

JERSEY CENTRAL POWER & LIGHT COMPANY
OYSTER CREEK NUCLEAR GENERATING STATION
EFFLUENT RELEASE REPORT
1981-1

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I. INTRODUCTION

I. INTRODUCTION

This report is submitted in accordance with section 6.9.3 of the Technical Specifications - Appendix A of the Oyster Creek Unit No. 1 Provisional Operating License, DPR-16.

Section I provides a brief summary of the plant status from December 1, 1980 through June 30, 1981. Included during this seven month summary are dates of a reactor scram, controlled reactor shutdowns, reactor startups, and selected dates showing reactor power levels.

Section II follows the format of regulatory guide 1.21 and provides a summary of gaseous effluents, liquid effluents, solid waste offsite shipments, and meteorological data for the first and second quarter of 1981. The first quarter begins on January 1, 1981 and extends through March 31, 1981. The second quarter starts on April 1, 1981 and ends on June 30, 1981.

Section III provides a summary of the Oyster Creek Radiological Environmental Monitoring Program and its associated sampling data for the period of December 1, 1981 through May 31, 1981 as per the stipulations outlined in Section 6.9.3.3 of the Technical Specifications - Appendix A. This section displays the data in tabular form and includes a correlation of plant effluent releases to the environmental radiological data.

Plant Operations Summary

December 1, 1980	Operating at approximately 64% rated power
December 15, 1980	Operating at approximately 95% rated power
January 1, 1981	Operating at approximately 90% rated power
January 15, 1981	Operating at approximately 91% rated power
February 1, 1981	Operating at approximately 99% rated power
February 15, 1981	Operating at approximately 96% rated power
March 1, 1981	Operating at approximately 90% rated power
March 13, 1981	Reactor shutdown
March 15, 1981	Reactor shutdown - continued
March 16, 1981	Reactor startup
March 27, 1981	Reactor shutdown
March 31, 1981	Reactor startup
April 1, 1981	Operating at approximately 36% rated power
April 15, 1981	Operating at approximately 74% rated power
April 18, 1981	Reactor shutdown
May 1, 1981	Reactor shutdown - continued
May 15, 1981	Reactor shutdown - continued
May 29, 1981	Reactor startup
June 1, 1981	Operating at approximately 65% rated power
June 15, 1981	Operating at approximately 100% rated power
June 26, 1981	Reactor scram
June 30, 1981	Reactor startup

II. EFFLUENT AND WASTE DISPOSAL SUMMARY

EFFLUENT AND WASTE DISPOSAL SUMMARY

A. Gaseous Effluents

During the reporting period, January 1, 1981 through June 30, 1981 a total of 2.74×10^4 curies of fission and activation gases, 4.46×10^{-1} curies of non-particulate halogens with half-lives greater than eight days, 3.59×10^{-1} curies of particulate activity with half-lives greater than eight days, and 6.22×10^{-7} curies of tritium were released. Totals include effluents released from both an elevated stack and a ground-level radwaste vent. The maximum hourly release rate of gross activity from the stack was 1.11×10^4 microcuries per second which occurred at approximately 0900 on March 20, 1981.

The airborne releases are summarized in Table 1.

B. Liquid Effluents

A total of 1.62×10^7 liters of water was processed through the radwaste system. Of this, 6.27×10^6 liters containing 2.04×10^1 curies of activity were released to the environment. The maximum concentration of gross radio-activity (beta-gamma) released to the unrestricted area (average over the period of release) was 7.21×10^{-8} microcuries per milliliter on January 28, 1981.

The liquid release data are summarized in Table 5.

C. Solid

During the reporting period, a total volume of 9.35×10^2 cubic meters of solid waste containing 2.57×10^2 curies of activity was shipped off site in 86 shipments. In addition, one shipment of irradiated material containing 3.95×10^4 curies of activity was made.

The solid waste shipment data are summarized in Table 7.

D. Meteorological Data

During the reporting period, onsite meteorological conditions were monitored and recorded. Joint frequency distribution of wind speed and direction per atmospheric stability class per quarter is summarized. Included is 116 meter and 10 meter data.

The meteorological data are summarized in Table 8.

EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT

SUPPLEMENTAL INFORMATION

FACILITY - Oyster Creek Nuclear Generating Station

LICENSEE - Jersey Central Power & Light Company

1. Regulatory Limits

- a. Fission and Activation Gases:
Technical Specification 3.6.A.1

$$Q = \frac{0.21}{E} \text{ Ci/sec}$$

- b. Iodines, half-lives > 8 days:
Technical Specification 3.6.A.2

4 uCi/sec

- c. Particulates, half-lives > 8 days:
Technical Specification 3.6.A.2

4 uCi/sec

- d. Liquid Effluents:
Technical Specification 3.6.B.1
Maximum permissible concentrations,
Appendix B, Table II, Column 2,
of 10 CFR 20 and notes 1 through 5 thereto.

2. Maximum Permissible Concentrations

- a. Fission and Activation Gases:

1. First Quarter - 3.39 E-3 uCi/cc

2. Second Quarter - 3.44 E-3 uCi/cc

- b. Iodines:

5.20 E-8 uCi/cc

- c. Particulates:

5.20 E-8 uCi/cc

- d. Liquid Effluents:

From Appendix B, Table II, Column 2, of
10 CFR 20 and notes 1 through 5 thereto.

(NOTE: MPC's for isotopes detected listed below)
Unit - uCi/ml

H-3	3 E-3	Xe-133	3 E-6
Cr-51	2 E-3	Xe-133m	3 E-6
Mn-54	1 E-4	Cs-134	9 E-6
Co-57	5 E-4	I-135	4 E-6
Co-58	1 E-4	Xe-135	3 E-6
Co-60	5 E-5	Cs-137	2 E-5
Sr-89	3 E-6	Ba-140	3 E-5
Sr-90	3 E-7	La-140	2 E-5
Sr-91	7 E-5	Ce-141	9 E-5
Tc-99m	6 E-3	Ce-143	4 E-5
Ru-103	8 E-5	Ce-144	1 E-5
Sb-125	1 E-4	Pa-233	1 E-4
I-131	3 E-7	Np-239	1 E-6
I-133	1 E-6		

3. Average Energy

- a. First Quarter - 8.04 E-1 mev
- b. Second Quarter - 7.94 E-1 mev

4. Measurements and Approximation of Total Radioactivity

- a. **Fission and Activation Gases:**
The incorporation of a weekly grab sample analysis using gamma ray spectrometry with a GeLi Detector, a conversion factor and the continuous recording of the stack effluent on a continuous activity monitor.
- b. **Iodines:**
Semi-weekly sample analysis - gamma ray spectrometry with a GeLi Detector, low background beta counter, internal proportional beta counter, and a single channel gamma counter.
- c. **Particulates:**
Semi-weekly sample analysis - gamma ray spectrometry with a GeLi Detector, low background beta counter, internal proportional beta counter, and single channel gamma counter.
- d. **Liquid Effluents:**
Analysis per batch release - gamma ray spectrometry with a GeLi Detector, a low background beta counter, and a liquid scintillation counter.

5. Batch Releases

a. Liquid

1. Number of batch releases:
 - a. First Quarter - 88 releases
 - b. Second Quarter - 44 releases
2. Total time period for batch releases:
 - a. First Quarter - 1.47 E4 minutes
 - b. Second Quarter - 8.21 E3 minutes
3. Maximum time period for a batch release:
 - a. First Quarter - 1.23 E3 minutes
 - b. Second Quarter - 5.05 E2 minutes
4. Average time period for a batch release:
 - a. First Quarter - 1.67 E2 minutes
 - b. Second Quarter - 1.87 E2 minutes
5. Minimum time period for a batch release:
 - a. First Quarter - 1.00 minutes
 - b. Second Quarter - 6.00 E1 minutes
6. Average stream flow during periods of release of effluent in a flowing stream:
 - a. First Quarter - 3.57 E6 liters/minute
 - b. Second Quarter - 2.94 E6 liters/minute

b. Gaseous

Not applicable (batch releases)

6. Abnormal Releases

a. Liquid

1. Number of releases:
One
2. Total activity released:
1.67 E-3 Ci as documented in RO 50-219/81-16/3L,
dated May 21, 1981

b. Gaseous

1. Number of releases:
None
2. Total activity released:
Not applicable

TABLE 1
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1981-1
GASEOUS EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Est. Total Error %
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A. Fission & activation gases

1. Total release	Ci	1.39 E 4	1.35 E 4	3.0 E 1
2. Average release rate for period	μCi/sec	1.83 E 3	3.35 E 3	
3. Percent of Tech Spec limit	%	6.98 E-1	1.26	

B. Iodines

1. Total iodine-131	Ci	1.79 E-1	2.67 E-1	2.5 E 1
2. Average release rate for period	μCi/sec	2.30 E-2	3.40 E-2	
3. Percent of Tech Spec limit	%	5.75 E-1	8.50 E-1	

C. Particulates

1. Particulates with half-lives >8 days	Ci	2.07 E-1	1.52 E-1	2.5 E 1
2. Average release rate for period	μCi/sec	2.66 E-2	1.94 E-2	
3. Percent of Tech Spec limit	%	6.65 E-1	4.85 E-1	
4. Gross alpha radioactivity	Ci	6.05 E-6	6.19 E-6	

D. Tritium

1. Total release	Ci	4.65 E-1	1.57 E-1	4.0 E 1
2. Average release rate for period	μCi/sec	5.98 E-2	2.00 E-2	

TABLE 2
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-ELEVATED RELEASE

CONTINUOUS MODE

Nuclides Released	Unit	First Quarter	Second Quarter		MDL
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1. Fission gases

krypton-85m	ci	3.89 E 2	5.19 E 2		8.92 E-11
krypton-87	ci	1.50 E 3	1.87 E 3		1.55 E-10
krypton-88	ci	1.24 E 3	1.37 E 3		2.09 E-10
xenon-133	ci	2.02 E 2	3.00 E 2		7.31 E-11
xenon-135	ci	2.33 E 3	3.22 E 3		5.31 E-11
xenon-135m	ci	1.00 E 3	1.27 E 3		1.26 E-10
xenon-138	ci	4.59 E 3	4.21 E 3		2.44 E-10
others					
krypton-89	ci	MDL	1.67 E-1		1.14 E-9
xenon-133m	ci	3.32 E 1	MDL		5.96 E-10
xenon-137	ci	1.43 E 3	3.88		7.87 E-10
Total for period	ci	1.27 E 4	1.28 E 4		

2. Iodines

Iodine-131	ci	1.68 E 5	2.59 E 5		1.61 E-4
Iodine-133	ci	7.71 E 5	9.36 E 5		1.23 E-4
Iodine-135	ci	1.15 E 6	1.17 E 6		7.31 E-4
Total for period	ci	2.09 E 6	2.37 E 6		

TABLE 3
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT
GASEOUS EFFLUENTS-ELEVATED RELEASE

CONTINUOUS MODE

Nuclides Released	Unit	First Quarter	Second Quarter		MDL
Strontium - 89	C1	4.36 E-2	3.21 E-2		1.95 E-9
Strontium - 90	C1	1.94 E-3	2.66 E-3		2.38 E-10
Cesium - 137	C1	1.28 E-3	9.78 E-4		8.12 E-11
Barium - 140	C1	1.35 E-1	1.05 E-1		3.03 E-10
Lanthanum - 140	C1	1.11 E-1	7.65 E-2		1.43 E-10
Others					
Chromium - 51	C1	2.22 E-3	6.71 E-4		3.97 E-10
Manganese - 54	C1	3.87 E-3	6.02 E-3		1.59 E-10
Cobalt - 58	C1	7.76 E-4	1.90 E-4		1.81 E-10
Cobalt - 60	C1	1.04 E-3	7.66 E-4		1.29 E-10
Strontium - 91	C1	5.94 E-1	4.87 E-1		3.41 E-10
Niobium - 95	C1	4.96 E-3	MDL		1.50 E-10
Molybdenum - 99	C1	1.13 E-2	MDL		5.04 E-10
Technetium - 99m	C1	2.79 E-1	3.35 E-3		4.69 E-11
Iodine - 131	C1	1.12 E-2	1.54 E-3		1.23 E-10
Iodine - 133	C1	1.07 E-1	1.54 E-2		7.61 E-11
Iodine - 135	C1	2.03 E-1	2.25 E-2		5.30 E-10
Cerium - 141	C1	4.07 E-4	1.22 E-4		2.14 E-9
Cerium - 143	C1	1.38 E-3	MDL		7.23 E-11
Cerium - 144	C1	9.92 E-4	5.29 E-4		2.27 E-10
Protactinium - 233	C1	9.89 E-5	MDL		9.30 E-11
Neptunium - 239	C1	2.62 E-3	9.33 E-3		1.28 E-10
Total	C1	1.52	7.65 E-1		

TABLE 4
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1981-1
 GASEOUS EFFLUENTS-GROUND LEVEL RELEASES

Nuclides Released	Unit	First Quarter	Second Quarter	MDL
1. Fission Gases				
Total for Period	C1	1.24 E 3	6.57 E 2	
2. Iodines				
I-131	C1	1.05 E-2	8.37 E-3	5.85 E-11
I-133	C1	1.69 E-2	1.83 E-2	1.23 E-10
I-135	C1	5.00 E-3	1.93 E-2	1.27 E-9
Total for Period	C1	3.24 E-2	4.60 E-2	
3. Particulates				
Cr-51	C1	3.67 E-6	4.87 E-5	4.83 E-10
Mn-54	C1	3.02 E-5	9.75 E-5	2.08 E-10
Co-57	C1	2.06 E-6	2.38 E-4	1.88 E-11
Co-58	C1	< MDL	4.32 E-5	2.10 E-10
Co-60	C1	1.53 E-4	6.23 E-4	2.08 E-10
Sr-89	C1	< MDL	< MDL	1.10 E-10
Sr-90	C1	< MDL	< MDL	7.15 E-12
Tc-99m	C1	2.62 E-6	8.93 E-5	6.72 E-10
Ce-137	C1	2.90 E-5	4.75 E-5	1.10 E-10
Ce-141	C1	< MDL	2.44 E-5	8.72 E-11
Ce-143	C1	< MDL	1.75 E-5	1.11 E-10
Ba-140	C1	< MDL	2.11 E-6	4.66 E-10
Np-239	C1	8.51 E-6	3.47 E-6	7.20 E-11
Total for Period	C1	2.29 E-4	1.24 E-3	

TABLE 5
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1981-1
LIQUID EFFLUENTS-SUMMATION OF ALL RELEASES

	Unit	First Quarter	Second Quarter	Est. Total Error %
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A. Fission and activation products

1. Total releases (not including tritium, gases, alpha)	Ci	8.80 E-2	1.14 E-1	3.0 E 1
2. Average diluted concentration during period	µCi/ml	7.30 E-10	1.22 E-9	
3. Percent of applicable limit	%	1.83 E-2	1.69 E-2	

B. Tritium

1. Total release	Ci	1.37 E 1	6.19	3.0 E 1
2. Average diluted concentration during period	µCi/ml	1.14 E-7	6.63 E-8	
3. Percent of applicable limit	%	3.79 E-3	2.21 E-3	

C. Dissolved and entrained gases

1. Total release	Ci	2.75 E-1	5.13 E-2	3.0 E 1
2. Average diluted concentration during period	µCi/ml	2.28 E-9	5.50 E-10	
3. Percent of applicable limit	%	7.60 E-2	1.83 E-2	

D. Gross alpha radioactivity

1. Total release	Ci	8.04 E-5	6.46 E-5	3.0 E 1
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E. Volume of waste released (prior to dilution)	liters	3.58 E 6	2.69 E 6	1.0 E 1
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F. Volume of dilution water used during period	liters	4.53 E 11	3.51 E 11	1.0 E 1
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TABLE 6
EFFLUENT AND WASTE DISPOSAL REPORT 1981-1
LIQUID EFFLUENTS

	UNIT	FIRST QUARTER	SECOND QUARTER		MDL
Strontium-89	C1	4.37 E-3	2.28 E-3		2.04 E-11
Strontium - 90	C1	2.89 E-4	2.67 E-4		5.47 E-12
Iodine-131	C1	2.83 E-3	3.84 E-4		3.68 E-10
Cesium-134	C1	8.75 E-5	2.99 E-4		4.73 E-10
Cesium - 137	C1	1.99 E-3	4.17 E-3		5.53 E-10

Cobalt-57	C1	1.11 E-4	7.29 E-4		1.86 E-10
Cobalt-58	C1	6.13 E-5	MDL		8.99 E-10
Cobalt-60	C1	2.87 E-2	3.06 E-2		7.85 E-10
Manganese-54	C1	2.47 E-3	3.44 E-3		7.68 E-10
Chromium-51	C1	2.23 E-2	1.54 E-2		2.77 E-9

Strontium-91	C1	1.48 E-4	6.66 E-4		1.74 E-9
Technetium-99m	C1	3.62 E-3	3.38 E-3		2.95 E-10
Ruthenium-103	C1	7.56 E-5	3.74 E-5		5.63 E-10
Antimony-125	C1	1.85 E-4	1.63 E-4		1.64 E-9
Iodine-133	C1	7.95 E-3	7.52 E-4		5.55 E-10
Iodine-135	C1	4.43 E-3	4.72 E-2		1.75 E-9
Barium-140	C1	2.43 E-3	2.27 E-4		2.38 E-9
Lanthanum-140	C1	3.48 E-3	1.33 E-3		8.58 E-10
Cerium-141	C1	2.53 E-3	3.02 E-4		4.97 E-10
Cerium-143	C1	MDL	1.44 E-4		6.30 E-10
Cerium-144	C1	1.85 E-3	2.41 E-3		2.38 E-9
Protactinium-233	C1	4.04 E-5	MDL		8.07 E-10
Neptunium-239	C1	3.13 E-4	1.30 E-4		4.58 E-10
Total	C1	8.80 E-2	1.14 E-1		

Xenon-133	C1	6.76 E-2	1.81 E-2		6.79 E-10
Xenon-133m	C1	8.74 E-5	3.00 E-4		1.99 E-9
Xenon-135	C1	2.07 E-1	3.29 E-2		2.81 E-10
Total	C1	2.75 E-1	5.13 E-2		

TABLE 7
EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT 1981-1
SOLID WASTE AND IRRADIATED FUEL SHIPMENTS

A. Solid waste shipped offsite for burial or disposal (not irradiated fuel)

1. Type of waste	Unit	6-month period	Est. Total Error, %
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³	3.57 E 2	5.0 E 1
b. Dry compressible waste contaminated equip., etc.	m ³	1.54 E 2	
c. Irradiated components, control rods, etc.	m ³	5.78 E 2	5.0 E 1
		1.03 E 2	
d. Other (describe)	m ³	3.95 E 4	5.0 E 1

2. Estimate of major nuclide composition (by type of waste)	Percentage	Activity (Ci)	MDL (Ci)
a. Co-60	5.4 E 1	8.32 E 1	4.12 E-10
Sr-89	1.3 E 1	2.00 E 1	5.00 E-11
Cs-137	8.2	1.26 E 1	2.29 E-10
Mn-54	7.9	1.22 E 1	4.12 E-10
La-140	4.3	6.62	4.32 E-10
b. Mn-54	3.4 E 1	3.50 E 1	
Co-60	2.8 E 1	2.88 E 1	
Cs-137	1.0 E 1	1.03 E 1	
Sr-89	7.2	7.42	
Co-58	5.5	5.67	
c.			
d.			

3. Solid Waste Disposition Number of Shipments	Mode of Transportation	Destination
78	Motor Vehicle	Barnwell, South Carolina
7	Motor Vehicle	Richmond, Washington
1	Motor Vehicle	Beatty, Nevada

B. Irradiated Fuel Shipments (Disposition)

Number of Shipments	Mode of Transportation	Destination
1	Motor Vehicle	Columbus, Ohio

TABLE 8
 Meteorological Classification of Atmospheric Stability

<u>Stability Classification</u>	<u>Pasquill Categories</u>	<u>Degrees</u>	<u>Temperature Change with height (°C/100m)</u>
Extremely unstable	A	25.0°	LT -1.9
Moderately unstable	B	20.0°	-1.9 to -1.7
Slightly unstable	C	15.0°	-1.7 to -1.5
Neutral	D	10.0°	-1.5 to -0.5
Slightly Stable	E	5.0°	-0.5 to 1.5
Moderately stable	F	2.5°	1.5 to 4.0
Extremely stable	G	1.7	GT 4.0