Brunswick Steam Electric Plant

Semiannual Radioactive Effluent Report

January 1, 1988 to June 30, 1988

IE48

ATTACHMENT 1

Supplemental Information

January 1, to June 30, 1988

EFFLUENT WASTE DISPOSAL SEMIANNUAL REPORT

Supplemental Information

Facility: Brunswick Steam Electric Plant
Licensee: Carolina Power and Light Company

1. Regulatory Limits

A. Fission and activation gases (Technical Spec. 3.11.2.2)

*(1) Calendar Quarter

(a) 10 mrad gamma
(b) 20 mrad beta

(2) Calendar Year

(a) 20 mrad gamma
(b) 40 mrad beta

B. Iodine-131, iodine-133, tritium, and particulates with half-lives greater than eight days (Technical Spec. 3.11.2.3)

*(1) Calendar Quarter

(a) 15 mrem to any organ

(2) Calendar Year

(a) 30 mrem to any organ

C. Liquid effluents (Technical Specification 3.11.1.2)

**(1) Calendar Quarter

(a) 3 mrem to total body
(b) 10 mrem to any organ

(2) Calendar Year

(a) 6 mrem to total body
(b) 20 mrem to any organ

NOTE: Dose calculations are determined in accordance with the Off-Site Dose Calculation Manual (ODCM)

*Used for percent of technical specification limit determinations in Table 1A.
**Used for percent of technical specification limit determinations in Table 2A.

2. Maximum permissible concentrations and dose rates which determine maximum instantaneous release rates.

A. Fission and activation gases (Technical Specification 3.11.2.1.a)

(1) 500 mrem/year to total body
(2) 3000 mrem/year to the skin

B. Iodine-131, iodine-133, tritium, and particulates with half-lives greater than eight days (Technical Specification 3.11.2.1.b)

(1) 1500 mrem/year to any organ

C. Liquid effluents (Technical Specification 3.11.1.1)

The concentration of radioactive material released in liquid effluents to unrestricted areas after dilution in the discharge canal shall be limited to the concentrations specified in 10CFR20, Appendix B, Table II, column 2, for radionuclides other than noble gases.

**(1) Tritium: MPC = 3 E-03 uCi/ml and
**(2) Dissolved and entrained gases: MPC = 2 E-04 uCi/ml

3. Measurements and Approximations of Total Radioactivity

A. Fission and activation gases

Analysis for specific radionuclides in representative grab samples by gamma spectroscopy.

D. Iodines

Analysis for specific radionuclides collected on charcoal cartridges by gamma spectroscopy.

C. Particulates

Analysis for specific radionuclides collected on filter papers by gamma spectroscopy.

D. Liquids Effluents

Analysis for specific radionuclides of individual releases by gamma spectroscopy.

**Used as applicable limits for Table 2A

Nuclear counting statistics are reported utilizing 1-sigma error. Total error where reported represents a best effort to approximate the total of all individual and sampling errors.

4. Batch Releases

A. Liquid

(1) Number of batch releases:	3.06E 02
(2) Total time period for batch releases:	3.31E 04 Minutes
(3) Maximum time period for a batch release:	2.45E 02 Minutes
(4) Average time period for a batch release:	1.08E 02 Minutes
(5) Minimum time period for a batch release:	6.00E 00 Minutes
(6) Average stream flow during periods of release of effluent into a flowing stream :	6.49E 05 GPM

B. Gaseous

(1) Number of batch releases:	0.00E 00 Minutes
(2) Total time period for a batch release:	0.00E 00 Minutes
(3) Maximum time period for a batch release:	0.00E 00 Minutes
(4) Average time period for a batch release:	0.00E 00 Minutes
(5) Minimum time period for a batch release:	0.00E 00 Minutes

5. Abnormal releases

A. Liquid

(1) Number of releases:	0.00E 00
(2) Total activity released:	0.00E 00 Curies

B. Gaseous

(1) Number of releases:	0.00E 00
(2) Total activity released:	0.00E 00 Curies

ATTACHMENT 2

Effluent and Waste Disposal Data

Brunswick Steam Electric Plant

January 1, 1988 to June 30, 1988

Enclosure 1

Table 1A: Gaseous Effluents - Summation of all Releases

Table 1B: Gaseous Effluents - Elevated Releases

Table 1C: Gaseous Effluents - Ground Level Releases

Table 2A: Liquid Effluents - Summation of all Releases

Table 2B: Liquid Effluents

Lower Limits of Detection

Table 3: Solid Waste and Irradiated Fuel Shipments

Enclosure 2

Combustion of Waste Oil

Table 1A
Effluent and Waste Disposal Semiannual Report Year 1988
Gaseous Effluents - Summation of all Releases

	Unit	Qtr 1	Qtr 2	Est. Total Error,%
A. Fission and Activation Gases				
1. Total release	Ci	2.01E 02	2.26E 02	1.15E 02
2. Average release rate for period	uCi/sec	2.56E 01	2.87E 01	
3. Percent of technical specification limit	%	4.68E-02	5.58E-02	
B. Iodines				
1. Total I-131	Ci	1.90E-03	1.67E-03	7.00E 01
2. Average release rate for period	uCi/sec	2.42E-04	2.12E-04	
C. Particulates				
1. Total release	Ci	1.08E-02	6.95E-02	7.00E 01
2. Average release rate for period	uCi/sec	1.37E-03	8.84E-03	
3. Gross alpha	Ci	5.27E-06	4.80E-06	
D. Tritium				
1. Total release	Ci	1.04E 00	1.24E 00	7.00E 01
2. Average release rate for period	uCi/sec	1.32E-01	1.57E-01	
E. Iodine-131, Iodine-133, Tritium and Particulates				
1. Total Release	Ci	1.06E 00	1.32E 00	
2. Average release rate for period	uCi/sec	1.34E-01	1.68E-01	
3. Percent of technical specification limit	%	7.27E-02	6.93E-02	

Table 1B
Effluent and Waste Disposal Semiannual Report Year 1988
Gaseous Effluents - Elevated Releases
Continuous Release

Nuclides Released	Unit	Qtr 1	Qtr 2
1. Fission Gases			
argon-41	Ci	4.72E-01	8.64E-01
krypton-85m	Ci	5.45E 00	1.52E 01
krypton-87	Ci	< LLD	2.34E-01
krypton-88	Ci	2.21E 00	1.20E 01
xenon-133	Ci	3.22E 01	8.79E 01
xenon-135m	Ci	< LLD	1.73E 00
xenon-135	Ci	7.84E-01	1.80E 00
xenon-137	Ci	< LLD	5.20E 00
xenon-138	Ci	< LLD	4.32E-01
total for period	Ci	4.11E 01	1.25E 02
2. Iodines			
iodine-131	Ci	1.46E-03	5.98E-04
iodine-132	Ci	< LLD	2.37E-03
iodine-133	Ci	3.39E-03	3.55E-03
iodine-134	Ci	< LLD	2.16E-04
iodine-135	Ci	< LLD	4.02E-03
total for period	Ci	4.85E-03	1.08E-02
3. Particulates			
chromium-51	Ci	1.88E-04	1.42E-05
manganese-54	Ci	2.90E-04	4.51E-05
cobalt-58	Ci	7.63E-05	1.59E-06
cobalt-60	Ci	2.48E-04	4.21E-05
strontium-89	Ci	1.80E-05	1.83E-04
strontium-90	Ci	3.95E-07	8.93E-07
cesium-137	Ci	1.09E-05	7.47E-06
barium-140	Ci	< LLD	1.63E-04
lanthanum-140	Ci	< LLD	1.31E-04
total for period	Ci	8.32E-04	5.88E-04
4. Tritium			
hydrogen-3	Ci	5.80E-02	4.88E-01

Table 1C
Effluent and Waste Disposal Semiannual Report Year 1988
Gaseous Effluents - Ground Level Releases
Continuous Release

Nuclides Released	Unit	Qtr 1	Qtr 2
1. Fission Gases			
xenon-133	Ci	1.31E 01	3.78E 00
xenon-135	Ci	1.47E 02	9.70E 01
total for period	Ci	1.60E 02	1.01E 02
2. Iodines			
iodine-131	Ci	4.42E-04	1.07E-03
iodine-132	Ci	< LLD	1.15E-02
iodine-133	Ci	5.24E-04	8.81E-03
iodine-134	Ci	< LLD	2.06E-02
iodine-135	Ci	< LLD	1.27E-02
total for period	Ci	9.66E-04	5.47E-02
3. Particulates			
chromium-51	Ci	4.18E-03	6.35E-02
manganese-54	Ci	2.06E-03	1.57E-03
cobalt-58	Ci	3.60E-04	1.25E-03
cobalt-60	Ci	2.16E-03	1.49E-03
iron-59	Ci	1.02E-03	1.05E-04
strontium-89	Ci	3.30E-06	9.08E-05
strontium-90	Ci	< LLD	1.27E-06
niobium-95	Ci	1.03E-05	< LLD
cesium-134	Ci	< LLD	9.53E-06
cesium-136	Ci	< LLD	1.89E-08
cesium-137	Ci	4.81E-05	2.47E-04
barium-140	Ci	4.21E-05	4.09E-04
lanthanum-140	Ci	7.30E-05	2.46E-04
cerium-144	Ci	2.06E-05	< LLD
total for period	Ci	9.95E-03	6.89E-02
4. Tritium			
hydrogen-3	Ci	9.85E-01	7.47E-01

Table 2A
Effluent and Waste Disposal Semiannual Report Year 1988
Liquid Effluents - Summation of all Releases

	Unit	Qtr 1	Qtr 2	Est Tot % Error
A. Fission and Activation Products				
1. Total release (excluding tritium, gases, & alpha)	Ci	1.80E-01	3.48E-01	3.50E 01
2. Avg. diluted conc.	uCi/ml	6.55E-09	7.79E-09	
3. Percent limit	%	5.52E-01	8.46E-01	
B. Tritium				
1. Total release	Ci	6.59E 00	4.62E 00	4.00E 00
2. Avg. diluted conc.	uCi/ml	2.40E-07	1.03E-07	
3. Percent limit	%	8.00E-03	3.43E-03	
C. Dissolved and Entrained Gases				
1. Total release	Ci	2.08E-03	1.57E-02	3.50E 01
2. Avg. diluted conc.	uCi/ml	7.56E-11	3.51E-10	
3. Percent limit	%	3.78E-05	1.76E-04	
D. Gross alpha radioactivity				
1. Total release		0.00E 00	0.00E 00	4.00E 01
E. Volume of waste	liters	1.21E 07	1.06E 07	1.25E 01
F. Total of dilution water (used during released for average dil. conc.)	liters	2.75E 10	4.47E 10	1.30E 01
G. Volume of cooling water discharged from plant	liters	2.05E 11	4.31E 11	

TABLE 2B
Effluent and Waste Disposal Semiannual Report Year 1988
Liquid Effluents - Batch Mode

Nuclides Released	Unit	Qtr 1	Qtr 2
1. Fission and activation products			
sodium-24	Ci	1.19E-03	6.13E-03
chromium-51	Ci	8.76E-03	3.47E-02
manganese-54	Ci	4.21E-02	7.93E-02
iron-55	Ci	1.87E-02	6.57E-03
cobalt-58	Ci	8.21E-03	1.56E-02
iron-59	Ci	2.85E-03	7.70E-03
cobalt-60	Ci	3.72E-02	1.28E-01
arsenic-76	Ci	1.52E-04	4.00E-04
strontium-89	Ci	1.86E-04	1.69E-03
strontium-91	Ci	< LLD	9.92E-05
yttrium-91m	Ci	3.47E-06	9.75E-05
strontium-92	Ci	3.67E-05	4.33E-05
niobium-95m	Ci	2.99E-06	< LLD
niobium-95	Ci	< LLD	2.16E-05
molybdenum-99	Ci	< LLD	1.92E-04
technetium-99m	Ci	3.50E-05	9.05E-04
silver-110m	Ci	6.95E-05	4.90E-05
antimony-125	Ci	1.24E-04	< LLD
iodine-131	Ci	7.34E-04	1.19E-03
iodine-132	Ci	< LLD	8.52E-05
iodine-133	Ci	1.23E-04	1.19E-03
iodine-134	Ci	1.26E-05	2.15E-05
cesium-134	Ci	1.01E-02	1.02E-02
iodine-135	Ci	< LLD	8.15E-04
cesium-137	Ci	4.88E-02	5.33E-02
cerium-144	Ci	7.99E-04	< LLD
tungsten-187	Ci	7.15E-05	< LLD
total for period	Ci	1.80E-01	3.48E-01
2. Gases			
argon-41	Ci	5.40E-06	< LLD
xenon-133	Ci	3.06E-04	2.97E-03
xenon-135m	Ci	< LLD	5.05E-04
xenon-135	Ci	1.77E-03	1.22E-02
total for period	Ci	2.08E-03	1.57E-02

Lower Limits of Detection

uCi/ml

1. Liquid Releases

Sr-90	4.97E-09
Sr-91	8.14E-08
Nb-95m	4.76E-08
Nb-95	1.84E-08
Mo-99	1.28E-07
Sb-125	4.61E-08
I-132	2.01E-08
I-135	4.29E-08
Ce-144	8.85E-08
W-187	8.09E-08
Ar-41	1.46E-08
Xe-135m	7.87E-08

2. Gaseous Releases

Kr-87	1.97E-08
Xe-135m	4.17E-08
Xe-138	9.82E-08

3. Iodines and Particulates

I-132	4.16E-13
I-135	2.51E-13
Sr-90	3.59E-16
Nb-95	2.27E-14
Cs-134	4.75E-14
Cs-136	3.88E-14
Ba-140	9.34E-14
La-140	6.48E-14
Ce-144	1.76E-13

NOTES

1: The above values represent typical "a priori" LLDs for isotopes where values of "<LLD" are indicated in Tables 1A, 1B, 1C, 2A, and 2B.

2: Where activity for any nuclide is reported as " Less than LLD", that nuclide is considered not present and the LLD activity listed is not considered in summary data.

Table 3A
Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

Waste Class A — January through June

1. Total volume shipped (cubic meters) 4.13 E2

   Total Curie quantity (estimated) 1.25 E3

2. Type of Waste	Units	Six-month Period	Est. Total Error,%
a. Spent resins,filter sludges	meters^3	1.99 E2	
	Curies	1.23 E5	1.00E1
b. Dry active waste,compacted, noncompacted	meters^3	2.14 E2	
	Curies	2.14 E1	1.00E1
c. Irradiated components	meters^3	0.00 E0	
	Curies	0.00 E0	N/A
d. Others (oil)	meters^3	0.00 E0	
	Curies	0.00 E0	N/A

3. Estimate of major radionuclide composition

a.	Cr-51	2.77 E0%
	Mn-54	1.66 E1%
	Fe-55	4.60 E1%
	Co-58	1.42 E0%
	Co-60	2.86 E1%
	Ni-63	1.12 E0%
	Cs-137	2.50 E0%
b.	Cr-51	1.40 E0%
	Mn-54	1.11 E1%
	Fe-55	6.47 E1%
	Co-58	1.20 E0%
	Co-60	1.89 E1%
	Ni-63	.97 E0%
c.	N/A	N/A
d.	N/A	N/A

Table 3A (cont.)

Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

4. Cross reference table, waste stream, form, and container type.

Stream	Form	Container type	No. of shipments
a. Resin	DeWatered & Solidified*	Type A/Type B	39/00
b. Dry active waste	Compacted/non-compacted waste	STP	27
c. Irradiated components		N/A	N/A
d. Other		N/A	N/A

*solidification agent or absorbent (e.g., cement, urea formaldehyde) CEMENT

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
40	Sole Use	CNSI/Barnwell SC
26	Sole Use	SEG/Oak Ridge TN

b. Irradiated Components

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

Table 3B
Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

Waste Class B January through June

1. Total volume shipped, (cubic meters) 0.00 E0

Total Ci quantity (estimated)

2. Type of Waste	Units	Six-month Period	Est. Total Error, %
a. Spent resins, filter sludges	meters^3	N/A	N/A
	Curies		
b. Dry active waste, compacted, and noncompacted	meters^3	N/A	N/A
	Curies		
c. Irradiated components	meters^3	N/A	N/A
	Curies		
d. Others (describe)	meters^3	N/A	N/A
	Curies		

3. Estimate of major radionuclide composition

a.	N/A	N/A
b.	N/A	N/A
c.	N/A	N/A
d.	N/A	N/A

4. Cross reference table, waste stream, form and container type

Stream	Form	Container type	No. of shipments
a. Resin	Dewatered & Solidified *	N/A	N/A
b. Dry active	Compacted/non-compacted waste	N/A	N/A
c. Irradiated components			N/A
d. Other			N/A
	* Solidification agent or absorbent (e.g., cement, urea formaldehyde)		N/A

Table 3B (cont.)
Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
N/A	N/A	N/A

b. Irradiated Fuel

Number of Shipments	Mode of Transportation	Destination
N/A	N/A	N/A

Table 3C
Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

Waste Class C January through June

1. Total volume shipped, (cubic meters) 0.00 E0

Total Ci quantity (estimated)

2. Type of Waste	Unit	Six-month Period	Est.Total Error,%
a. Spent resins, filter sludges	meters^3 Curies	N/A	
b. Dry active waste, compacted and noncompacted	meters^3	N/A	
c. Irradiated components	meters^3 Curies	N/A	
d. Others (describe)	meters^3 Curies	N/A	

3. Estimate of major radionuclide composition

a. N/A

b. N/A

c. N/A

d. N/A

4. Cross reference table, waste stream, form and container type

Stream	Form	Container Type	No. of shipments
a. Resin	Dewatered & Solidified *	N/A	N/A
b. Dry active waste	Compacted/non-compacted	N/A	N/A
c. Irradiated components		N/A	N/A
d. Others		N/A	N/A

* Solidification agent or absorbent (e.g., cement, urea formaldehyde) N/A

Table 3C (cont.)
Effluent and Waste Disposal Semiannual Report Year 1988
Solid Waste and Irradiated Fuel Shipments

5. Shipment Disposition

a. Solid Waste

Number of Shipments	Mode of Transportation	Destination
N/A	N/A	N/A

b. Irradiated Components

Number of Shipments	Mode of Transportation	Destination
0	N/A	N/A

ENCLOSURE 2

Combustion of Waste Oil

During the first quarter, 7.78E 02 gallons of waste oil containing 1.39E 00 uCi were disposed of by incineration. During the second quarter, 5.78E 02 gallons of waste oil containing 8.01E-01 uci were disposed of by incineration.

ATTACHMENT 3

Off-Site Dose Calculation Manual (ODCM) and

Process Control Program (PCP) Revisions

January 1, to June 30, 1988

Brunswick Steam Electric Plant

There were no revisions made to the Off-site Dose Calculation Manual (ODCM) or the Process Control Program (PCP) during this time period.

ATTACHMENT 4

Enviromental Monitoring Program

January 1, to June 30, 1988

Enclosure 1: Milk and Vegetable Sample Locations

Enclosure 2: Land Use Census

ENCLOSURE 1

Milk and Vegetable Sample Locations

No milk sample locations were available during this time period.

Vegetable sample locations were unchanged during this time period.

ENCLOSURE 2

Land Use Census

No new locations were identified that are reportable in the Semiannual Radioactive Effluent Release Report as per Technical Specification 3.12.2.a and b.

ATTACHMENT 5

Inoperable Effluent Instrumentation

January 1, to June 30, 1988

Enclosure 1: Radioactive Liquid Effluent Monitoring Instrumentation

Enclosure 2: Radioactive Gaseous Effluent Monitoring Instrumentation

Enclosure 3: Liquid Hold-Up Tank

ENCLOSURE 1

Radioactive Liquid Effluent Monitoring Instrumentation

The liquid radwaste effluent flow measurement device (2-G16-FIT-N057) was inoperable for greater than 30 days during this time period.

This instrument was not returned to service within a 30 day period due to the inability to calibrate the instrument within its design accuracy.

ENCLOSURE 2

Radioactive Gaseous Effluent Monitoring Instrumentation

Unit 1 & 2 Main Condenser Off-Gas treatment system explosive gas monitors 1(2)-OG-AIT-4284 (SJAE.A.H2 Analyzer), 1(2)-OG-AIT-4285 (SJAE.A.H2 Analyzer), 1(2)-OG-AIT-4324 (SJAE.B.H2 Analyzer), and 1(2)-OG-AIT-4325 (SJAE.B.H2 Analyzer) were inoperable for greater than a 30 day period during January 1,to June 30, 1988. Due to design problems, these monitors were not returned to service within 30 days.

Units 1 and 2, Reactor and Turbine buildings roof vent flow monitor elements; 1-VA-FE-3356,1-VA FE-3358,2-VA-FE-3356 and 2-VA-FE-3358 were inoperable for greater than a 30 day period during January 1, to June 30, 1988. Due to design problems these monitors were not returned to service within 30 days.

Unit 1 Turbine building roof vent flow monitor totalizer, 1-VA-FIQ-3358 was inoperable for greater than a 30 day period during January 1, to June 30, 1988, because it would not meet the acceptance criteria of an operational test. Investigations have been made and changes are currently underway to return 1-VA-FIQ-3358 to an operable status.

Unit 2 Main Condenser Off-Gas treatment system Argumented Off-Gas (AOG) monitor 2-AOG-RI-103 was inoperable for greater than 30 a day period during January 1, to June 30, 1988. Due to the Unit refueling outage this monitor was not returned to service within 30 days.

ENCLOSURE 3

Liquid Hold-Up Tank

No liquid hold-up tank exceeded the 10 Ci limit during this time period.

ATTACHMENT 6

Major Modifications to the Radioactive Waste Treatment Systems

January 1, to June 30, 1988

Discussion of major modifications to the Radioactive Waste Treatment Systems, if any, will be submitted with the Final Safety Analysis Report update as allowed by footnote 7 to Technical Specification 6.15.

ATTACHMENT 7

Meteorological Data

Brunswick Steam Electric Plant

January 1, to June 30, 1988

As per Technical Specification 6.9.1.10.a footnote 6, the annual summary of meteorological data collected over the calendar year will be submitted to a file and will be available for NRC review upon request.

ATTACHMENT 8

Potential Dose Assessment

Brunswick Steam Electric Plant

January 1, to June 30, 1988

As required by Technical Specification 6.9.1.10.b, an assessment of radiation doses due to the radioactive liquid and gaseous effluents released during the calender year will be reported within 90 days after January 1 of each year, and is not included in this report.

ATTACHMENT 9

SUPPLEMENT TO PREVIOUS
SEMIANNUAL RE. ORT

Brunswick Steam Electric Plant

January 1, to June 30, 1988

Enclosure 1: DISCUSSIC N

Enclosure 2: DATA TABLE