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U. S. Nuclear Regulatory Commission
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BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 & 50-324/LICENSE NOS. DPR-71 & DPR-62
SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT

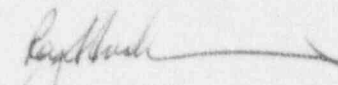
Gentlemen:

Enclosed is the Semiannual Radioactive Effluent Release Report for the Brunswick Steam Electric Plant Units 1 & 2, covering the period from July 1, 1994, through December 31, 1994.

This report is submitted for the Brunswick Steam Electric Plant in accordance with Technical Specification 6.9.1.8.

If you have any questions regarding this submittal please contact Ms. Jackie Gawron at (910) 457-2447.

Very truly yours,


R. A. Anderson

WGR/dm

Enclosure

cc: Mr. S. D. Ebnetter, Region II - Administrator
Mr. D. C. Trimble, NRR Senior Project Manager - Brunswick (Acting)
Mr. C. A. Patterson, Brunswick NRC Senior Resident Inspector
The Honorable H. Wells, Chairman-North Carolina Utilities Commission

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ENCLOSURE

BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
NRC DOCKET NOS. 50-325 & 50-324
OPERATING LICENSE NOS. DPR-71 & DPR-62

LIST OF REGULATORY COMMITMENTS

The following table identifies those actions committed to by Carolina Power & Light Company in this document. Any other actions discussed in the submittal represent intended or planned actions by Carolina Power & Light Company. These actions are described to the NRC for the staff's information and are not regulatory commitments. Please notify the Manager-Regulatory Affairs at the Brunswick Nuclear Plant of any questions regarding this document or any associated regulatory commitments.

Commitment	Committed date or outage
1. None	NA

Brunswick Steam Electric Plant
Semiannual Radioactive Effluent Report
July 1, to December 31, 1994

ATTACHMENTS:

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ATTACHMENT 1

Supplemental Information

July 1, to December 31, 1994

EFFLUENT AND 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.
- ** (1) Tritium: limit = 1 E-03 uCi/ml and
 - ** (2) Dissolved and entrained gases: limit = 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.

B. Iodines

Analysis for specific radionuclides collected on charcoal canisters 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:	1.46E+02
(2) Total time period for batch releases:	2.04E+04 Minutes
(3) Maximum time period for a batch release:	2.60E+02 Minutes
(4) Average time period for a batch release:	1.40E+02 Minutes
(5) Minimum time period for a batch release:	1.10E+02 Minutes
(6) Average stream flow during periods of release of effluent into a flowing stream :	8.98E+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 10CFR20 or 10CFR50 limits. See Page 6 for a discussion of release events that occurred.

1. Discussion of Tritium in the Storm Drain Collection Pond

Approximately $1.74\text{E}+07$ gallons containing $4.68\text{E}+00$ curies of tritium were released from the Storm Drain Collection Pond (SDCP) to the Intake Canal during this reporting period. The SDCP is a permitted release point.

NOTE 1: Curie totals are included in the quarterly summaries in Table 2A and 2B.

NOTE 2: The quantity of rainwater released from the Storm Drain Collection Basin and/or the Storm Drain Collection Pond is not included in VOLUME OF WASTE on Table 2A.

ATTACHMENT 2

Effluent and Waste Disposal Data

Brunswick Steam Electric Plant

July 1, to December 31, 1994

Enclosure 1

Table 1A: Gaseous Effluents - Summation of all Releases

Table 1B: Gaseous Effluents - Elevated Releases

Table 1C: Gaseous Effluents - Ground Level Releases

Table 1D: Gaseous Effluents - Ground Level Releases for
Burning Contaminated Oil

Table 2A: Liquid Effluents - Summation of all Releases

Table 2B: Liquid Effluents - Batch Mode

Appendix A: 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 1994
Gaseous Effluents - Summation of all Releases

	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>	<u>Est. Tot.</u> <u>Error %</u>
A. <u>FISSION AND ACTIVATION</u>				
<u>GASES</u>				
1. Total release	Ci	1.26E+02	9.37E+01	4.50E+01
2. Average release rate for period	uCi/sec	1.59E+01	1.18E+01	
3. Percent of technical specification limit	%	2.93E-02	1.86E-02	
B. <u>IODINES</u>				
1. Total I-131	Ci	5.35E-04	6.73E-04	3.50E+01
2. Average release rate for period	uCi/sec	6.73E-05	8.47E-05	
C. <u>PARTICULATES</u> <small>NOTE 1</small>				
1. Total release	Ci	2.99E-03	2.91E-03	3.50E+01
2. Average release rate for period	uCi/sec	3.76E-04	3.66E-04	
3. Gross alpha	Ci	4.45E-06	2.95E-06	
D. <u>Tritium</u>				
1. Total release	Ci	6.27E+00	5.09E+00	3.00E+01
2. Average release rate for period	uCi/sec	7.89E-01	6.40E-01	
E. <u>IODINE-131, IODINE-133, TRITIUM AND PARTICULATES</u> <small>NOTE 1</small>				
1. Total Release	Ci	6.27E+00	5.10E+00	
2. Average release rate for period	uCi/sec	7.89E-01	6.42E-01	
3. Percent of technical specification limit	%	2.15E-02	2.82E-02	
F. <u>PARTICULATES VIA BURNING CONTAMINATED OIL</u>				
1. Total Release	Ci	2.51E-06	0.00E+00	
2. Average release rate for period	uCi/sec	3.16E-07	0.00E+00	
3. Percent of technical specification limit	%	5.76E-01	0.00E+00	

NOTE 1 This includes the number of curies released via incineration.

TABLE 1B
Effluent and Waste Disposal Semiannual Report for Year 1994
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	1.86E+00	< LLD
krypton-85m	Ci	9.36E+00	9.29E+00
krypton-87	Ci	1.48E+01	1.12E+01
krypton-88	Ci	1.81E+01	1.60E+01
xenon-133	Ci	6.81E+00	7.08E+00
xenon-135	Ci	1.71E+01	1.42E+01
xenon-135m	Ci	1.08E+01	4.70E+00
xenon-137	Ci	2.84E+00	< LLD
<u>xenon-138</u>	<u>Ci</u>	<u>2.52E+01</u>	<u>7.35E+00</u>
total for period	Ci	1.07E+02	6.99E+01
<u>2. IODINES</u>			
iodine-131	Ci	2.86E-04	2.52E-04
iodine-132	Ci	2.54E-04	1.13E-04
iodine-133	Ci	1.11E-03	1.03E-03
<u>iodine-135</u>	<u>Ci</u>	<u>2.76E-04</u>	<u>< LLD</u>
total for period	Ci	1.92E-03	1.40E-03
<u>3. PARTICULATES</u>			
chromium-51	Ci	3.53E-05	1.14E-04
manganese-54	Ci	6.56E-06	< LLD
cobalt-60	Ci	1.77E-05	1.72E-06
strontium-89	Ci	3.04E-05	2.86E-05
strontium-90	Ci	4.18E-07	1.64E-07
cesium-137	Ci	2.18E-06	< LLD
barium-140	Ci	8.37E-05	5.54E-05
<u>lanthanum-140</u>	<u>Ci</u>	<u>1.19E-04</u>	<u>7.43E-05</u>
total for period	Ci	2.95E-04	2.74E-04
<u>4. TRITIUM</u>			
hydrogen-3	Ci	3.31E+00	1.91E+00

TABLE 1C
Effluent and Waste Disposal Semiannual Report for Year 1994
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-85m	Ci	1.84E+00	9.87E-01
xenon-133	Ci	4.04E+00	< LLD
<u>xenon-135</u>	<u>Ci</u>	<u>1.35E+01</u>	<u>2.28E+01</u>
total for period	Ci	1.94E+01	2.38E+01
<u>2. IODINES</u>			
iodine-131	Ci	2.49E-04	4.21E-04
iodine-132	Ci	1.40E-03	5.89E-03
iodine-133	Ci	2.78E-03	4.71E-03
<u>iodine-135</u>	<u>Ci</u>	<u>1.41E-03</u>	<u>6.18E-03</u>
total for period	Ci	5.84E-03	1.72E-02
<u>3. PARTICULATES</u>			
chromium-51	Ci	2.01E-03	2.13E-03
manganese-54	Ci	3.54E-05	3.33E-05
cobalt-58	Ci	5.65E-05	5.16E-05
cobalt-60	Ci	5.61E-04	4.08E-04
strontium-89	Ci	1.17E-05	7.17E-06
strontium-90	Ci	3.11E-08	2.20E-08
cesium-137	Ci	2.17E-05	3.44E-06
barium-140	Ci	7.05E-08	8.30E-07
<u>lanthanum-140</u>	<u>Ci</u>	<u>6.26E-08</u>	<u>1.11E-06</u>
total for period	Ci	2.70E-03	2.64E-03
<u>4. TRITIUM</u>			
hydrogen-3	Ci	2.96E+00	3.19E+00

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TABLE 1D
Effluent and Waste Disposal Semiannual Report for Year 1994
Gaseous Effluents - Ground Level Releases
For Burning Contaminated Oil

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
<u>1. PARTICULATES</u>			
cobalt-60	Ci	2.20E-06	0.00E+00
<u>cesium-137</u>	<u>Ci</u>	<u>3.07E-07</u>	<u>0.00E+00</u>
total for period	Ci	2.51E-06	0.00E+00

TABLE 2A
Effluent and Waste Disposal Semiannual Report for Year 1994
Liquid Effluents - Summation of all Releases

	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>	<u>Est Tot</u> <u>% Error</u>
A. <u>FISSION AND ACTIVATION</u>				
<u>PRODUCTS</u> <small>NOTE 1</small>				
1. Total release (excluding tritium, gases, & alpha)	Ci	1.34E-02	4.01E-03	4.00E+01
2. Avg. diluted conc. <small>NOTE 2</small>	uCi/ml	4.21E-10	1.06E-10	
3. Percent limit	%	1.59E-02	4.40E-03	
B. <u>TRITIUM</u> <small>NOTE 1</small>				
1. Total release	Ci	1.62E+01	2.15E+01	4.50E+01
2. Avg. diluted conc. <small>NOTE 2</small>	uCi/ml	5.09E-07	5.71E-07	
3. Percent limit	%	5.09E-02	5.71E-02	
C. <u>DISSOLVED AND ENTRAINED GASES</u> <small>NOTE 1</small>				
1. Total release	Ci	6.46E-03	6.62E-03	4.00E+01
2. Avg. diluted conc. <small>NOTE 2</small>	uCi/ml	2.03E-10	1.76E-10	
3. Percent limit	%	1.02E-04	8.79E-05	
D. <u>GROSS ALPHA RADIOACTIVITY</u>				
1. Total release	Ci	< LLD	< LLD	4.00E+01
E. <u>VOLUME OF WASTE</u> <small>NOTE 2</small>				
	liters	4.77E+06	6.00E+06	1.50E+01
F. <u>TOTAL OF DILUTION WATER</u> <u>(used during release</u> <u>for average dil. conc.)</u>				
	liters	3.18E+10	3.77E+10	1.30E+01
G. <u>VOLUME OF COOLING WATER</u> <u>DISCHARGED FROM PLANT</u>				
	liters	5.05E+11	4.62E+11	

NOTE 1: Includes radionuclides released via abnormal and/or non-routine release.

NOTE 2: Does not include rainwater released (ie. Storm Drain Collection Basin and/or Storm Drain Collection Pond).

TABLE 2B
Effluent and Waste Disposal Semiannual Report for Year 1994
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>			
chromium-51	Ci	2.80E-03	1.47E-04
manganese-54	Ci	3.67E-04	6.02E-05
iron-55	Ci	9.54E-04	< LLD
cobalt-58	Ci	1.97E-04	3.97E-06
cobalt-60	Ci	8.75E-03	2.27E-03
arsenic-76	Ci	2.01E-06	6.97E-06
technetium-99m	Ci	4.79E-06	< LLD
antimony-125	Ci	8.05E-06	< LLD
iodine-131	Ci	< LLD	1.45E-05
iodine-133	Ci	< LLD	1.38E-05
cesium-134	Ci	1.21E-05	5.80E-05
cesium-137	Ci	2.62E-04	1.44E-03
barium-140	Ci	< LLD	4.23E-06
<u>cerium-144</u>	<u>Ci</u>	<u>2.60E-05</u>	<u>< LLD</u>
total for period	Ci	1.34E-02	4.01E-03

TABLE 2B (continued)
Effluent and Waste Disposal Semiannual Report for Year 1994
Liquid Effluents - Batch Mode

<u>Nuclides Released</u>	<u>Unit</u>	<u>Qtr 3</u>	<u>Qtr 4</u>
2. <u>GASES</u>			
krypton-87	Ci	< LLD	2.64E-06
xenon-133	Ci	1.82E-03	1.73E-03
xenon-135m	Ci	3.18E-05	< LLD
<u>xenon-135</u>	<u>Ci</u>	<u>4.60E-03</u>	<u>4.89E-03</u>
total for period	Ci	6.46E-03	6.62E-03

APPENDIX A

Lower Limits of Detection

July through December 1994
uCi/ml

1. Liquid Releases

Fe-55	4.32E-08
Fe-59	2.34E-08
Zn-65	4.47E-08
Sr-89	2.67E-08
Sr-90	1.32E-08
Mo-99	1.57E-07
Tc-99m	1.12E-08
Sb-125	5.12E-08
I-131	1.26E-08
I-133	1.80E-08
Ba-140	7.13E-08
Ce-141	1.57E-08
Ce-144	7.31E-08
Alpha	4.28E-08
Kr-87	4.03E-08
Kr-88	5.21E-08
Xe-133m	1.08E-07
Xe-135m	7.57E-08
Xe-138	1.41E-07

2. Gaseous Releases

Ar-41	5.02E-09
Xe-133	1.79E-08
Xe-133m	3.55E-08
Xe-137	4.82E-05

3. Iodines and Particulates

Mn-54	3.07E-14
Fe-59	1.53E-14
Zn-65	1.14E-13
Cs-134	6.74E-14
I-135	8.37E-13
Cs-137	1.82E-14
Ce-141	3.08E-14
Ce-144	1.27E-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. Also included are isotopes specified in Technical Specifications.
- 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 1994
Solid Waste and Irradiated Fuel Shipments

<u>Waste Class A</u>		<u>July through December</u>		
1. <u>Total volume shipped</u> (cubic meters)		2.45 E2		
Total Curie quantity (estimated)		1.98 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 ³	1.02 E2		
	Curies	1.37 E2	1.00E1	
b. Dry active waste, compacted and noncompactd	meters ³	1.30 E2		
	Curies	2.67 E1	1.00E1	
c. Irradiated components	meters ³	1.28 E1		
	Curies	3.40 E1	1.00E1	
d. Others (describe)	meters ³	0.00 E0		
	Curies	0.00 E0	N/A	
3. <u>Estimate of major radionuclide composition</u>				
a.	Cr-51	1.61 E0%		
	Fe-55	6.16 E1%		
	Co-60	3.14 E1%		
	Ni-63	1.70 E0%		
	Sb-125	1.97 E0%		
b.	Mn-54	1.20 E0%		
	Fe-55	7.99 E1%		
	Co-60	1.63 E1%		
	Ni-63	1.80 E0%		
c.	Mn-54	2.55 E0%		
	Fe-55	3.32 E1%		
	Co-60	6.18 E1%		
	Ni-63	1.98 E0%		
d.	N/A	N/A		

TABLE 3A (cont.)

Effluent and Waste Disposal Semiannual Report for Year 1994
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	18/2
b. Dry active waste	Compacted/non-compacted waste	6/0	6 Noncompacted
c. Irradiated components		3/0	3/0
d. Other		0	0
* Solidification agent or absorbent (e.g., cement, urea formaldehyde)			N/A

5. Shipment Disposition

a. Solid Waste

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

b. Irradiated Fuel

<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 1994
Solid Waste and Irradiated Fuel Shipments

<u>Waste Class B</u>		<u>July through December</u>		
1. <u>Total volume shipped</u> (cubic meters)		3.41 E0		
Total Curie quantity (estimated)		7.61 E1		
2. <u>Type of Waste</u>		Six-month		Est.Total
	<u>Units</u>	<u>Period</u>		<u>% Error</u>
a. Spent resins, filter sludges	meters ³	0.00	E0	N/A
	Curies	0.00	E0	
b. Dry active waste, compacted, and noncompacted	meters ³	0.00	E0	N/A
	Curies	0.00	E0	
c. Irradiated components	meters ³	3.41	E0	1.00E1
	Curies	7.61	E1	
d. Others (describe)	meters ³	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.	Mn-54	3.03	E0%	
	Fe-55	5.68	E1%	
	Co-60	3.73	E1%	
	Ni-63	2.74	E0%	
d.	N/A	N/A		

TABLE 3B (cont.)

Effluent and Waste Disposal Semiannual Report for Year 1994
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	0/0
b. Dry active waste	Compacted/non-compacted waste	N/A	0/0
c. Irradiated components		0/1	0/1
d. Other		N/A	0
* Solidification agent or absorbent (e.g., cement, urea formaldehyde)			N/A

5. Shipment Disposition

a. Solid Waste

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
1	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 1994
Solid Waste and Irradiated Fuel Shipments

Waste Class CJuly through December

1. <u>Total volume shipped</u> (cubic meters)		2.97 E0	
Total Curie quantity (estimated)		6.71 E4	
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 ³	0.00 E0	N/A
	Curies	0.00 E0	
b. Dry active waste, compacted and noncompacted	meters ³	0.00 E0	N/A
	Curies	0.00 E0	
c. Irradiated components	meters ³	2.97 E0	1.00E1
	Curies	6.71 E4	
d. Others (describe)	meters ³	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.	Mn-54	1.95 E0%	
	Fe-55	5.41 E1%	
	Co-60	4.06 E1%	
	Ni-63	3.07 E0%	
d.	N/A	N/A	

TABLE 3C (cont.)

Effluent and Waste Disposal Semiannual Report for Year 1994
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	0/0
b. Dry active waste	Compacted/non- compacted	N/A	0/0
c. Irradiated components		0/4	0/4
d. Others		N/A	0
* Solidification agent or absorbent (e.g., cement, urea formaldehyde)			N/A

5. Shipment Disposition

a. Solid Waste

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

b. Irradiated Fuel

<u>Number of Shipments</u>	<u>Mode of Transportation</u>	<u>Destination</u>
7	Rail Car/ IF-300 Cask	CP&L/SHNNP

ATTACHMENT 2 (cont.)

ENCLOSURE 2

Combustion of Waste Oil

July 1, to December 31, 1994

During this reporting period, approximately 756 gallons of contaminated waste oil was incinerated in the on site oil incinerator. The total activity contained in this quantity of waste oil included $2.20\text{E-}06$ curies of Cobalt-60 and $3.07\text{E-}07$ curies of Cesium-137.

ATTACHMENT 3

Environmental Monitoring Program

July 1, to December 31, 1994

Enclosure 1: Milk and Vegetable Sample Locations

Enclosure 2: Land Use Census

ATTACHMENT 3 (cont.)

ENCLOSURE 1

Milk and Vegetation Sample Locations

July 1, to December 31, 1994

No milk animals were identified during the last Land Use Census, therefore, no milk sample locations were available during this time period.

Vegetation sample locations remained unchanged.

ATTACHMENT 3 (cont.)

ENCLOSURE 2

Land Use Census

July 1, to December 31, 1994

The 1994 Land Use Census was performed during the period of June 6 to June 13, 1994. No locations were identified that are reportable in the Semiannual Radioactive Effluent Release Report.

Land Use Census updates are included with the ODCM revision 16 in Attachment 8.

ATTACHMENT 4

Effluent Instrumentation

July 1, to December 31, 1994

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

ATTACHMENT 4 (cont.)

ENCLOSURE 1

July 1, to December 31, 1994

Radioactive Liquid Effluent Monitoring Instrumentation

No Radioactive Liquid Effluent Monitoring Instrumentation was inoperable for greater than 30 days.

ATTACHMENT 4 (cont.)

ENCLOSURE 2

July 1, to December 31, 1994

Radioactive Gaseous Effluent Monitoring Instrumentation

No Radioactive Gaseous Effluent Monitoring Instrumentation was inoperable for greater than 30 days.

ATTACHMENT 4 (cont.)

ENCLOSURE 3

Liquid Hold-Up Tanks

July 1, to December 31, 1994

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

ATTACHMENT 5

Major Modifications to the Radioactive Waste Treatment System

July 1, to December 31, 1994

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, 1994

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, 1994

Attached is the annual dose assessment for the Brunswick Steam Electric Plant for the time period of January 1 to December 31, 1994.

Enclosure 1: Annual Liquid Dose Assessment

Enclosure 2: Annual Gaseous Dose Assessment

Enclosure 3: Dose Assessment Summary

ATTACHMENT 7 (cont.)

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 1994,

DISCHARGE=1.72E+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	TOTAL BODY	THYROID
1H 3	6.96E+01	2.01E-06	2.01E-06	2.89E-08	2.49E-08
11NA 24	5.27E-06	4.24E-10	4.24E-10	8.04E-05	8.04E-05
24CR 51	1.07E-02	4.64E-08	4.51E-08	4.34E-06	4.22E-06
25MN 54	8.03E-04	9.93E-07	8.64E-07	1.24E-03	1.08E-03
25MN 56	4.02E-04	1.20E-08	1.20E-08	2.99E-05	2.99E-05
26FE 55	9.54E-04	4.68E-07	5.57E-13	4.91E-04	5.84E-10
27CO 58	8.28E-04	3.00E-07	2.55E-07	3.62E-04	3.08E-04
27CO 60	2.57E-02	4.29E-04	4.25E-04	1.67E-02	1.65E-02
36KR 87	2.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
39Y 91M	2.13E-06	1.56E-11	1.06E-11	9.21E-06	9.21E-06
43TC 99M	2.77E-04	6.46E-10	6.46E-10	2.33E-06	2.33E-06
51SB 125	2.07E-03	3.74E-06	3.73E-06	1.81E-03	1.80E-03
53I 131	1.45E-05	3.65E-10	4.06E-08	2.52E-05	2.80E-03
53I 133	2.12E-05	2.26E-10	2.35E-10	1.06E-05	1.11E-05
54XE 133	1.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54XE 135	4.79E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
54XE 135M	8.66E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
55CS 134	1.52E-04	1.00E-06	8.01E-07	6.59E-03	5.27E-03
55CS 137	2.67E-03	2.32E-05	2.11E-05	8.70E-03	7.92E-03
56BA 140	1.39E-05	3.20E-10	2.81E-10	2.31E-05	2.02E-05
58CE 144	3.65E-05	1.98E-09	1.98E-09	5.43E-05	5.42E-05
74W 187	1.07E-04	1.00E-09	1.00E-09	9.39E-06	9.39E-06
TOTAL		4.61E-04	4.54E-04		

Source Term

* * * 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		1.07E-05	2.04E-05	1.83E-05	4.36E-06	7.25E-06	7.07E-06	7.94E-05
INVERT		9.21E-06	1.71E-05	2.28E-05	1.32E-06	1.57E-06	4.44E-06	1.74E-04
SHORELINE	4.91E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04
SWIMMING		2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07
BOATING		1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07
TOTAL	4.91E-04	4.38E-04	4.55E-04	4.59E-04	4.23E-04	4.27E-04	4.29E-04	6.71E-04

USAGE (KG/YR,HR/YR)

DILUTION

TIME (HR)

SHOREWIDTH FACTOR=0.5

FISH	29.2	30.0	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		1.49E-05	2.62E-05	2.00E-05	4.45E-06	8.39E-06	8.86E-06	7.29E-05
INVERT		1.27E-05	2.28E-05	2.98E-05	1.38E-06	1.76E-06	6.48E-06	1.59E-04
SHORELINE	4.91E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04
SWIMMING		2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07
BOATING		1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07
TOTAL	4.91E-04	4.45E-04	4.67E-04	4.67E-04	4.24E-04	4.28E-04	4.33E-04	6.49E-04

USAGE (KG/YR,HR/YR)

DILUTION

TIME (HR)

SHOREWIDTH FACTOR=0.5

FISH	29.2	30.0	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		4.43E-05	5.36E-05	4.16E-05	8.65E-06	1.63E-05	1.72E-05	6.33E-05
INVERT		3.84E-05	4.64E-05	7.28E-05	2.81E-06	3.40E-06	1.30E-05	1.29E-04
SHORELINE	4.91E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04	4.17E-04
SWIMMING		2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07	2.78E-07
BOATING		1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07	1.39E-07
TOTAL	4.91E-04	5.00E-04	5.18E-04	5.32E-04	4.29E-04	4.37E-04	4.48E-04	6.10E-04

USAGE (KG/YR,HR/YR)

DILUTION

TIME (HR)

SHOREWIDTH FACTOR=0.5

FISH	29.2	30.0	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: 02/17/95
RUN TIME: 10:00:00TOTAL 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	6.042E-06	1.045E-05	9.050E-06	2.047E-06	3.597E-06	3.577E-06	3.481E-05	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	8.545E-08	1.456E-07	1.990E-07	9.367E-09	1.270E-08	3.860E-08	1.247E-06	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	4.507E-04	4.507E-04	4.507E-04	4.507E-04	4.507E-04	4.507E-04	4.507E-04	5.298E-04
SWIMMING	7.912E-07	7.912E-07	7.912E-07	7.912E-07	7.912E-07	7.912E-07	7.912E-07	0.000E+00
BOATING	3.748E-07	3.748E-07	3.748E-07	3.748E-07	3.748E-07	3.748E-07	3.748E-07	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	4.580E-04	4.624E-04	4.611E-04	4.539E-04	4.554E-04	4.554E-04	4.879E-04	5.298E-04

Summary - Total Integrated and Recreation Population Dose

ATTACHMENT 7 (cont)

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 1994 Land Use Census for the worst sector and existing pathways.

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

Source term for incinerated waste oil.

Integrated Population Dose by pathways and organs due to incinerated waste oil.

Maximum site boundary dose due to incinerated waste oil.

Source term for the three release modes and the site aggregate

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2

1 H - 3	1.230E+01
18 AR- 41	1.930E+00
24 CR- 51	1.890E-04
25 MN- 54	2.380E-05
27 CO- 58	1.310E-06
27 CO- 60	4.470E-04
36 KR- 85 M	3.820E+01
36 KR- 87	4.340E+01
36 KR- 88	6.530E+01
38 SR- 89	1.650E-04
38 SR- 90	1.730E-06
53 I -131	1.160E-03
53 I -132	8.670E-04
53 I -133	4.710E-03
53 I -135	4.570E-04
54 XE-133	3.420E+01
54 XE-135	6.420E+01
54 XE-135 M	3.840E+01
54 XE-137	2.840E+00
54 XE-138	5.680E+01
55 CS-137	2.790E-05
56 BA-140	2.950E-04
57 LA-140	4.240E-04

SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2

1 H - 3	6.990E+00
24 CR- 51	3.250E-08
27 CO- 60	4.850E-06
36 KR- 85 M	5.380E+00
38 SR- 89	3.320E-05
38 SR- 90	1.140E-07
53 I -131	2.620E-05
53 I -132	8.830E-05
53 I -133	1.760E-04
53 I -135	1.080E-04
54 XE-135	3.740E+00
55 CS-137	5.230E-07
56 BA-140	1.180E-06
57 LA-140	1.190E-06
58 CE-144	1.680E-06

BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

1 H - 3	3.270E+00
24 CR- 51	5.840E-03
25 MN- 54	2.710E-04
27 CO- 58	1.230E-03
27 CO- 60	1.190E-02
38 SR- 89	1.740E-05
38 SR- 90	5.720E-07
53 I -131	9.530E-04
53 I -132	7.990E-03
53 I -133	1.010E-02
53 I -135	7.790E-03
54 XE-133	2.350E+01
54 XE-135	7.380E+01
54 XE-135 M	2.580E+01
55 CS-137	8.540E-05
95 AM-241	1.460E-04

AGGREGATE SOURCE TERM

1 H - 3	2.2560E+01
18 AR- 41	1.9300E+00
24 CR- 51	6.0290E-03
25 MN- 54	2.9480E-04
27 CO- 58	1.2313E-03
27 CO- 60	1.2352E-02
36 KR- 85 M	4.3580E+01
36 KR- 87	4.3400E+01
36 KR- 88	6.5300E+01
38 SR- 89	2.1560E-04
38 SR- 90	2.4160E-06
53 I -131	2.1392E-03
53 I -132	8.9453E-03
53 I -133	1.4986E-02
53 I -135	8.3550E-03
54 XE-133	5.7700E+01
54 XE-135	1.4174E+02
54 XE-135 M	6.4200E+01
54 XE-137	2.8400E+00
54 XE-138	5.6800E+01
55 CS-137	1.1382E-04
56 BA-140	2.9618E-04
57 LA-140	4.2519E-04
58 CE-144	1.6800E-06
95 AM-241	1.4600E-04

CP&L
GASRPT

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

RUN DATE: 02/23/95
RUN TIME: 16:47:31

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2
SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2
BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

Total 50 mile Integrated Population Dose by pathways and organs

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
** TOTAL **	7.029E-02	6.801E-02	1.416E-01	1.191E-01	8.995E-02	7.203E-02	7.395E-02	9.884E-02
PLUME	1.771E-02 25.19%	1.771E-02 26.04%	1.771E-02 12.51%	1.771E-02 14.87%	1.771E-02 19.68%	1.771E-02 24.58%	1.798E-02 24.32%	4.158E-02 42.07%
GROUND PLANE	4.556E-02 64.82%	4.556E-02 66.99%	4.556E-02 32.18%	4.556E-02 38.26%	4.556E-02 50.65%	4.556E-02 63.25%	4.556E-02 61.61%	5.360E-02 54.23%
INHALATION	5.989E-03 8.52%	2.986E-03 4.39%	7.794E-02 55.04%	5.469E-02 45.93%	2.573E-02 28.61%	5.356E-03 7.44%	9.575E-03 12.95%	2.838E-03 2.87%
VEGETATION	9.364E-04 1.33%	1.554E-03 2.28%	3.898E-04 0.28%	1.026E-03 0.86%	8.760E-04 0.97%	3.151E-03 4.37%	7.561E-04 1.02%	7.526E-04 0.76%
COW MILK	1.737E-05 0.02%	1.865E-05 0.03%	1.793E-06 0.00%	1.792E-05 0.02%	1.729E-05 0.02%	1.499E-04 0.21%	1.636E-05 0.02%	1.623E-05 0.02%
MEAT & POULTRY	7.778E-05 0.11%	1.848E-04 0.27%	2.528E-06 0.00%	6.810E-05 0.06%	5.930E-05 0.07%	1.060E-04 0.15%	5.854E-05 0.08%	5.840E-05 0.06%

CP&L
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/23/95
RUN TIME: 16:47:31

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2
SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2
BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

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

ANNUAL BETA AIR DOSE = 9.380E-04 MILLRADS
ANNUAL GAMMA AIR DOSE = 1.296E-03 MILLRADS

	ADULT	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
		2.605E-03	2.808E-03	4.399E-03	3.955E-03	3.133E-03	3.906E-03	2.618E-03	2.853E-03
GROUND PLANE		2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.603E-03
INHALATION		1.564E-04	7.760E-05	2.074E-03	1.468E-03	6.958E-04	1.333E-04	2.275E-04	7.320E-05
VEGETATION		1.820E-04	4.492E-04	1.027E-04	2.185E-04	1.718E-04	4.602E-04	1.330E-04	1.321E-04
COW MILK		5.367E-05	6.902E-05	1.011E-05	5.587E-05	5.273E-05	1.101E-03	4.535E-05	4.460E-05
TEENAGER		2.665E-03	2.856E-03	4.547E-03	4.109E-03	3.216E-03	4.523E-03	2.745E-03	2.886E-03
GROUND PLANE		2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.603E-03
INHALATION		1.618E-04	7.778E-05	2.185E-03	1.555E-03	7.311E-04	1.522E-04	3.196E-04	7.367E-05
VEGETATION		2.206E-04	4.788E-04	1.316E-04	2.628E-04	1.995E-04	4.243E-04	1.529E-04	1.513E-04
COW MILK		7.019E-05	8.709E-05	1.812E-05	7.793E-05	7.257E-05	1.734E-03	5.965E-05	5.810E-05
CHILD		2.822E-03	2.838E-03	4.175E-03	3.841E-03	3.123E-03	6.462E-03	2.818E-03	2.994E-03
GROUND PLANE		2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.603E-03
INHALATION		1.365E-04	6.676E-05	1.696E-03	1.116E-03	5.015E-04	1.623E-04	2.748E-04	6.514E-05
VEGETATION		3.627E-04	4.477E-04	2.232E-04	3.866E-04	2.928E-04	6.541E-04	2.368E-04	2.343E-04
COW MILK		1.105E-04	1.113E-04	4.326E-05	1.259E-04	1.158E-04	3.434E-03	9.417E-05	9.179E-05
INFANT		2.448E-03	2.407E-03	2.970E-03	2.883E-03	2.602E-03	1.060E-02	2.542E-03	2.780E-03
GROUND PLANE		2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.212E-03	2.603E-03
INHALATION		6.601E-05	3.802E-05	6.809E-04	4.592E-04	2.095E-04	1.266E-04	1.858E-04	3.746E-05
COW MILK		1.692E-04	1.566E-04	7.640E-05	2.113E-04	1.802E-04	8.261E-03	1.436E-04	1.393E-04

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2
SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2
BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

SPECIAL LOCATION METERS DIR PL GR IN V CM GM M
2 SITE BOUNDARY 1127.0 NNE 1 1 1 1 1 1 1

ANNUAL BETA AIR DOSE = 4.246E-03 MILLRADS
ANNUAL GAMMA AIR DOSE = 4.939E-03 MILLRADS

	ADULT	TOTAL BODY 4.222E-02	GI-TRACT 4.728E-02	BONE 4.221E-02	LIVER 4.529E-02	KIDNEY 4.288E-02	THYROID 7.994E-02	LUNG 4.119E-02	SKIN 5.047E-02
PLUME		3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.339E-03	7.186E-03
GROUND PLANE		3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION		1.108E-03	9.617E-04	3.893E-03	3.570E-03	2.121E-03	1.138E-03	1.250E-03	9.519E-04
VEGETATION		2.463E-03	6.445E-03	1.650E-03	3.000E-03	2.308E-03	6.487E-03	1.731E-03	1.718E-03
COW MILK		7.135E-04	9.442E-04	1.620E-04	7.448E-04	6.985E-04	1.590E-02	5.909E-04	5.799E-04
GOAT MILK		1.419E-03	1.265E-03	3.715E-04	1.536E-03	1.384E-03	1.956E-02	1.216E-03	1.183E-03
MEAT & POULTRY		4.083E-04	1.556E-03	2.286E-05	3.317E-04	2.548E-04	6.430E-04	2.481E-04	2.469E-04
TEENAGER		4.324E-02	4.762E-02	4.333E-02	4.690E-02	4.401E-02	9.947E-02	4.211E-02	5.116E-02
PLUME		3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.339E-03	7.186E-03
GROUND PLANE		3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION		1.124E-03	9.673E-04	4.102E-03	3.738E-03	2.192E-03	1.202E-03	1.433E-03	9.579E-04
VEGETATION		3.004E-03	6.854E-03	2.139E-03	3.623E-03	2.683E-03	5.937E-03	1.991E-03	1.967E-03
COW MILK		9.340E-04	1.188E-03	2.907E-04	1.046E-03	9.663E-04	2.507E-02	7.781E-04	7.554E-04
GOAT MILK		1.795E-03	1.645E-03	6.673E-04	2.164E-03	1.899E-03	3.071E-02	1.609E-03	1.541E-03
MEAT & POULTRY		2.727E-04	8.516E-04	1.773E-05	2.128E-04	1.533E-04	4.342E-04	1.484E-04	1.473E-04
CHILD		4.661E-02	4.773E-02	4.536E-02	4.970E-02	4.645E-02	1.574E-01	4.444E-02	5.350E-02
PLUME		3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.339E-03	7.186E-03
GROUND PLANE		3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION		9.813E-04	8.509E-04	3.186E-03	2.820E-03	1.667E-03	1.148E-03	1.252E-03	8.471E-04
VEGETATION		4.969E-03	6.234E-03	3.737E-03	5.306E-03	3.915E-03	9.155E-03	3.083E-03	3.047E-03
COW MILK		1.471E-03	1.485E-03	6.951E-04	1.692E-03	1.544E-03	4.970E-02	1.228E-03	1.194E-03
GOAT MILK		2.710E-03	2.512E-03	1.597E-03	3.516E-03	3.029E-03	6.064E-02	2.539E-03	2.435E-03
MEAT & POULTRY		3.698E-04	5.336E-04	2.999E-05	2.565E-04	1.850E-04	6.110E-04	1.792E-04	1.779E-04
INFANT		4.298E-02	4.244E-02	4.137E-02	4.615E-02	4.402E-02	3.017E-01	4.269E-02	5.179E-02
PLUME		3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.296E-03	3.339E-03	7.186E-03
GROUND PLANE		3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION		5.411E-04	4.885E-04	1.280E-03	1.279E-03	8.105E-04	7.530E-04	7.752E-04	4.871E-04
COW MILK		2.254E-03	2.071E-03	1.234E-03	2.864E-03	2.408E-03	1.197E-01	1.874E-03	1.811E-03
GOAT MILK		4.075E-03	3.768E-03	2.742E-03	5.896E-03	4.690E-03	1.452E-01	3.883E-03	3.694E-03

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

CP&L
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/23/95
RUN TIME: 16:47:31

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2
SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2
BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

SPECIAL LOCATION METERS DIR PL GR IN V CM GM M
#18 RESIDENCE 1448.0 NNE 1 1 1 0 0 0 0

ANNUAL BETA AIR DOSE = 3.228E-03 MILLRADS
ANNUAL GAMMA AIR DOSE = 4.010E-03 MILLRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	2.779E-02	2.768E-02	2.993E-02	2.960E-02	2.853E-02	2.781E-02	2.792E-02	3.498E-02
PLUME	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.712E-03	5.686E-03
GROUND PLANE	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.867E-02
INHALATION	7.361E-04	6.279E-04	2.875E-03	2.554E-03	1.484E-03	7.578E-04	8.406E-04	6.206E-04
TEENAGER	2.780E-02	2.768E-02	3.008E-02	2.973E-02	2.859E-02	2.785E-02	2.806E-02	3.498E-02
PLUME	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.712E-03	5.686E-03
GROUND PLANE	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.867E-02
INHALATION	7.469E-04	6.315E-04	3.029E-03	2.678E-03	1.536E-03	8.036E-04	9.753E-04	6.245E-04
CHILD	2.770E-02	2.761E-02	2.940E-02	2.906E-02	2.821E-02	2.782E-02	2.793E-02	3.491E-02
PLUME	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.712E-03	5.686E-03
GROUND PLANE	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.867E-02
INHALATION	6.514E-04	5.551E-04	2.352E-03	2.009E-03	1.158E-03	7.732E-04	8.514E-04	5.523E-04
INFANT	2.741E-02	2.737E-02	2.800E-02	2.795E-02	2.761E-02	2.757E-02	2.761E-02	3.468E-02
PLUME	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.679E-03	2.712E-03	5.686E-03
GROUND PLANE	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.437E-02	2.867E-02
INHALATION	3.574E-04	3.186E-04	9.448E-04	9.024E-04	5.564E-04	5.201E-04	5.301E-04	3.176E-04

CP&L
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/23/95
RUN TIME: 16:47:31

1994 SOURCE TERM (ELEVATED MODE) BSEP UNITS 1&2
SOURCE TERM (GROUND LEVEL) 1994 BSEP UNITS 1 AND 2
BRUNSWICK UNITS 1 AND 2, MIXED MODE CONTINUOUS GASEOUS RELEASES, 1994

SPECIAL LOCATION METERS DIR PL GR IN V CM GM M
2 SITE BOUNDARY 1127.0 NNE 0 1 1 0 0 0 0

ANNUAL BETA AIR DOSE = 4.246E-03 MILLRADS
ANNUAL GAMMA AIR DOSE = 4.939E-03 MILLRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	3.392E-02	3.378E-02	3.671E-02	3.639E-02	3.494E-02	3.395E-02	3.407E-02	3.956E-02
GROUND PLANE	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION	1.108E-03	9.617E-04	3.893E-03	3.570E-03	2.121E-03	1.138E-03	1.250E-03	9.519E-04
TEENAGER	3.394E-02	3.378E-02	3.692E-02	3.655E-02	3.501E-02	3.402E-02	3.425E-02	3.957E-02
GROUND PLANE	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION	1.124E-03	9.673E-04	4.102E-03	3.738E-03	2.192E-03	1.202E-03	1.433E-03	9.579E-04
CHILD	3.380E-02	3.367E-02	3.600E-02	3.564E-02	3.448E-02	3.396E-02	3.407E-02	3.946E-02
GROUND PLANE	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION	9.813E-04	8.509E-04	3.186E-03	2.820E-03	1.667E-03	1.148E-03	1.252E-03	8.471E-04
INFANT	3.336E-02	3.330E-02	3.410E-02	3.410E-02	3.363E-02	3.358E-02	3.359E-02	3.910E-02
GROUND PLANE	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.282E-02	3.861E-02
INHALATION	5.411E-04	4.885E-04	1.280E-03	1.279E-03	8.105E-04	7.630E-04	7.752E-04	4.871E-04

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

CP&L
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
INPUT SOURCE TERMS

RUN DATE: 02/17/95
RUN TIME: 13:26:55

SOURCE TERM (INCINERATED OIL) BSEP UNITS 1 AND 2 1994

27 CO- 60	4.850E-06
55 CS-137	5.230E-07

Source term for incinerated waste oil

CP&L
GASRPTSEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
ALARA ANNUAL INTEGRATED POPULATION DOSE SUMMARY (MANREM)RUN DATE: 02/17/95
RUN TIME: 13:26:55

SOURCE TERM (INCINERATED OIL) BSEP UNITS 1 AND 2 1994

** TOTAL **	TOTAL BODY 4.793E-05	GI-TRACT 4.852E-05	BONE 4.794E-05	LIVER 4.804E-05	KIDNEY 4.776E-05	THYROID 4.764E-05	LUNG 5.333E-05	SKIN 5.603E-05
PLUME	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%	0.000E+00 0.00%
GROUND PLANE	4.764E-05 99.41%	4.764E-05 96.20%	4.764E-05 99.39%	4.764E-05 99.17%	4.764E-05 99.76%	4.764E-05 100.00%	4.764E-05 89.33%	5.603E-05 100.00%
INHALATION	4.867E-08 0.10%	2.173E-07 0.45%	5.431E-08 0.11%	7.495E-08 0.16%	2.281E-08 0.05%	0.000E+00 0.00%	5.657E-06 10.61%	0.000E+00 0.00%
VEGETATION	2.097E-07 0.44%	5.529E-07 1.14%	2.192E-07 0.46%	2.981E-07 0.62%	8.604E-08 0.18%	0.000E+00 0.00%	3.012E-08 0.06%	0.000E+00 0.00%
COW MILK	4.025E-09 0.01%	1.759E-09 0.00%	8.488E-09 0.02%	9.834E-09 0.02%	3.235E-09 0.01%	0.000E+00 0.00%	1.143E-09 0.00%	0.000E+00 0.00%
MEAT & POULTRY	2.054E-08 0.04%	9.892E-08 0.20%	9.081E-09 0.02%	1.762E-08 0.04%	3.843E-09 0.01%	0.000E+00 0.00%	1.318E-09 0.00%	0.000E+00 0.00%

CP&L
GASRPT

SEMI-ANNUAL RADIOLOGICAL EFFLUENT REPORTING
RADIATION DOSES AT SELECTED LOCATIONS

RUN DATE: 02/17/95
RUN TIME: 13:26:55

SOURCE TERM (INCINERATED CIL) BSEP UNITS 1 AND 2 1994

SPECIAL LOCATION METERS DIR PL CR IN V CM CM M
2 SITE BOUNDARY 1127.0 NNE 1 1 1 1 0 0 1

ANNUAL BETA AIR DOSE = 0.000E+00 MILLRADS
ANNUAL GAMMA AIR DOSE = 0.000E+00 MILLRADS

	TOTAL BODY	GI-TRACT	BONE	LIVER	KIDNEY	THYROID	LUNG	SKIN
ADULT	8.539E-05	9.503E-05	8.408E-05	8.578E-05	8.266E-05	8.142E-05	8.453E-05	9.574E-05
GROUND PLANE	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	9.574E-05
INHALATION	2.752E-08	1.290E-07	2.329E-08	3.542E-08	1.083E-08	0.000E+00	2.698E-06	0.000E+00
VEGETATION	3.400E-06	1.047E-05	2.432E-06	3.880E-06	1.129E-06	0.000E+00	3.753E-07	0.000E+00
MEAT & POULTRY	5.386E-07	3.007E-06	2.078E-07	4.440E-07	9.648E-08	0.000E+00	3.207E-08	0.000E+00
TEENAGER	8.546E-05	9.396E-05	8.550E-05	8.780E-05	8.327E-05	8.142E-05	8.607E-05	9.574E-05
GROUND PLANE	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	9.574E-05
INHALATION	2.411E-08	1.174E-07	3.264E-08	4.811E-08	1.480E-08	0.000E+00	3.942E-06	0.000E+00
VEGETATION	3.652E-06	1.081E-05	3.875E-06	5.979E-06	1.754E-06	0.000E+00	6.815E-07	0.000E+00
MEAT & POULTRY	3.593E-07	1.618E-06	1.726E-07	3.536E-07	7.812E-08	0.000E+00	3.635E-08	0.000E+00
CHILD	8.691E-05	8.928E-05	9.003E-05	9.193E-05	8.439E-05	8.142E-05	8.568E-05	9.574E-05
GROUND PLANE	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	9.574E-05
INHALATION	1.647E-08	4.360E-08	4.413E-08	4.610E-08	1.374E-08	0.000E+00	3.195E-06	0.000E+00
VEGETATION	4.991E-06	7.000E-06	9.149E-06	1.001E-05	2.854E-06	0.000E+00	1.027E-06	0.000E+00
MEAT & POULTRY	4.791E-07	8.174E-07	3.178E-07	4.514E-07	9.913E-08	0.000E+00	3.567E-08	0.000E+00
INFANT	8.143E-05	8.143E-05	8.145E-05	8.145E-05	8.143E-05	8.142E-05	8.346E-05	9.574E-05
GROUND PLANE	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	8.142E-05	9.574E-05
INHALATION	7.530E-09	1.447E-08	2.672E-08	3.340E-08	8.383E-09	0.000E+00	2.039E-06	0.000E+00

Maximum site boundary dose due to incinerated waste oil

ATTACHMENT 7 (cont)

ENCLOSURE 3

Dose Assessment Summary

I. Liquid Effluents:

<u>Maximum Dose to Individual: (mrem)</u>		<u>Limit: (mrem)</u>
Adult GI-LLI	6.71E-04	2.00E+01
Child Total Body	5.32E-04	6.00E+00

II. Gaseous Effluents:

<u>Noble Gas Air Dose at Site Boundary: (mrad)</u>		<u>Limit: (mrad)</u>
Gamma	5.16E-03	2.00E+01
Beta	5.94E-03	4.00E+01

Iodine-131, Iodine 133, Tritium and Particulates: (mrem)

(Limit 3.00E+01 mrem)

Maximum hypothetical dose at site boundary:	Infant thyroid	3.02E-01
Estimated dose for existing pathways at site boundary:	Teen skin	3.96E-02
Maximum hypothetical dose at 4.75 miles for cow milk pathway	Infant thyroid	1.06E-02
Estimated dose for existing pathways	Teen skin	3.49E-02

Lower total I-131 emission due to improved fuel performance from the elevated mode, and higher total Co-60 emission from the in-vessel outage work from the mixed mode, resulted in a lower relative dose at the "hypothetical" cow milk pathway location in 1994. The source term mix, and not a change in the use of land, resulted in the locations below to have a calculated dose higher than the dose determined for the cow milk pathway.

<u>Location</u>	<u>Dose</u>
0.9 mile NNE	3.49E-2 mrem skin
1.0 mile SW	2.78E-2 mrem skin
1.2 mile NNE	2.57E-2 mrem skin

ATTACHMENT 8

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

July 1, to December 31, 1994

Brunswick Steam Electric Plant

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

Revision 16 was made to the Off-Site Dose Calculation Manual during this time period. The following changes were made:

1. Updated Table 3.2-2 to concur with the latest Land Use Census Data. (page 3-30)
2. Added approval signature and effective date to the cover page.
3. Designated the equation on page 3-6 as "3.1-8."
4. Changed terminology of "Hot Shop" to "Decontamination Facility" to enhance accuracy of description. Also deleted reference to tritium being released from the decon facility and incinerator to enhance accuracy. Changes were made to pages 3-22 and 3-42.
5. Corrected typographical error in equation 3.3-14. (page 3-42)

A copy of Revision 16 to the ODCM is included as a part of this attachment.

ATTACHMENT A

REQUEST FOR OFF SITE DOSE CALCULATION MANUAL CHANGE

Originator: Grant Raker _____ Date: 12-9-94 _____ Rev. 16 _____

Pages and Sections Revised: Cover page; pages 3-6; 3-22; 3-30;
3-42

Reason for Change: Add signature and effective date to cover page; designate
equation on page 3-6 as "3.1-8;" change wording from "Hot Shop" to
"decontamination facility" to enhance accuracy of description; deleted
reference to tritium being released from decon facility and incinerator (p3-22
and p3-42) to enhance accuracy; updated Table 3.2-2 to concur with latest Land
Use Census Data.

Safety Analysis Complete: Grant Raker _____ Date: 12-09-94

REVIEWS:

Grant Raker _____ Recommended/Not Recommended Date: 12/10/94
1st Safety Reviewer

George Bein _____ Recommended/Not Recommended Date: 12/13/94
2nd Safety Reviewer

Joan Bozeman _____ Recommended/Not Recommended Date: 12/13/94
E&C Project Specialist

T R Jones _____ Recommended/Not Recommended Date: 12/15/94
Operations - Special Projects

Luan Thompson _____ Recommended/Not Recommended Date: 12/19/94
E&C Manager

APPROVALS:

Jacalyn P. Dawson _____ Recommended/Not Recommended Date: 12/20/94
Manager - E&C

Will _____ Recommended/Not Recommended Date: 12/21/94
PNSC Chairman

Will _____ Recommended/Not Recommended Date: 12/21/94
Plant General Manager

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SAFETY REVIEW COVER SHEET

DOCUMENT NO. Offsite Dose Calculation Manual (ODCM) REV. NO. 16

DESCRIPTION OR TITLE: _____

1. Assigned Responsibilities:

Safety Analysis Preparer: Grant RakerLead 1st Safety Reviewer: Grant Raker2nd Safety Reviewer: George Baird

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

Safety Analysis Preparer Grant Raker / 12/12/94
SIGNATURE 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 Grant Raker Grant Raker 12/12/94☐ 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.d 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 George Baird Date 12-19-94DISCIPLINE: Chemistry9. PNSC review required? If "yes," attach Part V and mark reason Yes No
below: M 1☐ Potential UNREVIEWED SAFETY QUESTION☒ Question 9 of Part IV answered "Yes"☐ Other (specify): ODCM revisions require PNSC approval by Tech 5

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Page 2 of 7PART I: SAFETY ANALYSIS
(See instructions in Section 8.4.1)
(Attach additional sheets as necessary.)DOCUMENT NO. ODCMREV. NO. 16

DESCRIPTION OF CHANGE: Added signature & effective date to cover page; designated equation as "3.1-B"; changed wording on pages 3-22 & 42 for enhanced accuracy ("hot spot" changed to "decon facility"; reference to tritium being released from decon facility; insulator deleted); updated Table 3.2-2 to reflect latest land use census data.

ANALYSIS: The changes made in revision 16 are administrative in nature and will not reduce the accuracy or reliability of any dose calculations or setpoint determinations. The changes added a signature and effective date to the cover page to enhance workability of the document. Other administrative changes were made including enhancements to narrative descriptions. The primary change was to update Table 3.2-2 to reflect the last land use census for the nearest resident, garden's milk animal within close proximity to the plant. This census was conducted in June 1994 and identified minor changes in resident & garden locations. This data is to be used in the annual dose assessment for 1994 that will be performed in the next semiannual radiological effluent report. Update of this data will provide more accurate receptor locations that is used in GASPAR's dose assessment program. These changes do not impact plant safety or safety related equipment. The practice of incineration of liquid scintillation media was discontinued several years ago; tritium can no longer be released via incineration; therefore the narrative wording is being updated to reflect.

REFERENCES:

ODCM, 1994 land use census Tech Spec 3/4.12.2 3/4 1.2, 6.13

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PART II: ITEM CLASSIFICATION

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- | | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| 1. Does this item represent: | | |
| a. A change to the facility as described in the SAFETY ANALYSIS REPORT? | [] | [X] |
| b. A change to the procedures as described in the SAFETY ANALYSIS REPORT? | [] | [X] |
| c. A test or experiment not described in the SAFETY ANALYSIS REPORT? | [] | [X] |
| 2. Does this item involve a change to the individual plant Operating License or to its Technical Specifications? | [] | [X] |
| 3. Does this item require a revision to the FSAR? | [] | [X] |
| 4. Does this item involve a change to the Off-Site Dose Calculation Manual? | [X] | [] |
| 5. Does this item constitute a change to the Process Control Program? | [] | [X] |
| 6. Does this item involve a major change to a Radwaste Treatment System? | [] | [X] |
| 7. Does this item involve a change to the Technical Specification Equipment List (BSEP and SHNPP only)? | [] | [X] |
| 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)? | [] | [X] |
| 9. Does this item involve a change to a previously accepted: | | |
| a. Quality Assurance Program | [] | [X] |
| b. Security Plan (including Training, Qualification, and Contingency Plans)? | [] | [X] |
| c. Emergency Plan? | [] | [X] |
| 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) | [] | [X] |

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.

The ODCM is being revised to update 1. Use Cases 1A-W Tech Specs
3.12.2; 6.9.1.10

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PART III: UNREVIEWED SAFETY QUESTION DETERMINATION SCREEN

DOCUMENT NO. 00cm REV. NO. 16Yes 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: _____ REV. NO. _____

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. 50cmREV. NO. 16

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

- | | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| 1. May the proposed activity increase the probability of occurrence of an accident evaluated previously in the SAFETY ANALYSIS REPORT? | [] | [X] |
| <u>Changes made were to update and re-evaluate information in ODCM. There are other administrative changes do not increase the probability of occurrence of an accident evaluated previously in the SAR.</u> | | |
| 2. May the proposed activity increase the consequences of an accident evaluated previously in the SAFETY ANALYSIS REPORT? | [] | [X] |
| <u>See item #1</u> | | |
| 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? | [] | [X] |
| <u>The proposed change is administrative to the ODCM which gives guidance on calculation of offsite dose from radiological effects. This change will not increase the probability of occurrence of a malfunction of equipment important to safety - No impact on any safety related equipment.</u> | | |
| 4. May the proposed activity increase the consequence of a malfunction of equipment important to safety evaluated previously in the SAFETY ANALYSIS REPORT? | [] | [X] |
| <u>See #3</u> | | |
| 5. May the proposed activity create the possibility of an accident of a different type than any evaluated previously in the SAFETY ANALYSIS REPORT? | [] | [X] |
| <u>This is administrative change to manual to calculate dose from effluents - possibility of an accident cannot be increased.</u> | | |

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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 4.5

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

☐ ☒

This revision to ODCM would have no impact on margin of safety as defined in Technical Specification

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:

FAR Section 15.0, ODCM Tech Spec 3/4.11.2 & 4.12 - 6.9.1.9

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

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

REVISION 16

DOCKET NOS. 50-324
50-325

CAROLINA POWER & LIGHT COMPANY

Effective Date 12-31-94

Approved By: Will [Signature]
PNSC

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6-3	4

$$Q_c = \frac{500}{\sum_i [V_i S_i]} \quad (3.1-8)$$

V_i = The constant for noble gas radionuclide i accounting for the gamma radiation from the elevated finite plume (mrem/year/ μ Ci/sec) from Table 3.1-2.

3.1.2.3 Determine Q_c based upon the skin exposure limit.

$$Q_c = \frac{3000}{\sum_i [(L_i (\bar{X}/\bar{Q}))_s + 1.1B_i] S_i} \quad (3.1-9)$$

$L_i (\bar{X}/\bar{Q})_s + 1.1B_i$ = The total skin dose constant for long-term releases (greater than 500 hours/year) due to emissions from noble gas radionuclide i (mrem/year/ μ Ci/sec) from Table 3.1-2.

NOTE: The stack radiation monitor is designed to input the monitor high-high alarm setpoint in μ Ci/sec or μ Ci/cc. The monitor setpoint in μ Ci/sec can be obtained by multiplying the lowest Q_c value (obtained from Sections 3.1.2.2 and 3.1.2.3) by the T_m value found in Section 3.1.2.5.b. The μ Ci/cc setpoint can be obtained by dividing the μ Ci/sec setpoint by the design flow rate in cc/sec. The equations for calculating the setpoint in cps are included for completeness and may be used if desired.

3.1.2.4 Determine C_c (the total maximum acceptable radioactivity concentration of noble gas radionuclides in the gaseous effluent, μ Ci/sec/cfm).

- mrem/year per $\mu\text{Ci/sec m}^{-2}$ for food and ground plane pathways
- Q_{i_s} - The release rate of radionuclide i in gaseous effluents from free-standing stack, $\mu\text{Ci/sec}$
- Q_{i_v} - The release rate of radionuclide i in gaseous effluents from all vents releases, $\mu\text{Ci/sec}$
- W_v - The highest calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to all vent releases
 - W_v = sec/m^3 for the inhalation pathway
 - W_v = meters^{-2} for the food and ground plane pathways
- W_s - The highest calculated annual average dispersion parameter for estimating the dose to an individual at the controlling location due to stack releases
 - W_s = sec/m^3 for the inhalation pathway
 - W_s = meters^{-2} for the food and ground plane pathways

Radioiodines, particulates, and tritium may be released from the stack, Reactor Buildings, and Turbine Buildings at BSEP. Radioiodines and particulates may also be released from other sources such as the decontamination facility and burning waste oil in the incinerator. Effluents from the decontamination facility and incinerator are combined with the Turbine Building's vent releases. To show compliance with 10CFR20, (see Appendix H for waste oil) Expression 3.2-9 is modified to incorporate the various release points for BSEP:

TABLE 3.2-2

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

Sector	Site Boundary	Milk Cow	Milk Goat	Meat Animal	Nearest Resident	Nearest Garden
NNE	0.7	-	-	-	0.9	1.2
NE	0.7	4.75*	-	-	-	-
ENE	0.7	-	-	-	-	-
E	0.7	-	-	-	-	-
ESE	0.7	-	-	-	1.5	-
SE	0.7	-	-	-	0.9	-
SSE	0.7	-	-	-	0.9	-
S	0.8	-	-	-	1.5	1.5
SSW	0.8	-	-	-	1.2	1.4
SW	0.7	-	-	-	1.0	1.0
WSW	0.7	-	-	-	1.0	1.0
W	0.7	-	-	-	0.8	0.8
WNW	0.6	-	-	-	0.8	1.0
NW	0.6	-	-	-	0.9	1.0
NNW	0.6	-	-	-	0.8	0.8
N	0.7	-	-	-	0.9	-

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

- sec/m³ for the inhalation pathway and tritium
- meters⁻² for the food and ground plane pathway
- W_v - The dispersion parameter for estimating the dose to an individual at the controlling location for short-term vent releases (equal to or less than 500 hours/year)
- sec/m³ for the inhalation pathway and tritium
- meters⁻² for the food and ground plane pathway
- 3.17×10^{-8} - The inverse of the number of seconds in a year
- R_i - The dose factor for each identified radionuclide i of the organ of interest, mrem/yr per $\mu\text{Ci/sec}$ per m⁻² or mrem/yr per $\mu\text{Ci/m}^3$

Radioiodines, particulates, and tritium may be released from the stack, Reactor Buildings, and Turbine Buildings at BSEP. Radioiodines and particulates, may also be released from other sources such as the decontamination facility and burning waste oil in the incinerator. Effluents from the decontamination facility and incinerator are combined with the Turbine Building's vent releases. Burning waste oil in the incinerator is limited to 0.1% of 10CFR50 Appendix I (see Appendix H for methodology and calculations). At BSEP all releases are considered long-term in duration. Therefore, incorporating the various release points into Expression 3.3-13 results in the following expressions to show compliance with 10CFR50 for a particular organ:

$$3.17 \times 10^{-8} \sum_i R_i \left[W_s Q_{is} + W_{rb} (Q_{irb1} + Q_{irb2}) + W_{tb} (Q_{itb1} + Q_{itb2}) \right]$$

≤ 15.0 mrem per quarter or 30 mrem per year

(3.3-14)