

Brunswick Steam Electric Plant  
Semiannual Radioactive Effluent Report  
July 1, to December 31, 1991

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ATTACHMENT 1

Supplemental Information

July 1, to December 31, 1991

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

- (3) Calendar Quarter for Burning Contaminated Oil

- (a) 436 uCi

- (4) Calendar Year for Burning Contaminated Oil

- (a) 872 uCi

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 =  $3 \text{ E-03 uCi/ml}$  and

\*\* (2) Dissolved and entrained gases: MPC =  $2 \text{ E-04 uCi/ml}$

3. Measurements and Approximations of Total Radioactivity

A. Fission and activation gases

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

B. 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. Particulates for Burning Oil

Analysis for specific radionuclides by grab samples of each batch of oil to be burned.

E. 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:	2.60E+02
(2) Total time period for batch releases:	2.73E+04 Minutes
(3) Maximum time period for a batch release:	2.15E+02 Minutes
(4) Average time period for a batch release:	1.05E+02 Minutes
(5) Minimum time period for a batch release:	7.00E+00 Minutes
(6) Average stream flow during periods of release of effluent into a flowing stream :	6.43E+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

\* There were no abnormal releases that exceeded 10CFR50 limits  
See Page 6 for a discussion of release events that occurred

### Non-Routine Releases

Liquid Releases - Total Releases =  $2.00\text{E}+00$   
Total Curies =  $8.34\text{E}-04$

#### 1. Storm Drain Basin

The Storm Drain Basin was released to the discharge canal via the emergency discharge line 2 times during periods of heavy rainfall. It was necessary to open the emergency discharge line to prevent flooding in critical plant areas.

Release 1 lasted 64 minutes and released approximately  $1.18\text{E}+06$  gallons of water containing  $2.91\text{E}-04$  curies. The activity released was  $1.79\text{E}-04$  curies of I-133 and  $1.12\text{E}-04$  curies of Xe-135.

Release 2 lasted 71 minutes and released approximately  $2.07\text{E}+06$  gallons of water containing  $5.43\text{E}-04$  curies. The activity released was  $4.31\text{E}-04$  curies of I-133 and  $1.12\text{E}-04$  curies of Ru-103.

## Discussion of Tritium in the Storm Drain Collection Pond

Approximately  $3.7\text{E}+07$  gallons containing  $1.88\text{E}+01$  curies of tritium was released from the Storm Drain Collection Pond (SDCP) to the Intake Canal during this reporting period. The tritium was found during an investigation by the plant staff. The source of tritium in this pathway is from small steam leaks in the Turbine Buildings. During normal operations tritium is being released via the swamp coolers that are used for cooling the air in the Turbine Buildings. Water that overflows from the swamp coolers discharges to the Storm Drain Collection Basin (SDCB) within the Protected Area and is then pumped to the SDCP. The SDCB and the SDCP are discussed in the FSAR and the Technical Specifications. The SDCP is a permitted release point approximately 39 acres in size which requires sampling and analysis prior to release but does not include tritium analysis unless the trigger level based on gamma isotopic analysis is exceeded. Since the gamma isotopic of the SDCP effluents is <LLD, tritium analysis is not required by the Technical Specifications. However, the SDCP effluent water that was analyzed during the investigation revealed detectable tritium activity and is therefore being reported for your information.

As per 10CFR20 Appendix B, this nuclide may be considered as not present in a mixture since the ratio of the concentration of that nuclide in the mixture to the concentration limit for that nuclide specified in Table II of Appendix B does not exceed 1/10 MPC and the total MPC is less than 1/4.

A conservative calculation using the above source term based on 1/10 of the 10CFR50 Appendix I limit, yielded approximately  $5.6\text{E}-02$  % of the limit. These dose calculations show that the impact to the environment is insignificant and provides the basis for not amending past reports. Curies of tritium released from the SDCP will be reported in future Radioactive Effluent Release Reports as long as tritium is detectable in the SDCP effluent.

ATTACHMENT 2

Effluent and Waste Disposal Data

Brunswick Steam Electric Plant

July 1, to December 31, 1991

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 for Year 1991  
Gaseous Effluents - Summation of all Releases

	Unit	Qtr 3	Qtr 4	Est. Tot. Error %
A. <u>FISSION AND ACTIVATION GASES</u>				
1. Total release	Ci	2.02E+02	9.95E+01	1.15E 02
2. Average release rate for period	uCi/sec	2.54E+01	1.25E+01	
3. Percent of technical specification limit	%	2.30E-02	1.20E-02	
B. <u>IODINES</u>				
1. Total I-131	Ci	5.90E-03	1.30E-03	7.00E 01
2. Average release rate for period	uCi/sec	7.42E-04	1.64E-04	
C. <u>PARTICULATES</u>				
1. Total release	Ci	2.49E-03	4.01E-03	7.00E 01
2. Average release rate for period	uCi/sec	3.13E-04	5.04E-04	
3. Gross alpha	Ci	3.27E-06	4.64E-06	
D. <u>Tritium</u>				
1. Total release	Ci	9.59E+00	8.63E-01	7.00E 01
2. Average release rate for period	uCi/sec	1.21E+00	1.09E-01	
E. <u>IODINE-131, IODINE-133, TRITIUM AND PARTICULATES</u>				
1. Total Release	Ci	9.61E+00	8.76E-01	
2. Average release rate for period	uCi/sec	1.21E+00	1.10E-01	
3. Percent of technical specification limit	%	2.16E-01	5.80E-02	
F. <u>PARTICULATES VIA BURNING CONTAMINATED OIL</u>				
1. Total Release	Ci	0.00E+00	0.00E+00	
2. Average release rate for period	uCi/sec	0.00E+00	0.00E+00	
3. Percent of technical specification limit	%	0.00E+00	0.00E+00	

TABLE 1B  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Gaseous Effluents - Elevated Releases  
Continuous Release

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
<u>1. FISSION GASES</u>			
argon-41	Ci	1.52E-01	<LLD
krypton-85m	Ci	1.69E+01	1.30E+01
krypton-87	Ci	1.40E+00	5.05E-01
krypton-88	Ci	1.73E+01	6.11E+00
xenon-131m	Ci	2.83E+00	<LLD
xenon-133	Ci	7.41E+01	3.80E+01
xenon-135m	Ci	1.04E+01	4.86E+00
xenon-135	Ci	9.49E+00	7.52E+00
xenon-137	Ci	1.37E+01	2.72E+00
<u>xenon-138</u>	<u>Ci</u>	<u>6.68E+00</u>	<u>6.26E-01</u>
total for period	Ci	1.53E+02	7.33E+01
<u>2. IODINES</u>			
iodine-131	Ci	4.02E-03	5.36E-04
iodine-132	Ci	1.56E-03	<LLD
iodine-133	Ci	7.25E-03	1.34E-03
<u>iodine-135</u>	<u>Ci</u>	<u>3.97E-03</u>	<u>&lt;LLD</u>
total for period	Ci	1.68E-02	1.88E-03
<u>3. PARTICULATES</u>			
chromium-51	Ci	1.51E-04	<LLD
manganese-54	Ci	9.72E-07	8.93E-06
cobalt-60	Ci	6.97E-05	5.91E-05
strontium-89	Ci	1.07E-04	3.87E-05
strontium-90	Ci	9.21E-07	<LLD
tellurium-129m	Ci	3.43E-05	<LLD
cesium-137	Ci	4.78E-05	1.87E-06
barium-140	Ci	2.68E-04	7.69E-05
lanthanum-140	Ci	4.45E-04	9.06E-05
cerium-141	Ci	8.36E-07	<LLD
<u>cerium-144</u>	<u>Ci</u>	<u>5.24E-06</u>	<u>&lt;LLD</u>
total for period	Ci	1.13E-03	2.76E-04
<u>4. TRITIUM</u>			
hydrogen-3	Ci	6.12E+00	1.56E-01

TABLE 1C  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Gaseous Effluents - Ground Level Releases  
Continuous Release

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
<u>1. FISSION GASES</u>			
krypton-85	Ci	5.88E-05	<LLD
xenon-133m	Ci	1.63E-01	<LLD
xenon-133	Ci	1.53E+01	8.36E+00
xenon-135m	Ci	1.77E+00	1.82E+00
<u>xenon-135</u>	<u>Ci</u>	<u>3.13E+01</u>	<u>1.60E+01</u>
total for period	Ci	4.86E+01	2.62E+01
<u>2. IODINES</u>			
iodine-131	Ci	1.88E-03	7.68E-04
iodine-132	Ci	1.37E-02	8.66E-03
iodine-133	Ci	1.23E-02	6.40E-03
iodine-134	Ci	2.42E-03	1.53E-03
<u>iodine-135</u>	<u>Ci</u>	<u>1.65E-02</u>	<u>9.92E-03</u>
total for period	Ci	4.68E-02	2.73E-02
<u>3. PARTICULATES</u>			
chromium-51	Ci	9.14E-04	6.21E-04
manganese-54	Ci	7.52E-05	9.37E-04
cobalt-57	Ci	1.00E-08	<LLD
cobalt-58	Ci	5.13E-05	2.04E-04
iron-59	Ci	<LLD	7.41E-05
cobalt-60	Ci	2.90E-04	1.85E-03
strontium-89	Ci	5.45E-06	4.58E-06
strontium-90	Ci	2.64E-07	1.40E-08
antimony-124	Ci	<LLD	1.68E-05
cesium-137	Ci	2.02E-06	1.22E-05
lanthanum-140	Ci	4.18E-06	5.04E-06
barium-140	Ci	1.13E-05	4.12E-06
cerium-141	Ci	1.54E-06	<LLD
<u>cerium-144</u>	<u>Ci</u>	<u>1.08E-06</u>	<u>&lt;LLD</u>
total for period	Ci	1.36E-03	3.73E-03
<u>4. TRITIUM</u>			
hydrogen-3	Ci	3.47E+00	7.07E-01

.....  
TABLE 1D  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Gaseous Effluents - Ground Level Releases  
For Burning Contaminated Oil

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
1. <u>PARTICULATES</u> *	Ci	N/A	N/A

\*No contaminated oil was incinerated during this reporting period.



TABLE 2A  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Liquid Effluents - Summation of all Releases

	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>	<u>Est Tot</u> <u>% Error</u>
<u>A. FISSION AND ACTIVATION PRODUCTS</u>				
1. Total release (excluding tritium, gases, & alpha)	Ci	1.29E-01	2.11E-01	3.50E 01
2. Avg. diluted conc.	uCi/ml	3.15E-09	8.29E-09	
3. Percent limit	%	1.68E-01	5.48E-01	
<u>B. TRITIUM</u>				
1. Total release	Ci	2.62E+01	1.25E+01	4.00E 01
2. Avg. diluted conc.	uCi/ml	6.41E-07	4.92E-07	
3. Percent limit	%	2.14E-02	1.64E-02	
<u>C. DISSOLVED AND ENTRAINED GASES</u>				
1. Total release	Ci	1.46E-01	6.89E-02	3.50E 01
2. Avg. diluted conc.	uCi/ml	3.56E-09	2.70E-09	
3. Percent limit	%	1.78E-03	1.35E-03	
<u>D. GROSS ALPHA RADIOACTIVITY</u>				
1. Total release	Ci	0.00E-00	0.00E-00	4.00E 01
<u>E. VOLUME OF WASTE</u>				
	liters	8.85E+06	1.02E+07	1.25E 01
<u>F. TOTAL OF DILUTION WATER (used during release for average dil. conc.)</u>				
	liters	4.09E+10	2.55E+10	1.30E 01
<u>G. VOLUME OF COOLING WATER DISCHARGED FROM PLANT</u>				
	liters	4.54E+11	2.71E+11	

TABLE 2B  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Liquid Effluents - Batch Mode

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
<u>1. FISSION AND ACTIVATION PRODUCTS</u>			
sodium-24	Ci	5.84E-04	9.26E-05
chromium-51	Ci	6.89E-03	3.03E-02
manganese-54	Ci	2.51E-02	2.43E-02
iron-55	Ci	5.12E-03	2.63E-02
cobalt-58	Ci	2.41E-02	2.43E-02
iron-59	Ci	8.79E-05	4.56E-04
cobalt-60	Ci	5.98E-02	1.03E-01
copper-64	Ci	4.93E-04	<LLD
zinc-65	Ci	<LLD	9.71E-04
zinc-69m	Ci	1.56E-06	<LLD
arsenic-76	Ci	2.18E-06	<LLD
strontium-89	Ci	3.20E-04	<LLD
yttrium-91m	Ci	7.44E-05	1.66E-05
yttrium-92	Ci	<LLD	3.52E-04
strontium-92	Ci	3.37E-05	2.94E-05
niobium-95	Ci	5.46E-05	1.28E-04
technetium-99m	Ci	6.80E-04	2.60E-05
ruthenium-103	Ci	8.20E-07	6.82E-05
silver-110m	Ci	2.13E-04	4.74E-05
antimony-124	Ci	<LLD	3.54E-04
tellurium-129m	Ci	1.86E-04	9.47E-05
iodine-131	Ci	1.46E-04	1.04E-05
tellurium-132	Ci	5.15E-06	<LLD
iodine-132	Ci	2.65E-04	<LLD
iodine-133	Ci	2.23E-04	5.98E-05
cesium-134	Ci	3.48E-04	2.62E-05
cesium-137	Ci	1.25E-03	4.19E-04
barium-140	Ci	1.50E-03	<LLD
lanthanum-140	Ci	1.05E-03	<LLD
cerium-141	Ci	<LLD	2.19E-05
cerium-144	Ci	3.15E-05	<LLD
hafnium-181	Ci	1.65E-06	<LLD
<u>tungsten-187</u>	<u>Ci</u>	<u>2.72E-04</u>	<u>&lt;LLD</u>
total for period	Ci	1.29E-01	2.11E-01

TABLE 2B (continued)  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Liquid Effluents - Batch Mode

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
2. <u>GASES</u>			
krypton-85m	Ci	2.17E-06	<LLD
xenon-133	Ci	8.38E-02	1.35E-02
xenon-133m	Ci	1.34E-03	2.08E-04
xenon-135m	Ci	4.19E-05	<LLD
<u>xenon-135</u>	<u>Ci</u>	<u>6.06E-02</u>	<u>5.52E-02</u>
total for period	Ci	1.46E-01	6.89E-02

Lower Limits of Detection  
July through December 1991

		uCi/ml	
1. <u>Liquid Releases</u>		2. <u>Gaseous Releases</u>	
Zn-65	5.45E-08	Ar-41	2.35E-08
Zn-69m	1.94E-08	Xe-131m	3.02E-07
Cu-64	4.01E-06	Xe-133m	5.73E-08
As-76	4.83E-08	Kr-85	2.31E-06
Y-92	1.22E-07		
Sb-124	2.15E-08	3. <u>Iodines and Particulates</u>	
Te-132	1.41E-08		
I-132	2.52E-08		
Ba-140	6.78E-08	Co-57	2.88E-14
La-140	3.98E-08	Cr-51	2.48E-13
Ce-141	3.00E-08	Fe-59	8.76E-13
Ce-144	1.17E-07	Sb-124	4.15E-14
Hf-181	1.78E-08	Te-129m	9.77E-13
W-187	7.86E-08	I-132	5.74E-13
Xe-135m	8.78E-08	I-135	3.13E-13
Kr-85m	2.38E-08	Ce-141	5.65E-14
Sr-89	4.25E-09	Ce-144	2.13E-13
		Sr-90	7.49E-16

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 for Year 1991  
Solid Waste and Irradiated Fuel Shipments

<u>Waste Class A</u>		<u>July through December</u>		
1.	<u>Total volume shipped</u> (cubic meters)	1.33 E2		
	Total Curie quantity (estimated)	3.32 E2		
2.	<u>Type of Waste</u>	<u>Units</u>	<u>Six-month Period</u>	<u>Est. Total % Error</u>
a.	Spent resins, filter sludges	meters <sup>3</sup>	6.46 E1	
		Curies <sub>3</sub>	3.02 E2	1.00E1
b.	Dry active waste, compacted	meters <sup>3</sup>	6.80 E1	
	noncompacted	Curies <sub>3</sub>	3.02 E1	1.00E1
c.	Irradiated components	meters <sup>3</sup>	0.00 E0	
		Curies <sub>3</sub>	0.00 E0	N/A
d.	Others (oil)	meters <sup>3</sup>	0.00 E0	
		Curies	0.00 E0	N/A
3.	<u>Estimate of major radionuclide composition</u>			
a.		Cr-51	1.47 E0%	
		Mn-54	6.35 E0%	
		Fe-55	5.38 E1%	
		Co-60	3.10 E1%	
		Ni-63	2.00 E0%	
		Cs-137	2.38 E0%	
b.		Mn-54	6.12 E0%	
		Fe-55	6.57 E1%	
		Co-60	2.19 E1%	
		Co-58	3.17 E0%	
		Ni-63	1.69 E0%	
c.		N/A	N/A	
d.		N/A	N/A	

Table 3A (cont.)

Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

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

	<u>Stream</u>	<u>Form</u>	<u>Container type</u>	<u>No. of shipments</u>
a.	Resin	Dewatered & Solidified*	Type A/Type B	9/4
b.	Dry active waste	Compacted /non-compacted waste	STP	19
c.	Irradiated components		N/A	0
d.	Other		N/A	0
		*solidification agent or absorbent (e.g., cement, urea formaldehyde)		NONE

5. Shipment Disposition

a. Solid Waste

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
32	Sole Use	CNSI/Barnwell SC

b. Irradiated Components

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
0	N/A	N/A

TABLE 3B  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

Waste Class B

1. Total volume shipped (cubic meters)  
Total Curie quantity (estimated)

7.69 E0  
9.89 E1

2. Type of Waste

- a. Spent resins, filter sludges  
b. Dry active waste, compacted,  
and noncompact  
c. Irradiated components  
d. Others (describe)

Units	Six-month Period	Est. Total % Error
meters <sup>3</sup>	7.69 E0	1.0E1%
Curies <sub>3</sub>	9.89 E1	
meters <sup>3</sup>	0.00 E0	N/A
Curies <sub>3</sub>	0.00 E0	
meters <sup>3</sup>	0.00 E0	N/A
Curies <sub>3</sub>	0.00 E0	
meters <sup>3</sup>	0.00 E0	N/A
Curies	0.00 E0	

3. Estimate of major radionuclide composition

- a.
- |        |          |
|--------|----------|
| Mn-54  | 4.86 E0% |
| Fe-55  | 4.57 E1% |
| Co-58  | 1.79 E0% |
| Co-60  | 4.24 E1% |
| Ni-63  | 3.01 E0% |
| Sb-125 | 1.29 E0% |
| N/A    | N/A      |
| N/A    | N/A      |
| N/A    | N/A      |
- b.
- c.
- d.

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	0 / 2
b. Dry active	Compacted/non- compacted	N/A	0
c. Irradiated components	waste	N/A	0
d. Other		N/A	0

\* Solidification agent or absorbent  
(e.g., cement, urea formaldehyde)

N/A



TABLE 3B

Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

Waste Class BJuly through December

1. <u>Total volume shipped</u> (cubic meters)		7.69 E0
Total Curie quantity (estimated)		9.89 E1
2. <u>Type of Waste</u>		Six-month Est.Total
	<u>Units</u>	<u>Period</u> % Error
a. Spent resins, filter sludges	meters <sup>3</sup>	7.69 E0 1.0E1%
	Curies	9.89 E1
b. Dry active waste, compacted, and noncompact	meters <sup>3</sup>	0.00 E0 N/A
	Curies	0.00 E0
c. Irradiated components	meters <sup>3</sup>	0.00 E0 N/A
	Curies	0.00 E0
d. Others (describe)	meters <sup>3</sup>	0.00 E0 N/A
	Curies	0.00 E0
3. <u>Estimate of major radionuclide composition</u>		
a.	Mn-54	4.86 E0%
	Fe-55	4.57 E1%
	Co-58	1.79 E0%
	Co-60	4.24 E1%
	Ni-63	3.01 E0%
	Sb-125	1.29 E0%
b.	N/A	N/A
c.	N/A	N/A
d.	N/A	N/A
4. <u>Cross reference table, waste stream, form and container type</u>		
<u>Stream</u>	<u>Form</u>	<u>Container type</u> <u>No. of shipments</u>
a. Resin	Dewatered & Solidified	Type A/Type B 0 / 2
b. Dry active	Compacted/non-compacted waste	N/A 0
c. Irradiated components		N/A 0
d. Other		N/A 0
* Solidification agent or absorbent (e.g., cement, urea formaldehyde)		N/A

Table 3B (cont.)  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

5. Shipment Disposition

a. Solid Waste

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
2	SOLE USE	CNSI/BARNWELL S.C.

b. Irradiated Fuel

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
0	N/A	N/A

TABLE 3C

Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

<u>Waste Class C</u>		<u>July through December</u>		
1. <u>Total volume shipped</u> (cubic meters)		0.00 E0		
Total Curie quantity (estimated)		0.00 E0		
2. <u>Type of Waste</u>		Six-month	Est. Tot.	
	<u>Units</u>	<u>Period</u>	<u>% Error</u>	
a. Spent resins, filter sludges	meters <sup>3</sup>	0.00 E0	N/A	
	Curies <sub>3</sub>	0.00 E0		
b. Dry active waste, compacted and noncompact	meters <sup>3</sup>	0.00 E0	N/A	
	Curies	0.00 E0		
c. Irradiated components	meters <sup>3</sup>	0.00 E0	N/A	
	Curies <sub>3</sub>	0.00 E0		
d. Others (describe)	meters <sup>3</sup>	0.00 E0	N/A	
	Curies	0.00 E0		
3. <u>Estimate of major radionuclide composition</u>				
a.	N/A	N/A		
b.	N/A	N/A		
c.	N/A	N/A		
d.	N/A	N/A		
4. <u>Cross reference table, waste stream, form and container type</u>				
<u>Stream</u>	<u>Form</u>	<u>Container Type</u>	<u>No. of shipments</u>	
a. Resin	Dewatered & Solidified *	N/A	0/0	
b. Dry active waste	Compacted/non-compacted	N/A	0	
c. Irradiated components		Type B	0	
d. Others		N/A	0	
* Solidification agent or absorbent (e.g., cement, urea formaldehyde)			NONE	

Table 3C (cont.)  
Effluent and Waste Disposal Semiannual Report for Year 1991  
Solid Waste and Irradiated Fuel Shipments

5. Shipment Disposition

a. Solid Waste

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
0	N/A	N/A

b. Irradiated Fuel (non-burial)

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
2	Railcar/IF300 CASK Sole Use	CP&L/SHNPP

ENCLOSURE 2

Combustion of Waste Oil

July 1, to December 31, 1991

No contaminated waste oil was incinerated during this reporting period.

ATTACHMENT 3

Environmental Monitoring Program

July 1, to December 31, 1991

Enclosure 1: Milk and Vegetable Sample Locations

Enclosure 2: Land Use Census

ENCLOSURE 1

Milk and Vegetation Sample Locations

July 1, to December 31, 1991

No milk sample locations were available during this time period.

Vegetation sample locations remained unchanged.



ENCLOSURE 2

Land Use Census

July 1, to December 31, 1991

The 1991 Land Use Census was performed during the period of August 16 to August 20, 1991. No locations were identified that are reportable in the Semiannual Radioactive Effluent Release Report.

ATTACHMENT 4

Effluent Instrumentation

July 1, to December 31, 1991

- Enclosure 1: Radioactive Liquid Effluent Monitoring Instrumentation.
- Enclosure 2: Radioactive Gaseous Effluent Monitoring
- Enclosure 3: Liquid Hold-Up Tank

ENCLOSURE 1

July 1, to December 31, 1991

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 period. The instrument was not returned to service within a 30 day period due to the inability to calibrate the instrument within its design accuracy. A Plant Modification installed new instrumentation in December of 1991.

The Unit #2 Service Water Radiation Monitor (2-D12-RM-K605) was inoperable for a period greater than 30 days during this reporting period due to the system being bypassed for the Unit #2 Outage.

## ENCLOSURE 2

July 1, to December 31, 1991

### Radioactive Gaseous Effluent Monitoring Instrumentation

Unit 1 & 2 Main Condenser Off-Gas treatment system explosive gas monitors 1(2)-OG-AIT-4284 (SJAE.A.H<sub>2</sub> Analyzer), 1(2)-OG-AIT-4285 (SJAE.A.H<sub>2</sub> Analyzer), 1(2)-OG-AIT-4324 (SJAE.B.H<sub>2</sub> Analyzer), and 1(2)-OG-AIT-4325 (SJAE.B.H<sub>2</sub> Analyzer) were inoperable for greater than a 30 day period during July 1 to December 31, 1991. Due to design problems, these monitors were not returned to service within 30 days.

The Unit #2 Reactor Roof Vent Monitor (2-CAC-AQH-1264-3) was inoperable for a period greater than 30 days during this reporting period. System modifications were made such that continuous collection of particulate and iodine samples could be maintained during sampling and maintenance evolutions. The delay in return to service was caused by design problems that were discovered during this evolution. During acceptance testing it was found that the system had considerable air leakage. Differences between system photohelic indication and a calibrated rotameter lead to an in-depth investigation of the system's integrity. The new location of the photohelic sensing orifice made it possible for the first time to identify an inleakage problem associated with the detector, sample holder chambers, and pump seals. When identifiable sources of inleakage were removed from the system, the previously used flow rate of 3 scfm could not be obtained even when subjecting the system to considerable vacuum (greater than 10 inches of Hg). The short term solution was to operate the reconfigured monitor using an auxiliary sample pump at 2 scfm. The data that is collected during the next reporting period will be evaluated against past data to determine if the magnitude of the problem has had any impact on past reports. The long term solution is to remove the existing sample pumps via plant modification and install sealed shaft sample pumps capable of maintaining a desired sample flow rate and provide indication of seal failure.

ENCLOSURE 3

Liquid Hold-Up Tank

July 1, to December 31, 1991

No liquid hold-up tank exceeded its design limit during this reporting period.

ATTACHMENT 5

Major Modifications to the Radioactive Waste Treatment System

July 1, to December 31, 1991

As per footnote 7 to Technical Specification 6.15, a discussion of any major modifications to the radioactive waste treatment systems will be submitted with the Final Safety Analysis Report update.

ATTACHMENT 6

Meteorological Data

July 1, to December 31, 1991

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 7

Annual Dose Assessment

January 1, to December 31, 1991

Attached is the annual dose assessment for the Brunswick Steam Electric Plant for the time period of January 1, to December 31, 1991.

Enclosure 1: Annual Liquid Dose Assessment

Enclosure 2: Annual Gaseous Dose Assessment

Enclosure 1

Annual Liquid Dose Assessment

INCLUDED ARE:

Site Specific Data

Source Term

As Low As Reasonably Achievable Maximum Individual Dose

Summary - Total Integrated and Recreation Population Dose

BSEP UNITS 1 AND 2 LIQUID RELEASES 1991. ANNUAL

DISCHARGE=1.52E+03 CFS

SOURCE TERM MULTIPLIER=1.00E+00

SALTWATER SITE

NO RECONCENTRATION MODEL

50-MILE POPULATION=2.82E+05

FRACTION ---

ADULT=0.71  
TEENAGER=0.11  
CHILD=0.18

DOSE FACTOR LIBRARY CONTAINS 698 ENTRIES

## COST-BENEFIT ANALYSIS

NUCLIDE	RELEASE CI/YR	PERSON-REM		DOSE		PERSON-REM		PER CURIE	
		TOTAL	BODY	THYROID	THYROID	TOTAL	BODY	TOTAL	THYROID
1H 3	7.99E+01	2.61E-06		2.61E-06		3.26E-08		3.26E-08	
11NA 24	7.45E-04	6.75E-08		6.75E-08		9.06E-05		9.06E-05	
24CR 51	7.03E-02	3.43E-07		3.43E-07		4.88E-06		4.75E-06	
25MN 54	5.82E-02	8.11E-05		7.06E-05		1.39E-03		1.21E-03	
25MN 56	7.19E-05	2.42E-09		2.42E-09		3.37E-05		3.37E-05	
26FE 55	3.26E-02	1.80E-05		2.15E-11		5.53E-04		6.58E-10	
26FE 59	5.44E-04	2.34E-06		1.41E-07		4.25E-03		2.58E-04	
27CO 57	1.57E-06	2.11E-10		2.60E-10		1.77E-04		1.65E-04	
27CO 58	5.18E-02	2.11E-05		1.80E-05		4.08E-04		1.86E-02	
27CO 60	2.02E-01	3.80E-03		3.76E-03		1.88E-02		4.33E-06	
29CU 64	4.93E-04	2.13E-09		2.13E-09		6.38E-03		6.56E-04	
30ZN 65	9.75E-04	6.22E-06		6.40E-07		8.81E-06		8.81E-06	
30ZN 69M	5.11E-06	4.50E-11		4.50E-11		6.62E-06		6.60E-08	
38SR 89	3.20E-04	2.12E-09		2.11E-11		2.74E-05		2.74E-05	
38SR 92	7.17E-05	1.97E-09		1.97E-09		1.04E-05		1.04E-05	
39V 91M	1.03E-04	1.07E-09		1.07E-09		4.89E-06		4.89E-06	
39V 92	4.11E-04	2.01E-09		2.01E-09		1.51E-04		1.33E-04	
41NB 95	1.83E-04	2.76E-08		2.43E-08		2.63E-06		2.63E-06	
43TC 99M	1.33E-03	3.50E-09		3.50E-09		1.03E-04		1.03E-04	
44RU 103	1.81E-04	1.86E-08		1.86E-08		3.14E-03		3.03E-03	
47AG 110M	2.60E-04	8.17E-07		7.89E-07		5.71E-04		5.56E-04	
51SB 124	8.79E-04	5.02E-07		4.88E-07		2.04E-03		2.03E-03	
51SB 125	2.79E-03	5.68E-06		5.67E-06		1.98E-06		1.98E-06	
52TE 129	6.55E-05	1.30E-10		1.30E-10		2.55E-05		3.26E-05	
52TE 132	2.81E-04	7.17E-09		9.16E-09		8.52E-06		8.65E-06	
52TE 137	5.15E-06	4.39E-11		4.46E-11		2.84E-05		3.16E-03	
531 131	4.18E-04	1.19E-01		1.32E-06		4.63E-05		4.63E-05	
531 132	2.65E-04	1.23E-08		1.23E-08		1.20E-05		1.25E-05	
531 133	9.20E-04	1.10E-08		1.15E-08		7.42E-03		5.94E-03	
55CS 134	1.24E-03	9.21E-06		7.37E-06		9.80E-03		8.92E-03	
55CS 137	4.29E-03	4.21E-05		3.83E-05		2.60E-05		2.28E-05	
56BA 140	1.50E-03	3.90E-08		3.42E-08		5.88E-05		5.88E-05	
57LA 140	1.05E-03	6.18E-08		6.18E-08		5.52E-07		5.52E-07	
57LA 141	2.69E-04	1.48E-10		1.48E-10		1.32E-05		1.31E-05	
58CE 141	2.19E-05	2.88E-10		2.88E-10		6.12E-05		6.11E-05	
58CE 144	7.99E-05	4.89E-09		4.88E-09		1.83E-04		1.80E-04	
72HF 181	1.65E-06	3.01E-10		2.97E-10		1.06E-05		1.06E-05	
74W 187	4.60E-04	4.87E-09		4.87E-09					
TOTAL		3.99E-03		3.91E-03					

\* \* \* AS LOW AS REASONABLY ACHIEVABLE \* \* \*

# A D U L T D O S E S (MREM PER YEAR INTAKE)

## DOSE

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.17E-04	3.28E-04	1.58E-04	1.19E-05	5.74E-05	8.51E-05	1.23E-03
INVERT		3.74E-04	4.82E-04	3.13E-04	9.48E-06	9.79E-05	1.31E-04	1.97E-03
SHORELINE	4.24E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03
SWIMMING		2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06
BOATING		1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06
TOTAL	4.24E-03	4.20E-03	4.42E-03	4.08E-03	3.63E-03	3.77E-03	3.83E-03	6.80E-03

SHOREWIDTH FACTOR=0.5

USAGE (KG/YR,HR/YR)

FISH	29.2	DILUTION	30.0	TIME(HR)	24.00
INVERT	7.3		30.0		24.00
SHORELINE	500.0		30.0		0.00
SWIMMING	100.0		30.0		0.00
BOATING	100.0		30.0		0.00

# T E E N D O S E S (MREM PER YEAR INTAKE)

## DOSE

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		2.97E-04	4.41E-04	2.04E-04	1.35E-05	7.24E-05	1.33E-04	1.12E-03
INVERT		5.06E-04	6.53E-04	4.21E-04	1.14E-05	1.22E-04	2.08E-04	1.81E-03
SHORELINE	4.24E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03
SWIMMING		2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06
BOATING		1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06
TOTAL	4.24E-03	4.41E-03	4.70E-03	4.24E-03	3.64E-03	3.80E-03	3.95E-03	6.53E-03

SHOREWIDTH FACTOR=0.5

USAGE (KG/YR,HR/YR)

FISH	29.2	DILUTION	30.0	TIME(HR)	24.00
INVERT	7.3		30.0		24.00
SHORELINE	500.0		30.0		0.00
SWIMMING	100.0		30.0		0.00
BOATING	100.0		30.0		0.00

# C H I L D D O S E S (MREM PER YEAR INTAKE)

## DOSE

PATHWAY	SKIN	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI
FISH		8.93E-04	8.98E-04	5.09E-04	3.03E-05	1.29E-04	2.67E-04	9.01E-04
INVERT		1.50E-03	1.34E-03	1.07E-03	2.75E-05	2.19E-04	4.21E-04	1.47E-03
SHORELINE	4.24E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03	3.61E-03
SWIMMING		2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06	2.81E-06
BOATING		1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06	1.40E-06
TOTAL	4.24E-03	6.01E-03	5.85E-03	5.19E-03	3.67E-03	3.96E-03	4.30E-03	5.98E-03

SHOREWIDTH FACTOR=0.5

USAGE (KG/YR,HR/YR)

FISH	29.2	DILUTION	30.0	TIME(HR)	24.00
INVERT	7.3		30.0		24.00
SHORELINE	500.0		30.0		0.00
SWIMMING	100.0		30.0		0.00
BOATING	100.0		30.0		0.00

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
RADIATION DOSES FROM LIQUID EFFLUENTSRUN DATE: 02/11/92  
RUN TIME: 08:36:23TOTAL INTEGRATED AND RECREATION POPULATION DOSES FROM LIQUID EFFLUENTS  
(PERSON-REM)

PATHWAY	BONE	LIVER	TOTAL BODY	THYROID	KIDNEY	LUNG	GI-LLI	SKIN
SPORT FISH	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
COM FISH	1.209E-04	1.680E-04	8.303E-05	3.895E-06	2.825E-05	4.564E-05	5.236E-04	0.000E+00
SPORT INVERT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
COM INVERT	3.410E-06	4.072E-06	2.748E-06	3.785E-08	7.859E-07	1.163E-06	1.390E-05	0.000E+00
DRINKING WATER	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
SHORELINE	3.894E-03	3.894E-03	3.894E-03	3.894E-03	3.894E-03	3.894E-03	3.894E-03	4.581E-03
SWIMMING	7.996E-06	7.996E-06	7.996E-06	7.996E-06	7.996E-06	7.996E-06	7.996E-06	0.000E+00
BOATING	3.787E-06	3.787E-06	3.787E-06	3.787E-06	3.787E-06	3.787E-06	3.787E-06	0.000E+00
IRRI VEG	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IRRI LEAFY VEG	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IRRI MILK	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
IRRI MEAT	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00	0.000E+00
ALL PATHWAYS	4.031E-03	4.078E-03	3.992E-03	3.910E-03	3.935E-03	3.953E-03	4.444E-03	4.581E-03

## Enclosure 2

### Annual Gaseous Dose Assessment

#### INCLUDED ARE:

Source term for the three release modes and the site aggregate

Total 50 mile Integrated Population Dose by pathways and organs

Hypothetical maximum individual organ dose due to Iodines, Particulates, and Tritium for a cow milk pathway at 4.75 miles Northeast.

Maximum site boundary dose by age group and organs for all pathways.

Estimated individual organ dose using the 1991 Land Use Census for the worst sector and existing pathways.

Maximum site boundary dose due to Iodines, Particulates, and Tritium for existing pathways.

CP&L  
GASRPT

SEI AL RADIOLOGICAL EFFLUENT REPORTING  
INPUT SOURCE TERMS

RUN DATE: 02/11/92  
RUN TIME: 12:54:09

THIS 1991 SOURCE TERM (GROUND LEVEL) BSEP UNITS 1 AND 2

1 H - 3	3.440E+00
25 MN- 54	1.030E-06
27 CO- 57	1.000E-08
27 CO- 60	7.260E-06
36 KR- 85	5.880E-05
38 SR- 89	5.750E-06
44 RU-103	4.840E-08
53 I -131	2.880E-04
53 I -132	7.160E-05
53 I -133	8.390E-04
53 I -135	2.100E-04
54 XE-133	7.340E+00
54 XE-135	7.690E+00
56 BA-140	5.720E-06
57 LA-140	5.040E-06
58 CE-141	8.570E-08
58 CE-144	1.490E-06



RUN DATE: 02/11/92  
RUN TIME: 12:54:09

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
INPUT SOURCE TERMS

CP&L  
GASRPT

1991 SOURCE TERM (MIXED MODE) BSEP UNITS 1&2

1 H - 3	5.260E+00
24 CR- 51	2.760E-03
25 MN- 54	1.170E-03
26 FE- 59	7.410E-05
27 CO- 57	1.100E-06
27 CO- 58	3.200E-04
27 CO- 60	2.830E-03
36 KR- 88	5.040E-01
38 SR- 89	6.180E-06
38 SA- 90	4.320E-07
51 SB-124	1.680E-05
53 I -131	2.780E-03
53 I -132	2.680E-02
53 I -133	2.130E-02
53 I -134	4.850E-03
53 I -135	3.150E-02
54 KE-133	4.070E+01
54 KE-133 M	1.630E-01
54 KE-135	8.130E+01
54 KE-135 M	1.430E+01
55 CS-137	1.600E-05
56 BA-140	9.680E-06
57 LA-140	4.180E-06
58 CE-141	1.450E-06

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
INPUT SOURCE TERMS

RUN DATE: 02/11/92  
RUN TIME: 12:54:09

CP&L  
GASRPT

1991 SOURCE TERM (ELEVATED MODE) BSEP UNITS 182

1 H - 3	1.070E+01
18 AR - 41	1.330E+01
24 CR - 51	3.220E-04
25 MN - 54	2.490E-05
27 CO - 57	7.430E-07
27 CO - 58	4.350E-05
27 CO - 60	2.390E-04
36 KR - 85	6.520E+01
36 KR - 87	1.340E+01
36 KR - 88	6.630E+01
38 SR - 89	6.120E-04
38 SR - 90	2.420E-06
52 TE - 129	3.430E-05
53 I - 131	6.620E-03
53 I - 132	3.710E-03
53 I - 133	1.420E-02
53 I - 135	8.810E-03
54 XE - 133	2.070E+02
54 XE - 135	7.670E+01
54 XE - 135	2.650E+01
54 XE - 137	3.330E+01
54 XE - 138	2.080E+01
55 CS - 137	6.610E-05
56 BA - 140	8.360E-04
57 LA - 140	1.380E-03
58 CE - 141	8.360E-07
58 CE - 144	5.240E-06

AGGREGATE SOURCE TERM

1 H - 3	1.9420E+01
18 AR - 41	1.3300E+01
24 CR - 51	3.0820E-03
25 MN - 54	1.1959E-03
26 FE - 59	7.4100E-03
27 CO - 57	1.8555E-06
27 CO - 58	3.2435E-04
27 CO - 60	3.0763E-03
36 KR - 85	5.8800E-05
36 KR - 87	6.5200E+01
36 KR - 88	1.3400E+01
38 SR - 89	6.6804E+01
38 SR - 90	6.2393E-04
44 RU - 103	2.8520E-06
51 SB - 124	4.8400E-08
52 TE - 129	1.6800E-05
53 I - 131	3.4300E-05
53 I - 132	9.6880E-03
53 I - 133	3.0582E-02
53 I - 134	3.6339E-02
53 I - 135	4.8500E-03
54 XE - 133	4.0520E-02
54 XE - 135	2.5504E+02
54 XE - 137	1.6300E-01
54 XE - 138	1.6569E+02
55 CS - 137	4.0800E+01
56 BA - 140	3.3300E+01
57 LA - 140	2.0800E+01
58 CE - 141	8.2100E-05
58 CE - 144	8.5140E-04

1.3892E-03  
2.3717E-06  
6.7300E-06

57 LA-140  
58 CE-141  
58 CE-144

RUN DATE: 02/11/92  
 RUN TIME: 12:54:09

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
 ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (MANREM)

CP&L  
 GASRPT

THIS 1991 SOURCE TERM (GROUND LEVEL) BSEP UNITS 1 AND 2  
 1991 SOURCE TERM (MIXED MODE) BSEP UNITS 1&2  
 1991 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
** TOTAL **	2.736E-02	2.758E-02	2.538E-02	2.738E-02	2.739E-02	4.531E-02	2.842E-02	5.137E-02
PLUME	1.716E-02 62.73%	1.716E-02 62.21%	1.716E-02 67.62%	1.716E-02 62.68%	1.716E-02 62.65%	1.716E-02 37.87%	1.747E-02 61.48%	3.989E-02 77.66%
GROUND PLANE	7.815E-03 28.57%	7.815E-03 28.33%	7.815E-03 30.80%	7.815E-03 28.55%	7.815E-03 28.53%	7.815E-03 17.25%	7.815E-03 27.50%	9.193E-03 17.90%
INHALATION	1.680E-03 6.14%	1.734E-03 6.29%	4.450E-05 0.18%	1.706E-03 6.23%	1.730E-03 6.32%	9.567E-03 21.12%	2.506E-03 8.82%	1.659E-03 3.23%
VEGETATION	6.345E-04 2.32%	7.844E-04 2.84%	3.504E-04 1.38%	6.293E-04 2.30%	6.213E-04 2.27%	9.913E-03 21.88%	5.649E-04 1.99%	5.626E-04 1.10%
COW MILK	1.647E-05 0.06%	1.602E-05 0.06%	3.349E-06 0.01%	1.764E-05 0.06%	1.838E-05 0.07%	6.194E-04 1.37%	1.506E-05 0.05%	1.497E-05 0.03%
MEAT & POULTRY	4.862E-05 0.18%	7.305E-05 0.26%	3.400E-06 0.01%	4.719E-05 0.17%	4.623E-05 0.17%	2.341E-04 0.52%	4.391E-05 0.15%	4.373E-05 0.09%

CP&L  
GASPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/11/92  
RUN TIME: 15:22:51

1991 SOURCE TERM (ELEVATED MODE) BSEP UNITS 18.2  
THIS 1991 SOURCE TERM (GROUND LEVEL) BSEP UNITS 1 AND 2  
1991 SOURCE TERM (MIXED MODE) BSEP UNITS 18.2

SPECIAL LOCATION METERS DIR PL GR IN V CM GM M  
#41 COW MILK 7644.0 NE 0 1 1 1 1 0 0

ANNUAL BETA AIR DOSE = 1.213E-03 MILLIRADS  
ANNUAL GAMMA AIR DOSE = 1.578E-03 MILLIRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	7.938E-04	8.763E-04	6.764E-04	7.990E-04	8.009E-04	7.162E-03	7.879E-04	8.649E-04
GROUND PLANE	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	6.974E-04
INHALATION	4.974E-05	5.188E-05	1.396E-06	5.064E-05	5.149E-05	2.893E-04	7.536E-05	4.906E-05
VEGETATION	1.090E-04	1.895E-04	6.289E-05	1.059E-04	9.955E-05	1.528E-03	8.922E-05	8.856E-05
COW MILK	4.210E-05	4.198E-05	1.928E-05	4.958E-05	5.701E-05	4.752E-03	3.040E-05	2.989E-05
TEENAGER	8.279E-04	9.040E-04	7.194E-04	8.430E-04	8.463E-04	9.771E-03	8.236E-04	8.871E-04
GROUND PLANE	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	6.974E-04
INHALATION	5.026E-05	5.229E-05	1.757E-06	5.152E-05	5.270E-05	3.504E-04	8.809E-05	4.937E-05
VEGETATION	1.275E-04	2.046E-04	8.988E-05	1.247E-04	1.134E-04	1.297E-03	1.026E-04	1.014E-04
COW MILK	5.724E-05	5.421E-05	3.484E-05	7.382E-05	8.729E-05	7.521E-03	3.999E-05	3.894E-05
CHILD	9.339E-04	9.353E-04	8.785E-04	9.537E-04	9.551E-04	1.791E-02	8.901E-04	9.596E-04
GROUND PLANE	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	6.974E-04
INHALATION	4.466E-05	4.506E-05	2.274E-06	4.573E-05	4.675E-05	4.185E-04	7.522E-05	4.366E-05
VEGETATION	2.036E-04	2.246E-04	1.993E-04	1.930E-04	1.775E-04	1.984E-03	1.586E-04	1.570E-04
COW MILK	9.281E-05	7.279E-05	8.409E-05	1.222E-04	1.419E-04	1.492E-02	6.313E-05	6.152E-05
INFANT	7.684E-04	7.225E-04	7.573E-04	8.545E-04	8.527E-04	3.716E-02	7.353E-04	8.159E-04
GROUND PLANE	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	5.929E-04	6.974E-04
INHALATION	2.578E-05	2.565E-05	1.622E-06	2.695E-05	2.712E-05	3.678E-04	4.611E-05	2.511E-05
COW MILK	1.487E-04	1.040E-04	1.628E-04	2.246E-04	2.327E-04	3.620E-02	9.626E-05	9.334E-05

SPECIAL LOCATION	METERS DIR	PL	GR	IN	V	CM	GM	M
3 SITE BOUNDARY	1127.0	NE	1	1	1	1	1	1

ANNUAL BETA AIR DOSE = 6.389E-03 MILLIRADS

ANNUAL GAMMA RAY DOSE	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	1.556E-02	1.298E-02	1.577E-02	1.589E-02	1.875E-01	1.498E-02	2.113E-02
PLUME	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.848E-03	8.730E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.861E-04	5.239E-06	6.845E-04	6.886E-04	1.809E-03	7.344E-04	6.785E-04
VEGETATION	1.485E-03	2.541E-03	1.450E-03	1.376E-03	2.188E-02	1.232E-03	1.725E-03
COW MILK	5.794E-04	2.560E-04	6.841E-04	7.985E-04	6.817E-02	4.194E-04	1.134E-04
GOAT MILK	1.097E-03	4.345E-04	1.255E-03	1.336E-03	8.215E-02	8.608E-04	5.433E-04
MEAT & POULTRY	2.200E-04	2.406E-05	2.071E-04	1.958E-04	1.972E-03	1.775E-04	1.760E-04
TEENAGER	1.629E-02	1.386E-02	1.686E-02	1.708E-02	2.714E-01	1.553E-02	2.162E-02
PLUME	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.848E-03	8.730E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.863E-04	7.237E-06	6.915E-04	6.967E-04	2.132E-03	7.658E-04	6.828E-04
VEGETATION	1.734E-03	1.097E-03	1.701E-03	1.564E-03	1.856E-02	1.416E-03	1.402E-03
COW MILK	7.912E-04	4.628E-04	1.018E-03	1.225E-03	1.079E-01	5.508E-04	5.385E-04
GOAT MILK	1.447E-03	7.849E-04	1.828E-03	1.977E-03	1.299E-01	1.135E-03	1.098E-03
MEAT & POULTRY	1.384E-04	1.973E-05	1.296E-04	1.213E-04	1.406E-03	1.063E-04	1.050E-04
CHILD	1.861E-02	1.698E-02	1.958E-02	1.984E-02	5.159E-01	1.721E-02	2.329E-02
PLUME	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.848E-03	8.730E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.077E-04	9.656E-06	6.123E-04	6.168E-04	2.337E-03	6.718E-04	6.038E-04
VEGETATION	2.766E-03	2.434E-03	2.629E-03	2.393E-03	2.839E-02	2.193E-03	2.172E-03
COW MILK	1.289E-03	1.118E-03	1.685E-03	1.993E-03	2.140E-01	8.697E-04	8.508E-04
GOAT MILK	2.279E-03	1.893E-03	3.006E-03	3.196E-03	2.570E-01	1.791E-03	1.736E-03
MEAT & POULTRY	1.771E-04	3.609E-05	1.575E-04	1.479E-04	2.091E-03	1.284E-04	1.268E-04
INFANT	1.751E-02	1.724E-02	2.060E-02	2.027E-02	1.157E+00	1.601E-02	2.207E-02
PLUME	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.785E-03	3.848E-03	8.730E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	3.499E-04	6.873E-06	3.548E-04	3.557E-04	1.935E-03	3.934E-04	3.472E-04
COW MILK	2.085E-03	2.182E-03	3.248E-03	3.271E-03	5.193E-01	1.325E-03	1.291E-03
GOAT MILK	3.586E-03	3.561E-03	5.506E-03	5.154E-03	2.43E-01	2.734E-03	2.633E-03

CP&L  
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/11/92  
RUN TIME: 12:54:09

THIS 1991 SOURCE TERM (GROUND LEVEL) BSEP UNITS 1 AND 2  
1991 SOURCE TERM (MIXED MODE) BSEP UNITS 1&2  
1991 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2

SPECIAL LOCATION METERS DIR PL GR IN V CM CM M  
#24 RESIDENCE 1609.0 SW 1 1 1 0 0 0

ANNUAL BETA AIR DOSE = 2.597E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 2.505E-03 MILLRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	5.021E-03	5.368E-03	4.470E-03	5.009E-03	4.986E-03	1.264E-02	4.974E-03	7.391E-03
PLUME	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.678E-03	3.672E-03
GROUND PLANE	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.959E-03
INHALATION	2.721E-04	2.740E-04	2.093E-06	2.735E-04	2.749E-04	7.094E-04	2.883E-04	2.711E-04
VEGETATION	5.811E-04	9.259E-04	3.004E-04	5.680E-04	5.430E-04	7.759E-03	4.924E-04	4.894E-04
TEENAGER	5.118E-03	5.450E-03	4.600E-03	5.109E-03	5.064E-03	1.160E-02	5.058E-03	7.464E-03
PLUME	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.678E-03	3.672E-03
GROUND PLANE	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.959E-03
INHALATION	2.741E-04	2.759E-04	2.883E-06	2.761E-04	2.780E-04	8.329E-04	2.985E-04	2.728E-04
VEGETATION	6.761E-04	1.007E-03	4.296E-04	6.651E-04	6.180E-04	6.601E-03	5.657E-04	5.603E-04
CHILD	5.484E-03	5.571E-03	5.126E-03	5.441E-03	5.361E-03	1.517E-02	5.332E-03	7.740E-03
PLUME	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.678E-03	3.672E-03
GROUND PLANE	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.959E-03
INHALATION	2.427E-04	2.427E-04	3.832E-06	2.440E-04	2.461E-04	9.088E-04	2.624E-04	2.413E-04
VEGETATION	1.073E-03	1.161E-03	9.545E-04	1.029E-03	9.470E-04	1.009E-02	8.759E-04	8.678E-04
INFANT	4.308E-03	4.307E-03	4.170E-03	4.309E-03	4.310E-03	4.918E-03	4.347E-03	6.769E-03
PLUME	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.652E-03	1.678E-03	3.672E-03
GROUND PLANE	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.515E-03	2.959E-03
INHALATION	1.398E-04	1.393E-04	2.703E-06	1.416E-04	1.419E-04	7.502E-04	1.535E-04	1.387E-04

CP&L  
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING  
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/11/92  
RUN TIME: 12:54:09

THIS 1991 SOURCE TERM (GROUND LEVEL) BSEP UNITS 1 AND 2  
1991 SOURCE TERM (MIXED MODE) BSEP UNITS 1&2  
1991 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2

SPECIAL LOCATION METERS DIR PL GR IN V CM GM M  
# 3 SITE BOUNDARY 1127.0 NE 0 1 1 0 0 0 0

ANNUAL BETA AIR DOSE = 6.389E-03 MILLRADS  
ANNUAL GAMMA AIR DOSE = 5.751E-03 MILLRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	8.389E-03	8.394E-03	7.713E-03	8.393E-03	8.397E-03	9.518E-03	8.443E-03	9.746E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.811E-04	6.861E-04	5.239E-06	6.849E-04	6.886E-04	1.809E-03	7.344E-04	6.785E-04
TEENAGER	8.394E-03	8.399E-03	7.715E-03	8.400E-03	8.405E-03	9.840E-03	8.474E-03	9.750E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.863E-04	6.908E-04	7.237E-06	6.915E-04	6.967E-04	2.132E-03	7.658E-04	6.828E-04
CHILD	8.316E-03	8.316E-03	7.718E-03	8.321E-03	8.325E-03	1.005E-02	8.380E-03	9.671E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	6.077E-04	6.077E-04	9.656E-06	6.123E-04	6.168E-04	2.337E-03	6.718E-04	6.039E-04
INFANT	8.058E-03	8.057E-03	7.715E-03	8.063E-03	8.064E-03	9.643E-03	8.102E-03	9.414E-03
GROUND PLANE	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	7.708E-03	9.067E-03
INHALATION	3.499E-04	3.487E-04	6.873E-06	3.548E-04	3.557E-04	1.935E-03	3.934E-04	3.472E-04



ATTACHMENT 8

Off-Site Dose Calculation Manual (ODCM) and  
Process Control Program (PCP) Revisions

July 1, to December 31, 1991

Brunswick Steam Electric Plant

There were no revisions made to the Process Control Program during this reporting period.

Revisions 12 and 13 were made to the Off-Site Dose Calculational Manual during this time period.

1. In revision 12, Page 3-30 of the ODCM was revised to update the table with the results of the latest Land Use Census.
2. In revision 13, Page E-1 of the ODCM was revised per Plant Modification to change the Liquid Effluent Flow Rate Measurement Devise.

A copy of Revisions 12 and 13 to the ODCM are included as a part of this attachment.

ATTACHMENT A

REQUEST FOR OFF SITE DOSE CALCULATION MANUAL CHANGE

Originator: J.W. Davis Date: 9-11-91 Rev. 12

Pages and Sections Revised: Cover page, page i (List of Effective Pages),  
page 3-30

Reason for Change: Table 3.2-2 was updated to be consistent  
with the results of the most recent Land Use Census.

Safety Analysis Complete: J.W. Davis Date: 9-11-91

REVIEWS:

J.W. Davis Recommended/Not Recommended Date: 9-11-91  
1st Safety Reviewer

Susan Thompson Recommended/Not Recommended Date: 9/16/91  
2nd Safety Reviewer

J.W. Davis Recommended/Not Recommended Date: 9-11-91  
E&C Project Specialist

Ray Tate Recommended/Not Recommended Date: 9-18-91  
Operations - Special Projects

Ken White Recommended/Not Recommended Date: 9-19-91  
E&C Manager

APPROVALS:

[Signature] Recommended/Not Recommended Date: 9-20-91  
Manager - E&RC

[Signature] Recommended/Not Recommended Date: 9-26-91  
PNSC Chairman

[Signature] Recommended/Not Recommended Date: 9/27/91  
Plant General Manager

REVISION 2

10CFR50.59 PROGRAM MANUAL  
ATTACHMENT A  
CP&L SAFETY REVIEW PACKAGE  
SAFETY REVIEW COVER SHEET

Page 59

Page 1 of 8DOCUMENT NO. ODCMREV. NO. 12DESCRIPTION OF TITLE: OFFSITE DOSE CALCULATION MANUAL

## 1. Assigned Responsibilities:

Safety Analysis Preparer:

Lead 1st Safety Reviewer:

2nd Safety Reviewer:

## 2. Safety Analysis Preparer: Complete PART I. SAFETY ANALYSIS

Safety Analysis Preparer

SIGNATURE

9-11-91  
DATE

## 3. Lead 1st Safety Reviewer: Complete Part II. Item Classification.

## 4. Lead 1st Safety Reviewer: Part III may be completed. If either question 1 or 2 is 'yes,' then Part IV is not required.

## 5. Lead 1st Safety Reviewer: Determine which DISCIPLINES are required for review of this item (including own) and mark the appropriate block(s) below.

## DISCIPLINES Required:

(Print Name)

Signature/Date (Step 7)

☐ Nuclear Plant Operations☐ Nuclear Engineering☐ Mechanical☐ Electrical☐ Instrumentation & Control☐ Structural☐ Metallurgy☒ Chemistry/Radiochemistry☐ Health Physics☐ Administrative Controls

## 6. A QUALIFIED SAFETY REVIEWER will be assigned for each DISCIPLINE marked in step 5 and his/her name printed in the space provided. Each person listed shall perform a SAFETY REVIEW and provide input into the Safety Review Package.

## 7. The Lead 1st Safety Reviewer will assure that a Part III or Part IV is completed (see step 4 above) and a Part VI if required (see 9.b of Part II). Each person listed in step 5 shall sign and date next to his/her name in step 5, indicating completion of a SAFETY REVIEW.

## 8. 2nd Safety Reviewer: Perform a SAFETY REVIEW in accordance with Section 8.0.

2nd Safety Reviewer

Date 9/16/91

DISCIPLINE:

## 9. PNSC review required? If "yes" attach Part V and mark reason below:

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

☐ Potential UNREVIEWED SAFETY QUESTION☐ Question 9 of Part IV answered "Yes"☒ Other (specify): ODCM requires PNSC review

ATTACHMENT 2 (Cont'd)

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PART I: SAFETY ANALYSIS  
(See instructions in Section 8.4.1)  
(Attach additional sheets as necessary)

DOCUMENT NO. ODCM REV. NO. 12

DESCRIPTION OF CHANGE: Updated Table 3.2-2 on page 3-30 to be  
consistent with the most recent Land Use Census. Changed nearest  
resident in SSE to 1.0 mile, changed nearest garden in W to 0.8 mile  
and nearest garden in NW to 0.9 mile.

ANALYSIS: Updating Table 3.2-2 "DISTANCE TO CONTROLLING  
LOCATIONS AS MEASURED FROM THE BRUNSWICK PLANT CENTER (mi.)"  
is administrative in nature and does not effect  
any system structure or component that is important  
to safety. Updating this Table allows for a more  
accurate estimation of dose to the public resulting from  
radioactive liquid and gaseous effluents from the plant.

REFERENCES:

FSAR Index, Table of Contents, Section 15, Section 12

ODCM

Tech Specs Index, 3/4.11.1, 3/4.11.2, 3/4.12.2, 6.13

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## PART II: ITEM CLASSIFICATION

DOCUMENT NO. OPCMREV. NO. 12

- |  | Yes                                 | No                                  |
|--|-------------------------------------|-------------------------------------|
| 1. Does this item represent:   |                                     |                                     |
| a. A change to the facility as described in the SAFETY ANALYSIS REPORT?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b. A change to the procedures as described in the SAFETY ANALYSIS REPORT?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c. A test or experiment not described in the SAFETY ANALYSIS REPORT?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 2. Does this item involve a change to the individual plant Operating License or to its Technical Specifications?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 3. Does this item require a revision to the FSAR?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 4. Does this item involve a change to the Offsite Dose Calculation Manual?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 5. Does this item constitute a change to the Process Control Program?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 6. Does this item involve a major change to a Radwaste Treatment System?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 7. Does this item involve a change to the Technical Specification Equipment List?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8. Does this item impact the NPDES Permit (all 3 sites) or constitute an "unreviewed environmental question" (SHNPP Environmental Plan, Section 3.1) or a "significant environmental impact" (BSEP)? | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9. Does this item involve a change to a previously accepted:   |                                     |                                     |
| a. Quality Assurance Program   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b. Security Plan (including Training, Qualification, and Contingency Plans)?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c. Emergency Plan?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d. Independent Spent Fuel Storage Installation license? (If "yes," refer to Section 8.4.2, "Question 9," for special considerations. Complete Part VI in accordance with Section 8.4.6)              | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

SEE SECTION 8.4.2 FOR INSTRUCTIONS FOR EACH "YES" ANSWER.

REFERENCES. List FSAR and Technical Specification references used to answer questions 1-9 above. Identify specific reference sections used for any "Yes" answer.

OPCMFSAR Index, Table of Contents, Section 15Test Specs Index, Section 6



ATTACHMENT 2 (Cont'd)

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PART III: UNREVIEWED SAFETY QUESTION DETERMINATION SCREEN

DOCUMENT NO. ODCM

REV. NO. 12

Yes No

1. Is this change fully addressed by another completed UNREVIEWED SAFETY QUESTION determination? (See Sections 7.2.1, 7.2.5, and 7.9.1.1)

☐ ☒

REFERENCE DOCUMENT: \_\_\_\_\_

REV. \_\_\_\_\_

Yes No

2. For procedures, is the change a non-intent change which only (check all that apply): (See Section 7.2.2.3)

☐ ☒

- ☐ Corrects typographical errors which do not alter the meaning or intent of the procedure; or,
- ☐ Adds or revises steps for clarification (provided they are consistent with the original purpose or applicability of the procedure); or,
- ☐ Changes the title of an organizational position; or,
- ☐ Changes names, addresses, or telephone numbers of persons; or,
- ☐ Changes the designation of an item of equipment where the equipment is the same as the original equipment or is an authorized replacement; or,
- ☐ Changes a specified tool or instrument to an equivalent substitute; or,
- ☐ Changes the format of a procedure without altering the meaning, intent, or content; or,
- ☐ Deletes a part or all of a procedure, the deleted portions of which are wholly covered by approved plant procedures?

If the answer to either Question 1 or Question 2 in PART III is "Yes," then PART IV need not be completed.

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## PART IV: UNREVIEWED SAFETY QUESTION DETERMINATION

DOCUMENT NO. ODCMREV. NO. 12

Using the SAFETY ANALYSIS developed for the change, test or experiment, as well as other required references (LICENSING BASIS DOCUMENTATION, Design Drawings, Design Basis Documents, codes, etc.), the preparer of the Unreviewed Safety Question Determination must directly answer each of the following seven questions and make a determination of whether an UNREVIEWED SAFETY QUESTION exists.

## A WRITTEN BASIS IS REQUIRED FOR EACH ANSWER

- |  | Yes                      | No                                  |
|--|--------------------------|-------------------------------------|
| 1. May the proposed activity increase the probability of occurrence of an accident evaluated previously in the SAFETY ANALYSIS REPORT?<br><u>See Attached</u>                                    | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2. May the proposed activity increase the consequences of an accident evaluated previously in the SAFETY ANALYSIS REPORT?<br><u>See Attached</u>   | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 3. May the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety evaluated previously in the SAFETY ANALYSIS REPORT?<br><u>See Attached</u> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 4. May the proposed activity increase the consequence of a malfunction of equipment important to safety evaluated previously in the SAFETY ANALYSIS REPORT?<br><u>See Attached</u>               | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 5. May the proposed activity create the possibility of an accident of a different type than any evaluated previously in the SAFETY ANALYSIS REPORT?<br><u>See Attached</u>                       | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

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PART IV: (Continued)

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Yes No

6. May the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any evaluated previously in the SAFETY ANALYSIS REPORT?

☐ ☒*See Attached*

7. Does the proposed activity reduce the margin of safety as defined in the basis of any Technical Specification?

☐ ☒*See Attached*

8. Based on the answers to questions 1 - 7, does this item result in an UNREVIEWED SAFETY QUESTION? If the answer to any of the questions 1-7 is "Yes", then the item is considered to constitute an UNREVIEWED SAFETY QUESTION.

☐ ☒

9. Is PNSC review required for any of the following reasons?

☐ ☒

If, in answering question 1 or 3 "No," it was determined that the probability increase was small relative to the uncertainties; or, in answering question 2 or 4 "No," it was determined that the doses increased, but the dose was still less than the NRC ACCEPTANCE LIMIT; or, in answering question 7 "No," a parameter would be closer to the NRC ACCEPTANCE LIMIT, but the end result was still within the NRC ACCEPTANCE LIMIT; then PNSC review is required.

## REFERENCES:

OFFSITE DOSE CALCULATION MANUALFSAR Index, Table of Contents, Section 11, Section 15, Section 12Technical Specifications Index, Section 3/4.11.1, 3/4.11.2,3/4.12.2, 6.9, 6.13, and Bases

This Unreviewed Safety Question Determination is for the following DISCIPLINE(s):  
(Additional Part IV forms may be included as appropriate.)

- ☐ Nuclear Plant Operations  
☐ Nuclear Engineering  
☐ Mechanical  
☐ Electrical  
☐ Instrumentation & Control

- ☐ Structural  
☐ Metallurgy  
☒ Chemistry/Radiochemistry  
☐ Health Physics  
☐ Administrative Controls



UNREVIEWED SAFETY QUESTION DETERMINATION  
OFF-SITE DOSE CALCULATION MANUAL  
REVISION 12

1. THIS REVISION TO THE ODCM DOES NOT EFFECT ANY INITIATING SYSTEMS, STRUCTURES, OR COMPONENTS. THE CHANGES MADE WERE TO UPDATE TABLE 3.2-2 DISTANCE TO CONTROLLING LOCATIONS AS MEASURED FROM THE BRUNSWICK PLANT CENTER (MI) AS INDICATED BY THE 1990 LAND USE CENSUS. IMPLEMENTATION OF THIS REVISION WILL NOT INCREASE THE PROBABILITY OF ANY ACCIDENT PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT.
2. THESE CHANGES TO THE ODCM DO NOT ALTER OR CHANGE THE INITIAL CONDITIONS OF ANY ACCIDENT OR EFFECT MITIGATING SYSTEMS, STRUCTURES, OR COMPONENTS. THEREFORE, THE CHANGES WILL NOT INCREASE THE CONSEQUENCES OF ANY ACCIDENT PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT.
3. UPDATING THE ODCM WITH THE MOST RECENT LAND USE CENSUS RESULTS DOES NOT EFFECT THE PERFORMANCE OR OPERATION OF ANY IMPORTANT TO SAFETY EQUIPMENT AND WILL NOT INCREASE THE PROBABILITY OF OCCURRENCE OF MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT.
4. IMPORTANT TO SAFETY EQUIPMENT IS NOT EFFECTED BY THIS PROCEDURE AND THEREFORE THE CONSEQUENCE OF A MALFUNCTION OF IMPORTANT TO SAFETY EQUIPMENT WILL NOT BE INCREASED.
5. IMPLEMENTATION OF THIS CHANGE WILL NOT CREATE THE POSSIBILITY OF AN ACCIDENT OF A DIFFERENT TYPE THAN PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT. THE CHANGE TO TABLE 3.2-2 CHANGES THE LOCATION OF THE NEAREST RESIDENT IN ONE SECTOR AND THE NEAREST GARDEN IN TWO SECTORS.
6. THE CHANGES DO NOT EFFECT ANY EQUIPMENT IMPORTANT TO SAFETY AND THEREFORE WILL NOT CREATE THE POSSIBILITY OF A MALFUNCTION OF EQUIPMENT IMPORTANT TO SAFETY OF A DIFFERENT TYPE THAN PREVIOUSLY EVALUATED IN THE SAFETY ANALYSIS REPORT.
7. ALTHOUGH THE ODCM IS REFERENCED IN SEVERAL SECTIONS OF THE TECHNICAL SPECIFICATIONS, THESE CHANGES WILL NOT REDUCE THE MARGIN OF SAFETY AS DEFINED IN THE TECHNICAL SPECIFICATIONS.

BRUNSWICK STEAM ELECTRIC PLANT  
OFF-SITE DOSE CALCULATION MANUAL  
(ODCM)

REVISION 12

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CAROLINA POWER & LIGHT COMPANY

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TABLE 3.2-2

DISTANCE TO CONTROLLING LOCATIONS AS MEASURED FROM THE  
BRUNSWICK PLANT CENTER (M1)

<u>Sector</u>	<u>Site Boundary</u>	<u>Milk Cow</u>	<u>Milk Goat</u>	<u>Meat Animal</u>	<u>Nearest Resident</u>	<u>Nearest Garden</u>
NNE	0.7	-	-	-	1.2	1.2
NE	0.7	4.75*	-	-	-	-
ENE	0.7	-	-	-	-	-
E	0.7	-	-	-	-	-
ESE	0.7	-	-	-	1.6	-
SE	0.7	-	-	-	0.9	-
SSE	0.7	-	-	-	1.0	-
S	0.8	-	-	-	1.5	1.6
SSW	0.8	-	-	-	1.2	1.5
SW	0.7	-	-	-	1.0	1.0
WSW	0.7	-	-	-	1.1	1.1
W	0.7	-	-	-	0.8	0.8
WNW	0.6	-	-	-	0.9	0.9
NW	0.6	-	-	-	0.9	0.9
NNW	0.6	-	-	-	0.8	4.8
N	0.7	-	-	-	0.9	-

\* A "hypothetical" cow milk pathway is located at this point in accordance with 5.3.1 of NUREG 0133.

ATTACHMENT A

REQUEST FOR OFF SITE DOSE CALCULATION MANUAL CHANGE

Originator: Susan Fitzpatrick Date: 11/14/91 Rev. 13

Pages and Sections Revised: Cover sheet, i, ii pg E-1

Reason for Change: Update effluent monitoring instrumentation  
numbers per plant dtd 91-040.

Safety Analysis Complete: Susan Fitzpatrick Date: 11/19/91

REVIEWS:

Susan Fitzpatrick Recommended/Not Recommended Date: 11/21/91  
1st Safety Reviewer

Jim Davis Recommended/Not Recommended Date: 11-25-91  
2nd Safety Reviewer

Jim Davis Recommended/Not Recommended Date: 11-25-91  
E&C Project Specialist

Rayford, Pete Recommended/Not Recommended Date: 11-26-91  
Operations - Special Projects

Ken White Recommended/Not Recommended Date: 12/2/91  
E&C Manager

APPROVALS:

[Signature] Recommended/Not Recommended Date: 12/2/91  
Manager - E&RC

[Signature] Recommended/Not Recommended Date: 12/5/91  
PNSG Chairman

[Signature] Recommended/Not Recommended Date: 12/5/91  
Plant General Manager

REVISION 2

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SAFETY REVIEW COVER SHEET

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Page 1 of 5DOCUMENT NO. ODCMREV. NO. 13DESCRIPTION OF TITLE: Radon Dose Calculation Manual

## 1. Assigned Responsibilities:

Safety Analysis Preparer:

Susan Fitzpatrick

Lead 1st Safety Reviewer:

Susan Fitzpatrick

2nd Safety Reviewer:

J. W. Davis

## 2. Safety Analysis Preparer: Complete PART I, SAFETY ANALYSIS

Safety Analysis Preparer

Susan Fitzpatrick  
SIGNATURE11/19/91  
DATE

## 3. Lead 1st Safety Reviewer: Complete Part II, Item Classification.

## 4. Lead 1st Safety Reviewer: Part III may be completed. If either question 1 or 2 is "yes," then Part IV is not required.

## 5. Lead 1st Safety Reviewer: Determine which DISCIPLINES are required for review of this item (including own) and mark the appropriate block(s) below.

## DISCIPLINES Required:

(Print Name)

Signature/Date (Step 7)

☐ Nuclear Plant Operations☐ Nuclear Engineering☐ Mechanical☐ Electrical☐ Instrumentation & Control☐ Structural☐ Metallurgy☒ Chemistry/Radiochemistry☐ Health Physics☐ Administrative ControlsSusan FitzpatrickSusan Fitzpatrick 11/19/91

## 6. A QUALIFIED SAFETY REVIEWER will be assigned for each DISCIPLINE marked in step 5 and his/her name printed in the space provided. Each person listed shall perform a SAFETY REVIEW and provide input into the Safety Review Package.

## 7. The Lead 1st Safety Reviewer will assure that a Part III or Part IV is completed (see step 4 above) and a Part VI if required (see 9.b of Part II). Each person listed in step 5 shall sign and date next to his/her name in step 5, indicating completion of a SAFETY REVIEW.

## 8. 2nd Safety Reviewer: Perform a SAFETY REVIEW in accordance with Section 8.0.

2nd Safety Reviewer

J. W. Davis  
Chemistry / RadiochemistryDate 11-25-91

DISCIPLINE:

Yes ☒ No ☐

## 9. PNRC review required? If "yes" attach Part V and mark reason below:

☐ Potential UNREVIEWED SAFETY QUESTION☐ Question 9 of Part IV answered "Yes"☒ Other (specify): ODCM changes require PNRC review.



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PART I: SAFETY ANALYSIS  
(See instructions in Section 8.4.1)  
(Attach additional sheets as necessary)

DOCUMENT NO. ODCM REV. NO. 13

DESCRIPTION OF CHANGE: Update effluent monitoring  
instrumentation numbers per plant Mod. 91-040.

ANALYSIS: Plant Mod 91-040 is replacing the flow  
instrumentation for the radwaste liquid effluent  
pathways. The low and high flow rate integrators  
are being replaced with one that covers the  
whole range. Instrument numbers in the ODCM  
for Tech Spec instruments remained the same  
however the low flow rate path is being deleted.  
This is the change being incorporated with this  
revision to the ODCM. Making this change in the  
ODCM does not represent a safety concern. The  
safety analysis reviews for the work covering the  
reason for this change, can be found in Plant  
Mod 91-040.

## REFERENCES:

PM 91-040

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## PART II: ITEM CLASSIFICATION

DOCUMENT NO. ODCMREV. NO. 13

- |    |   | Yes                                 | No                                  |
|----|---|-------------------------------------|-------------------------------------|
| 1. | Does this item represent:   |                                     |                                     |
| a. | A change to the facility as described in the SAFETY ANALYSIS REPORT?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b. | A change to the procedures as described in the SAFETY ANALYSIS REPORT?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c. | A test or experiment not described in the SAFETY ANALYSIS REPORT?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 2. | Does this item involve a change to the individual plant Operating License or to its Technical Specifications?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 3. | Does this item require a revision to the FSAR?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 4. | Does this item involve a change to the Offsite Dose Calculation Manual?   | <input checked="" type="checkbox"/> | <input type="checkbox"/>            |
| 5. | Does this item constitute a change to the Process Control Program?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 6. | Does this item involve a major change to a Radwaste Treatment System?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 7. | Does this item involve a change to the Technical Specification Equipment List?  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 8. | Does this item impact the NPDES Permit (all 3 sites) or constitute an "unreviewed environmental question" (SHNPP Environmental Plan, Section 3.1) or a "significant environmental impact" (BSEP)? | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| 9. | Does this item involve a change to a previously accepted:   |                                     |                                     |
| a. | Quality Assurance Program   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| b. | Security Plan (including Training, Qualification, and Contingency Plans)?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| c. | Emergency Plan?   | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |
| d. | Independent Spent Fuel Storage Installation license? (If "yes," refer to Section 8.4.2, "Question 9," for special considerations. Complete Part VI in accordance with Section 8.4.6)              | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

SEE SECTION 8.4.2 FOR INSTRUCTIONS FOR EACH "YES" ANSWER.

REFERENCES. List FSAR and Technical Specification references used to answer questions 1-9 above. Identify specific reference sections used for any "Yes" answer.

DM 91-040, ODCM Appendix E



## ATTACHMENT 2 (Cont'd)

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## PART III: UNREVIEWED SAFETY QUESTION DETERMINATION SCREEN

DOCUMENT NO. 00000REV. NO. 10

Yes No

1. Is this change fully addressed by another completed UNREVIEWED SAFETY QUESTION determination? (See Sections 7.2.1, 7.2.2.5, and 7.9.1.1)

☒ ☐REFERENCE DOCUMENT: Plant Mod 91-040REV. 0

Yes No

2. For procedures, is the change a non-intent change which only (check all that apply): (See Section 7.2.2.3)

☒ ☐

- ☐ Corrects typographical errors which do not alter the meaning or intent of the procedure; or.
- ☐ Adds or revises steps for clarification (provided they are consistent with the original purpose or applicability of the procedure); or.
- ☐ Changes the title of an organizational position; or.
- ☐ Changes names, addresses, or telephone numbers of persons; or.
- ☒ Changes the designation of an item of equipment where the equipment is the same as the original equipment or is an authorized replacement; or.
- ☐ Changes a specified tool or instrument to an equivalent substitute; or.
- ☐ Changes the format of a procedure without altering the meaning, intent, or content; or.
- ☐ Deletes a part or all of a procedure, the deleted portions of which are wholly covered by approved plant procedures?

If the answer to either Question 1 or Question 2 in PART III is "Yes," then PART IV need not be completed.

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OFF-SITE DOSE CALCULATION MANUAL  
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C-9	8
C-10 - C-13	0
C-14	8
C-15	0
C-16	8
C-17 - C-18	0
D-1 - D-2	1
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E-2	11
E-3	10
F-1 - F-3	0
G-1	1
H-1 - H-5	9

APPENDIX E

RADIOACTIVE LIQUID AND GASEOUS EFFLUENT MONITORING  
INSTRUMENTATION NUMBERS

I. Liquid Effluent Monitoring Instruments

A.	Liquid Radwaste Radioactivity Monitor	2-D17-RM-K604
B.	Liquid Radwaste Effluent Flow Measurement Device	2-G16-FIT-N057
C.	Main Service Water Effluent Radioactivity Monitor	1(2)-D12-RM-K605
D.	Stabilization Pond Effluent Composite Sampler	2-DST-XE-5027
E.	Stabilization Pond Effluent Flow Measurement Device	2-DST-FIT-5026
F.	Condensate Storage Tank Level Indicating Device	1(2)-CO-LIT-1160