic content. This information is combined with total air volume discharged and the process radiation monitor readings to determine the quantity of activity from continuous discharges.

When no noble gas activity is identified for an entire quarter, a "less than" value is reported. This value is determined from the established Xe-133 minimum detectable concentration and the total volume of air released from all continuous release points.

b/c) Iodines and Particulates

Iodine-131 and particulate releases are quantified by collecting a continuous sample of ventilation air on a TEDA impregnated, activated charcoal cartridge and a glass-fiber filter paper. These samples are changed weekly as required in Table 3.4.1-1 of the RECS. 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 quantity of activity discharged.

For other iodine isotopes, concentrations are determined monthly on a 24-hour sample. The concentration of each isotope is analytically determined by ratioing the activities with weekly media for I-131. This activity is combined with the volume of air discharged during the sampling period to calculate the quantity of activity discharged.

A compositing method of analyzing for gross alpha is used to improve efficiency. When no Gross Alpha or Iodine-131 is identified for an entire quarter, a "less than" value is reported (in curies) on Table 1A. This value is derived from established minimum detectable concentrations and the total volume of air released from all continuous release points. This method generates a more accurate Minimum Detectable total curie level than summing MDCs and occasional false positives at the critical level. The values demonstrate that the RECS/ODCM required LLDs are not challenged.

d) Liquid Effluents

A sample of each batch discharge is taken and an isotopic analysis is performed in compliance with requirements specified in Table 3.3.1-1 of the RECS. Proportional composite samples of continuous discharges are taken and analyzed in compliance with this table as well. Isotopic concentration data are combined with the information on volume discharged to determine the amount of each isotope discharged.

5. Batch Releases

a) <b>Liquid Releases</b>	Qtr 1	Qtr 2	Qtr 3	Qtr 4	2002
Number of Batch Releases	8	6	14	25	53
Total Time Period (min)	8.94E+2	5.78E+2	1.56E+3	2.81E+3	5.84E+3
Maximum Time Period (min)	1.20E+2	1.12E+2	1.21E+2	1.20E+2	1.21E+2
Average Time Period (min)	1.12E+2	9.63E+1	1.09E+2	1.12E+2	1.10E+2
Minimum Time Period (min)	1.00E+2	3.30E+1	1.05E+2	1.04E+2	3.30E+1

**Average Stream Flow :**

Hudson River flow information is obtained from the Department of the Interior, United States Geological Survey (USGS). These data are received after review from the USGS, approximately 18 months after initial data collection. This information is included in the effluents report as the data become available.

**Estimated Average Stream Flows of the Hudson River at Indian Point:**

Year	Quarter	Flow(cfs)
2000	Fourth	16600
2001	First	18900
2001	Second	31300
2001	Third	5510

b) Airborne Releases	Qtr 1	Qtr 2	Qtr 3	Qtr 4	2002
Number of Batch Releases	20	26	20	20	86
Total Time Period (min)	4.08E+03	4.08E+03	3.44E+03	4.30E+03	1.59E+04
Maximum Time Period (min)	3.96E+02	2.53E+02	2.37E+02	4.28E+02	4.28E+02
Average Time Period (min)	2.04E+02	1.57E+02	1.72E+02	2.15E+02	1.85E+02
Minimum Time Period (min)	4.00E+00	1.00E+00	4.00E+00	7.00E+00	1.00E+00

**6. Abnormal Releases**

a) Liquid  
 None

b) Gaseous  
 None

**7. ODCM Reporting Requirements**

The ODCM (RECS) Sections 2.1.B and 2.2.B require reporting of prolonged outages of effluent monitoring equipment. Also required in this report is notification of any changes in the land use census, the Radiological Environmental Monitoring Program (REMP), or exceeding the total curie content limitations in outdoor tanks (RECS 2.10 and 2.11).

During this reporting period, no required ODCM or Technical Specification Effluent Monitoring equipment was out of service for periods greater than 30 consecutive days.

During this reporting period, no tank curie limits in outdoor tanks were exceeded.

Neither the Offsite Dose Calculation Manual, nor the Process Control Program were updated during this reporting period.

Indian Point 3  
RADIOACTIVE EFFLUENT RELEASE REPORT

B. GASEOUS EFFLUENTS

2002

TABLE 1A  
 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)  
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

A. Fission & Activation Gases	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 2002	Est. Total % Error
1. Total Release	Ci	1.81E-01	2.29E-01	1.27E+00	2.08E+00	3.76E+00	± 25
2. Average release rate	uCi/sec	2.33E-02	2.91E-02	1.60E-01	2.62E-01	1.19E-01	
3. Percent of ODCM limit (Noble Gases only)	%	6.06E-04	4.74E-04	2.32E-03	4.87E-03	4.05E-03	

B. Iodines

1. Total Iodine-131	Ci	<3.00E-6	<3.00E-6	<3.00E-6	< 3.00E-6	< 1.20E-5	± 25
2. Average release rate	uCi/sec	<3.858E-7	<3.816E-7	<3.77E-7	< 3.77E-7	< 3.81E-7	

C. Particulates

1. Total Release, with half-life > 8 days	Ci	N/D	N/D	N/D	N/D	N/D	± 25
2. Average release rate	uCi/sec	N/D	N/D	N/D	N/D	N/D	
3. Gross Alpha	Ci	N/D	N/D	N/D	N/D	N/D	± 25

D. Tritium

1. Total release	Ci	1.31E+00	1.67E+00	1.54E+00	6.79E-01	5.20E+00	± 25
2. Average release rate	uCi/sec	1.68E-01	2.12E-01	1.94E-01	8.54E-02	1.64E-01	

E. Percent ODCM limit, I&P with half-life > 8 days, H-3	%	2.55E-03	3.25E-03	3.00E-03	1.32E-03	5.06E-03	± 25
---	---	----------	----------	----------	----------	----------	------

N/D = None Detected



TABLE 1C

RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)  
 CONTINUOUS GASEOUS EFFLUENTS - GROUND RELEASES

Nuclides Released

1) Fission Gases	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 2002
Kr-85m	Ci					0.00E+00
Kr-85	Ci					
Kr-87	Ci					
Kr-88	Ci					
Xe-131m	Ci					
Xe-133m	Ci					
Xe-133	Ci			7.49E-01	4.87E-01	1.24E+00
Xe-135m	Ci					
Xe-135	Ci					0.00E+00
Xe-138	Ci					
Ar-41	Ci					
Total for Period	Ci	0.00E+00	0.00E+00	7.49E-01	4.87E-01	1.24E+00

2) Iodines

I-131	Ci	<3.00E-6	<3.00E-6	<3.00E-6	< 3.00E-06	< 1.20E-5
I-133	Ci	N/D	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	<3.00E-6	<3.00E-6	<3.00E-6	< 3.00E-06	< 1.20E-5

3) Particulates

Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
------------------	----	-----	-----	-----	-----	-----

N/D= None Detected

TABLE 1C

RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)  
BATCH GASEOUS EFFLUENTS - GROUND RELEASES

## Nuclides Released

1) Fission Gases	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 2002
Ar-41	Ci	3.89E-02	2.43E-02	2.29E-02	2.39E-02	1.10E-01
Kr-85	Ci		1.40E-02	1.28E-01	1.03E+00	1.17E+00
Kr-85m	Ci					0.00E+00
Kr-87	Ci					0.00E+00
Kr-88	Ci					0.00E+00
Xe-131m	Ci				6.71E-03	6.71E-03
Xe-133	Ci	1.41E-01	1.90E-01	3.71E-01	5.23E-01	1.23E+00
Xe-133m	Ci			7.08E-04	1.22E-03	1.93E-03
Xe-135	Ci	1.11E-03	8.88E-04	2.33E-03	2.94E-03	7.27E-03
Xe-135m	Ci					
Total for Period	Ci	1.81E-01	2.29E-01	5.25E-01	1.59E+00	2.52E+00

## 2) Iodines

I-131	Ci	N/D	N/D	N/D	N/D	N/D
I-133	Ci	N/D	N/D	N/D	N/D	N/D
I-135	Ci	N/D	N/D	N/D	N/D	N/D
Total for Period	Ci	N/D	N/D	N/D	N/D	N/D

## 3) Particulates

Total for Period	Ci	N/D	N/D	N/D	N/D	N/D
------------------	----	-----	-----	-----	-----	-----

N/D= None Detected

Indian Point 3  
RADIOACTIVE EFFLUENT REPORT  
C. LIQUID EFFLUENTS  
2002

TABLE 2A  
 RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)  
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

A. Fission & Activation Products	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 2002	Est. Total % Error
1. Total Release (not including Tritium, Gr Alpha, & Gases)	Ci	4.45E-03	2.46E-03	7.59E-03	1.40E-02	2.85E-02	± 25
2. Average Diluted Conc	uCi/ml	1.63E-11	7.11E-12	1.76E-11	4.99E-11	2.14E-11	
B. Tritium							
1. Total Release	Ci	3.19E+01	1.96E+01	5.14E+01	6.92E+02	7.95E+02	± 25
2. Average Diluted Conc	uCi/ml	1.17E-07	5.67E-08	1.19E-07	2.47E-06	5.97E-07	
C. Dissolved & Entrained Gases							
1. Total Release	Ci	4.10E-05	0.00E+00	1.68E-05	1.57E-01	1.57E-01	± 25
2. Average Diluted Conc	uCi/ml	1.50E-13	0.00E+00	3.89E-14	5.60E-10	1.18E-10	
D. Gross Alpha							
1. Total Release	Ci	<8.33E-05	<4.47E-05	<1.67E-04	9.45E-04	9.45E-04	± 25
E. Volume of Waste Released							
E. Volume of Waste Released	liters	2.08E+05	1.34E+05	3.60E+05	6.45E+05	1.35E+06	± 25
F. Volume of Dilution Water							
F. Volume of Dilution Water	liters	2.73E+11	3.46E+11	4.32E+11	2.80E+11	1.33E+12	± 10
E. Percent of the ODCM Liquid Effluent limit							
E. Percent of the ODCM Liquid Effluent limit	%	2.80E-03	2.12E-03	5.46E-03	6.32E-02	3.42E-02	± 25

## RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)

TABLE 2B

## BATCH LIQUID RADIOACTIVE EFFLUENT REPORT (Jan - Dec 2002)

Nuclides Released	Units	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 2001
Cr-51	Ci					0.00E+00
Mn-54	Ci	5.09E-05	1.32E-05	1.15E-04	8.09E-05	2.60E-04
Fe-55	Ci	4.95E-04	3.57E-04		4.77E-04	1.33E-03
Co-57	Ci			2.79E-06		2.79E-06
Co-58	Ci	6.69E-04	1.16E-04	2.52E-04	8.34E-05	1.12E-03
Co-60	Ci	9.88E-04	4.73E-04	2.29E-03	2.41E-03	6.16E-03
Ni-63	Ci	1.18E-03	5.50E-04	1.37E-03	2.33E-03	5.43E-03
Sr-90	Ci			1.79E-06		1.79E-06
Zr-95	Ci					0.00E+00
Nb-95	Ci	8.33E-05	1.82E-05			1.02E-04
Ag-110m	Ci	4.62E-04	3.26E-04	1.02E-03	5.71E-04	2.38E-03
Sb-124	Ci					0.00E+00
Sb-125	Ci	4.80E-04	5.28E-04	2.26E-03	1.83E-03	5.10E-03
Te-123m	Ci					0.00E+00
I-131	Ci					0.00E+00
Cs-134	Ci		4.68E-06	9.31E-06	2.90E-03	2.91E-03
Cs-137	Ci	4.55E-05	7.66E-05	2.74E-04	3.34E-03	3.74E-03
La-140	Ci					0.00E+00
Total for Period	Ci	4.45E-03	2.46E-03	7.59E-03	1.40E-02	2.85E-02

  

Xe-131m	Ci				1.79E-03	1.79E-03
Xe-133m	Ci					0.00E+00
Xe-133	Ci	4.10E-05		1.68E-05	6.19E-02	6.20E-02
Xe-135	Ci				9.37E-02	9.37E-02
Kr-85m	Ci					0.00E+00
Total for Period	Ci	4.10E-05	0.00E+00	1.68E-05	1.57E-01	1.57E-01

Indian Point 3  
RADIOACTIVE EFFLUENT REPORT

D. SOLID WASTE

2002

**Solid Waste Shipped Offsite for Disposal  
 and Estimates of Major Nuclides  
 by Waste Class and Stream  
 01/01/2002 to 12/31/2002  
 Percent Cutoff: 0**

Waste Stream : Resins, Filters, and Evap Bottoms BR D NA PRIMARY

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft <sup>3</sup>	M <sup>3</sup>		
A	0.00E+00	0.00E+00	0.00E+00	+/- 25%
B	1.20E+02	3.41E+00	2.82E+01	+/- 25%
C	0.00E+00	0.00E+00	0.00E+00	+/- 25%
All	1.20E+02	3.41E+00	2.82E+01	+/- 25%

Waste Stream : Dry Active Waste

DAW/B-25 BOX

Waste Class	Volume		Curies Shipped	%Error (Ci)
	Ft <sup>3</sup>	M <sup>3</sup>		
A	2.54E+03	7.20E+01	3.24E-02	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	2.54E+03	7.20E+01	3.24E-02	+/-25%

Waste Stream : Irradiated Components

Waste Class	Volume		Curies Shipped	% Error (Ci)
	Ft <sup>3</sup>	M <sup>3</sup>		
A	0.00E+00	0.00E+00	0.00E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	0.00E+00	0.00E+00	0.00E+00	+/-25%

**Solid Waste Shipped Offsite for Disposal  
and Estimates of Major Nuclides  
by Waste Class and Stream  
01/01/2002 to 12/31/2002  
Percent Cutoff: 0**

Waste Stream : Other Waste

Combined Packages

Waste Class	Volume Ft <sup>3</sup>	Volume M <sup>3</sup>	Curies Shipped	% Error (Ci)
A	2.04E+02	5.78E+00	3.18E+00	+/-25%
B	0.00E+00	0.00E+00	0.00E+00	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	2.04E+02	5.78E+00	3.18E+00	+/-25%

Waste Stream : Sum of All 4 Categories

Combined Packages DAW/B-25 BOX, DAW/SEALAND, BR D NA PRIMARY

Waste Class	Volume Ft <sup>3</sup>	Volume M <sup>3</sup>	Curies Shipped	% Error (Ci)
A	2.75E+03	7.78E+01	3.21E+00	+/-25%
B	1.20E+02	3.41E+00	2.82E+01	+/-25%
C	0.00E+00	0.00E+00	0.00E+00	+/-25%
All	2.87E+03	8.12E+01	3.14E+01	+/-25%

Combined Waste Type Shipment, Major Volume Waste Type Shown

**Number of  
Shipments****Mode of Transportation****Destination**

2	HITTMAN TRANSPORTATION	Barnwell Waste Management Facility
4	HITTMAN	GTS---DURATEK



**Solid Waste Shipped Offsite for Disposal  
 and Estimates of Major Nuclides  
 by Waste Class and Stream  
 01/01/2002 to 12/31/2002  
 Percent Cutoff: 0**

Resins, Filters, and Evap Bottoms

Waste Class B

Nuclide Name	Percent Abundance	Curies
H-3	0.023%	6.43E-03
C-14	0.004%	9.91E-04
Mn-54	2.191%	6.17E-01
Fe-55	5.707%	1.61E+00
Co-57	0.065%	1.82E-02
Co-58	1.500%	4.23E-01
Co-60	24.976%	7.04E+00
Ni-63	50.867%	1.43E+01
Zn-65	0.159%	4.48E-02
Sr-90	0.022%	6.24E-03
Zr-95	0.235%	6.64E-02
Nb-95	0.580%	1.63E-01
Tc-99	0.015%	4.37E-03
Ag-110m	0.270%	7.61E-02
Sn-113	0.076%	2.15E-02
Sb-124	0.068%	1.93E-02
Sb-125	2.188%	6.16E-01
Cs-134	4.617%	1.30E+00
Cs-137	6.431%	1.81E+00
Ce-144	0.002%	4.97E-04
Pu-238	0.000%	3.31E-05
Pu-239	0.000%	4.35E-06
Pu-241	0.003%	8.44E-04
Am-241	0.000%	1.30E-05
Am-243	0.000%	4.16E-06
Cm-242	0.000%	8.94E-05
Cm-243	0.000%	5.13E-05

**Solid Waste Shipped Offsite for Disposal  
and Estimates of Major Nuclides  
by Waste Class and Stream  
01/01/2002 to 12/31/2002  
Percent Cutoff: 0**

Dry Active Waste

Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	32.604%	1.05E-02
Be-7	0.250%	8.08E-05
Cr-51	0.773%	2.50E-04
Mn-54	0.009%	2.81E-06
Fe-55	3.945%	1.28E-03
Co-58	0.723%	2.34E-04
Co-60	15.905%	5.15E-03
Ni-63	19.726%	6.38E-03
Sr-90	0.154%	4.98E-05
Zr-95	2.097%	6.79E-04
Nb-95	1.849%	5.58E-04
Ag-110m	0.003%	8.77E-07
Sb-125	1.525%	4.93E-04
Cs-134	3.031%	9.81E-04
Cs-137	16.956%	5.49E-03
Ce-144	0.006%	2.09E-06
Pu-241	0.337%	1.09E-04
Am-241	0.056%	1.81E-05
Am-243	0.048%	1.57E-05
Cm-242	0.003%	8.78E-07

**Solid Waste Shipped Offsite for Disposal  
and Estimates of Major Nuclides  
by Waste Class and Stream  
01/01/2002 to 12/31/2002  
Percent Cutoff: 0**

Other Waste

Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	2.439%	7.76E-02
Be-7	0.000%	0.00E+00
C-14	0.098%	3.13E-03
Cr-51	0.000%	1.98E-09
Mn-54	1.151%	3.66E-02
Fe-55	26.801%	8.52E-01
Fe-59	0.000%	1.89E-07
Co-57	0.068%	2.17E-03
Co-58	0.376%	1.20E-02
Co-60	47.509%	1.51E+00
Ni-59	0.222%	7.07E-03
Ni-63	16.845%	5.36E-01
Zn-65	0.123%	3.91E-03
Sr-89	0.000%	5.63E-10
Sr-90	0.029%	9.21E-04
Zr-95	0.003%	9.39E-05
Nb-95	0.000%	2.63E-06
Tc-99	0.009%	2.71E-04
Ru-103	0.000%	1.20E-09
Ru-106	0.038%	1.20E-03
Ag-110m	0.272%	8.66E-03
Sn-113	0.011%	3.36E-04
Sb-124	0.000%	4.24E-06
Sb-125	2.907%	9.25E-02
Cs-134	0.088%	2.80E-03
Cs-137	0.845%	2.69E-02
Ce-144	0.012%	3.76E-04
Np-237	0.019%	6.02E-04
Pu-238	0.001%	2.73E-05
Pu-239	0.000%	6.77E-06
Pu-241	0.132%	4.21E-03
Am-241	0.000%	1.10E-05
Am-243	0.000%	9.99E-06
Cm-242	0.000%	2.46E-06
Cm-243	0.001%	4.31E-05

**Solid Waste Shipped Offsite for Disposal  
 and Estimates of Major Nuclides  
 by Waste Class and Stream  
 01/01/2002 to 12/31/2002  
 Percent Cutoff: 0**

Sum of All 4 Categories

Waste Class A

Nuclide Name	Percent Abundance	Curies
H-3	2.743%	8.81E-02
Be-7	0.003%	8.08E-05
C-14	0.097%	3.13E-03
Cr-51	0.008%	2.50E-04
Mn-54	1.140%	3.66E-02
Fe-55	26.571%	8.54E-01
Fe-59	0.000%	1.89E-07
Co-57	0.068%	2.17E-03
Co-58	0.379%	1.22E-02
Co-60	47.190%	1.52E+00
Ni-59	0.220%	7.07E-03
Ni-63	16.874%	5.42E-01
Zn-65	0.122%	3.91E-03
Sr-89	0.000%	5.63E-10
Sr-90	0.030%	9.71E-04
Zr-95	0.024%	7.73E-04
Nb-95	0.019%	6.01E-04
Tc-99	0.008%	2.71E-04
Ru-103	0.000%	1.20E-09
Ru-106	0.037%	1.20E-03
Ag-110m	0.269%	8.66E-03
Sn-113	0.010%	3.36E-04
Sb-124	0.000%	4.24E-06
Sb-125	2.894%	9.30E-02
Cs-134	0.118%	3.78E-03
Cs-137	1.007%	3.24E-02
Ce-144	0.012%	3.78E-04
Np-237	0.019%	6.02E-04
Pu-238	0.001%	2.73E-05
Pu-239	0.000%	6.77E-06
Pu-241	0.134%	4.32E-03
Am-241	0.001%	2.91E-05
Am-243	0.001%	2.57E-05
Cm-242	0.000%	3.34E-06
Cm-243	0.001%	4.31E-05

**Solid Waste Shipped Offsite for Disposal  
 and Estimates of Major Nuclides  
 by Waste Class and Stream  
 01/01/2002 to 12/31/2002  
 Percent Cutoff: 0**

Sum of All 4 Categories

Waste Class B

Nuclide Name	Percent Abundance	Curies
H-3	0.023%	6.43E-03
C-14	0.004%	9.91E-04
Mn-54	2.191%	6.17E-01
Fe-55	5.707%	1.61E+00
Co-57	0.065%	1.82E-02
Co-58	1.500%	4.23E-01
Co-60	24.976%	7.04E+00
Ni-63	50.867%	1.43E+01
Zn-65	0.159%	4.48E-02
Sr-90	0.022%	6.24E-03
Zr-95	0.235%	6.64E-02
Nb-95	0.580%	1.63E-01
Tc-99	0.015%	4.37E-03
Ag-110m	0.270%	7.61E-02
Sn-113	0.076%	2.15E-02
Sb-124	0.068%	1.93E-02
Sb-125	2.188%	6.16E-01
Cs-134	4.617%	1.30E+00
Cs-137	6.431%	1.81E+00
Ce-144	0.002%	4.97E-04
Pu-238	0.000%	3.31E-05
Pu-239	0.000%	4.35E-06
Pu-241	0.003%	8.44E-04
Am-241	0.000%	1.30E-05
Am-243	0.000%	4.16E-06
Cm-242	0.000%	8.94E-05
Cm-243	0.000%	5.13E-05

**Solid Waste Shipped Offsite for Disposal  
 and Estimates of Major Nuclides  
 by Waste Class and Stream  
 01/01/2002 to 12/31/2002  
 Percent Cutoff: 0**

Sum of All 4 Categories

Waste Class All

Nuclide Name	Percent Abundance	Curies
H-3	0.301%	9.45E-02
Be-7	0.000%	8.08E-05
C-14	0.013%	4.12E-03
Cr-51	0.001%	2.50E-04
Mn-54	2.084%	6.54E-01
Fe-55	7.842%	2.46E+00
Fe-59	0.000%	1.89E-07
Co-57	0.065%	2.04E-02
Co-58	1.386%	4.35E-01
Co-60	27.249%	8.55E+00
Ni-59	0.023%	7.07E-03
Ni-63	47.388%	1.49E+01
Zn-65	0.155%	4.87E-02
Sr-89	0.000%	5.63E-10
Sr-90	0.023%	7.21E-03
Zr-95	0.214%	6.71E-02
Nb-95	0.522%	1.64E-01
Tc-99	0.015%	4.64E-03
Ru-103	0.000%	1.20E-09
Ru-106	0.004%	1.20E-03
Ag-110m	0.270%	8.47E-02
Sn-113	0.070%	2.19E-02
Sb-124	0.061%	1.93E-02
Sb-125	2.260%	7.09E-01
Cs-134	4.157%	1.30E+00
Cs-137	5.876%	1.84E+00
Ce-144	0.003%	8.75E-04
Np-237	0.002%	6.02E-04
Pu-238	0.000%	6.04E-05
Pu-239	0.000%	1.11E-05
Pu-241	0.016%	5.16E-03
Am-241	0.000%	4.21E-05
Am-243	0.000%	2.98E-05
Cm-242	0.000%	9.28E-05
Cm-243	0.000%	9.44E-05

Indian Point 3

RADIOACTIVE EFFLUENT REPORT

E. RADIOLOGICAL IMPACT ON MAN

Jan 1, 2002 - Dec 31, 2002

### RADIOLOGICAL IMPACT ON MAN

The radiological impact on man is determined by conservatively calculating doses to a hypothetical maximally exposed individual offsite based on plant effluents. These calculations are divided into 3 categories: Noble Gases, Particulates and Iodine, and Liquid Releases (fish and invertebrate consumption).

An annual average dispersion factor is used in the calculations, the details of which are presented in the Offsite Dose Calculation Manual (ODCM).

The computer code used to perform gaseous dose calculations incorporates the models and parameters presented in the Indian Point 3 ODCM, which utilizes the assumptions in Regulatory Guide 1.109 and NUREG 0133.

These doses were calculated using radioactive releases from the Indian Point #3 Nuclear Power Plant. Although Indian Point is a multi-unit site owned and operated by Entergy Nuclear Northeast, doses resulting from releases from Indian Point Units 1 and 2 are independently reported.

Doses to individuals from liquid pathways for the fish and invertebrate consumption pathways are computed using the methodology and parameters in the Indian Point 3 ODCM, which incorporates the calculational models that are present in Regulatory Guide 1.109 and NUREG 0133 where site specific data do not exist.

Carbon 14 release concentration and resulting dose have been estimated using data generated at IP3 from August 1980 to June 1982 after a study conducted by the NY State Department of Health. These estimates are consistent with NUREG 0017, Rev. 1. The maximum expected annual dose from Carbon 14 releases at IP3 has been calculated using the maximum dependable gross electrical capacity of Indian Point 3, which is 1000 MW(e) maintained for the entire year. The resultant worst case doses are based upon site specific assumptions of source term released for an entire year at 1000 MW(e) output, as outlined in the ODCM.

The annual dose to the maximally exposed individual (child) from gaseous releases of Carbon-14 is 0.254 mRem to the critical organ (bone) and 0.0508 mRem to the total body. The annual dose to the maximally exposed individual (child) from liquid releases of Carbon-14 is 0.00583 mRem to the critical organ (bone) and 0.00117 mRem to the total body.



Doses to members of the public from airborne and liquid releases are minimal due to the relatively insignificant total duration of these individuals on site. Their doses can be calculated from standard ODCM methodology, with typical occupancy factors employed. These factors are determined by comparing the expected hours on site to 8760 hours (the number of hours in a year, used in calculations in the ODCM).

example 1: Several students visit the site for an 8-hour guided tour.  
 Their occupancy factor is:  $8 / 8760$  or **.0009**.

example 2: A man drives his wife to work and drops her off at the security gate each morning, with a total stay-time on site for 2 minutes per day. His occupancy factor is calculated as follows:

$$2 \text{ min}/60 \text{ min per hour} = .0333 \text{ hr} ; .0333 / 8760 = \mathbf{3.8E-6}$$

These factors, when multiplied by doses calculated per the ODCM, demonstrate that dose to MEMBERS OF THE PUBLIC within the site boundary is negligible, despite a potential reduction in the atmospheric dispersion.

In compliance with 40CFR190, the following table indicates the measured direct shine dose component for Indian Point 3 property in 2002:

	Whole Body (mrem)	Max Organ (mrem)
40 CFR 190 limit	25	75
Airborne Effluents	.00076	.00076
Liquid Effluents	.0010	.0013
Radwaste Storage	< 4	< 4
Station Total	< 4.0	< 4.0

INDIAN POINT 3 NUCLEAR POWER PLANT  
 RADIOLOGICAL IMPACT ON MAN  
 JANUARY - DECEMBER 2002

Maximum exposed individual doses in mrem or mrad

A. LIQUID DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Organ Dose	(mrem)	1.40E-04	1.06E-04	2.73E-04	1.17E-03	1.28E-03
Applicable Limit	(mrem)	5	5	5	5	10
Percent of Limit	(%)	2.80E-03	2.12E-03	5.46E-03	2.35E-02	1.28E-02
Age Group		Adult	Adult	Adult	Adult	Adult
Critical Organ		GILLI	GILLI	GILLI	Liver	Liver

Adult Total Body	(mrem)	2.07E-05	1.78E-05	3.99E-05	9.48E-04	1.03E-03
Applicable Limit	(mrem)	1.5	1.5	1.5	1.5	3
Percent of Limit	(%)	1.38E-03	1.19E-03	2.66E-03	6.32E-02	3.42E-02

B. AIRBORNE NOBLE GAS DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Gamma Air	(mrad)	3.03E-05	2.32E-05	6.13E-05	5.89E-05	1.74E-04
Applicable Limit	(mrad)	5	5	5	5	10
Percent of Limit	(%)	6.06E-04	4.64E-04	1.23E-03	1.18E-03	1.74E-03

Beta Air	(mrad)	4.27E-05	4.74E-05	2.32E-04	4.87E-04	8.09E-04
Applicable Limit	(mrad)	10	10	10	10	20
Percent of Limit	(%)	4.27E-04	4.74E-04	2.32E-03	4.87E-03	4.05E-03

C. AIRBORNE IODINE and PARTICULATE DOSES

		Qtr 1	Qtr 2	Qtr 3	Qtr 4	ANNUAL
Iodine/Part	(mrem)	1.91E-04	2.44E-04	2.25E-04	9.90E-05	7.59E-04
Applicable Limit	(mrem)	7.5	7.5	7.5	7.5	15
Percent of Limit	(%)	2.55E-03	3.25E-03	3.00E-03	1.32E-03	5.06E-03

Age Group		Child	Child	Child	Child	Child
Critical Organ		Liver	Liver	Liver	Liver	Liver

Indian Point 3  
RADIOLOGICAL EFFLUENT REPORT

F. METEOROLOGICAL DATA

Jan 1, 2002 - Dec 31, 2002

This data is stored onsite and is available electronically or in writing, upon request.

Indian Point 3

RADIOACTIVE EFFLUENT REPORT

G. OFFSITE DOSE CALCULATION MANUAL,  
PROCESS CONTROL PROGRAM, OR LAND USE CENSUS LOCATION CHANGES

2002

The ODCM was not upgraded in year 2002.

There were no changes in the REMP locations for dose calculations  
and/or environmental monitoring in year 2002.

The PCP was not upgraded in this period and remains at Revision 7.