

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Unit Number 1 Type BWR
Docket No. 50-325
Thermal Power (MWH) 0.00E+00
Commercial Operation 03/18/77
Cooling Water Source Cape Fear River

Licensee Carolina Power & Light
Licensed Power (MWT) 2.44E+03
Net Electrical Power (MWH) 0.00E+00
Initial Criticality 10/08/76

Unit Number 2 Type BWR
Docket No. 50-324
Thermal Power (MWH) 1.28E+07
Commercial Operation 11/03/75
Cooling Water Source Cape Fear River

Licensee Carolina Power & Light
Licensed Power (MWT) 2.44E+03
Net Electrical Power (MWH) 3.98E+06
Initial Criticality 03/20/75

N/A = Not Applicable

N/D = Not Detectable

Page No. 1

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Measurements and Approximations of Total Radioactivity

Fission and Activation Gases

Analysis for specific radionuclides in representative grab samples ~~and particulate filters~~ by gamma spectroscopy

N/A = Not Applicable

N/D = Not Detectable

Page No. 2

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Measurements and Approximations of Total Radioactivity

Iodines

Analysis for specific radionuclides collected on charcoal cartridges by gamma spectroscopy

N/A = Not Applicable

N/D = Not Detectable

Page No. 3

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Measurements and Approximations of Total Radioactivity

Particulates

Analysis for specific radionuclides collected on filter papers by gamma spectroscopy

N/A = Not Applicable

N/D = Not Detectable

Page No. 4

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1 & 2

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Measurements and Approximations of Total Radioactivity

Liquid Effluents

Analysis for specific radionuclides by individual releases and composite sample by gamma spectroscopy

N/A = Not Applicable

N/D = Not Detectable

Page No. 5

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993 Supplemental Information

Batch Releases	First Six Months	Second Six Months
A. Liquid		
1. Number of Batch Releases -	229	227
2. Total Time Period for Batch Releases (min) -	2.40E+04	2.29E+04
3. Maximum Time Period for a Batch Release (min) -	1.77E+02	1.65E+02
4. Average Time Period for Batch Releases (min) -	1.05E+02	1.01E+02
5. Minimum Time Period for a Batch release (min) -	8.00E+00	1.40E+01
6. Average Stream Flow During Periods of Release of Effluent into a Flowing Stream (lts/min) -	2.06E+06	2.27E+06

N/A = Not Applicable

Page No. 6

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Summation of All Releases

		Quarter	Quarter	Est Total
	Unit	1	2	Error%
A. Fission and Activation Gases				
1. Total Release	Ci	N/D	9.70E+01	4.50E+01
2. Average Release Rate for Period	uci/sec	N/D	1.23E+01	
3. Percent of Technical Specification Limit	%	0.00E+00	1.96E-02	
B. Iodines				
1. Total Iodine - 131	Ci	N/D	8.27E-05	3.50E+01
2. Average Release Rate for Period	uci/sec	N/D	1.05E-05	
3. Percent of Technical Specification Limit	%			
C. Particulates				
1. Particulates with Half-Lives > 8 Days	Ci	4.36E-04	1.68E-03	3.50E+01
2. Average Release Rate for Period	uci/sec	5.61E-05	2.14E-04	
3. Percent of Technical Specification Limit	%			
4. Gross Alpha Radioactivity	Ci	1.02E-05	7.67E-06	
D. Tritium				
1. Total Release	Ci	1.08E-01	1.65E+00	3.00E+01
2. Average Release Rate for Period	uci/sec	1.39E-02	2.10E-01	
3. Percent of Technical Specification Limit	%			

N/A = Not Applicable

Page No. 7

N/D = Not Detectable

Printed: 12/7/94

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Summation of All Releases

		Quarter	Quarter	Est Total
	Unit	3	4	Error %
A. Fission and Activation Gases				
1. Total Release	Ci	1.38E+02	1.06E+02	4.50E+01
2. Average Release Rate for Period	uci/sec	1.74E+01	1.33E+01	
3. Percent of Technical Specification Limit	%	3.62E-02	2.16E-02	
B. Iodines				
1. Total Iodine - 131	Ci	1.37E-04	1.08E-04	3.50E+01
2. Average Release Rate for Period	uci/sec	1.72E-05	1.36E-05	
3. Percent of Technical Specification Limit	%			
C. Particulates				
1. Particulates with Half-Lives > 8 Days	Ci	7.24E-04	4.73E-03	3.50E+01
2. Average Release Rate for Period	uci/sec	9.52E-05	5.99E-04	
3. Percent of Technical Specification Limit	%			
4. Gross Alpha Radioactivity	Ci	1.17E-05	7.46E-06	
D. Tritium				
1. Total Release	Ci	4.60E+00	1.34E+01	3.00E+01
2. Average Release Rate for Period	uci/sec	6.03E-01	1.69E+00	
3. Percent of Technical Specification Limit	%			

Note: Since LA-140 has a half-life < 8 days it was not included in this summation.

N/A = Not Applicable

Page No. 8

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1 & 2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Elevated Release

Fission Gases Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
KR-85M			4.64E+00		
KR-87			1.46E+01		
KR-88			1.09E+01		
XE-133			2.81E-01		
XE-135M			7.93E+00		
XE-135			2.14E+01		
XE-138			4.71E+00		

N/A = Not Applicable

Page No. 9

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1 & 2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Elevated Release

Iodines Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
I-131			8.27E-05		
I-133			5.08E-04		

N/A = Not Applicable

Page No. 10

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Elevated Release

Particulates Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
CO-60		3.33E-06	2.04E-06		
SR-89			2.24E-05		
SR-90			2.43E-07		
CS-137			1.54E-06		
BA-140			1.83E-06		
H-3		5.14E-02	1.22E+00		

N/A = Not Applicable

Page No. 11

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Elevated Release

Fission Gases Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
KR-85M		5.09E+00	6.04E+00		
KR-87		2.02E+01	1.55E+01		
KR-88		1.74E+01	1.62E+01		
XE-133			6.87E-01		
XE-135		2.51E+01	2.26E+01		
XE-135M		1.11E+01	6.64E+00		
XE-138		3.10E+01	1.72E+01		

N/A = Not Applicable

Page No. 12

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Elevated Release

Iodines Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
I-131		1.35E-04	1.08E-04		
I-133		6.93E-04	6.37E-04		

N/A = Not Applicable

Page No. 13

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Printed: 12/7/94

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Elevated Release

Particulates Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
CO-60		5.20E-06	1.93E-04		
SR-89		2.20E-05	4.81E-05		
SR-90		3.85E-07	1.39E-06		
CS-137		6.50E-06	6.60E-04		
BA-140		3.69E-05	5.96E-05		
LA-140		3.33E-05	2.65E-05		
H-3		4.08E+00	1.14E+01		

N/A = Not Applicable

Page No. 14

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Ground

Release

Fission Gases Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
XE-133			4.04E+00		
XE-135M			3.64E+00		
XE-135			2.50E+01		

N/A = Not Applicable

Page No. 15

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Ground Release

Iodines Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
I-131			8.52E-08		
I-133			9.08E-07		

N/A = Not Applicable

Page No. 16

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Gaseous Effluents - Ground Release

Particulates Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
MN-54		4.38E-05	1.60E-04		
CO-60		3.55E-04	1.49E-03		
SR-89			1.07E-06		
SR-90		4.28E-07	2.24E-07		
CS-137		2.48E-05	2.67E-07		
AM-241		8.56E-06			
H-3		5.69E-02	4.24E-01		

N/A = Not Applicable

Page No. 17

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1 & 2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Ground Release

Fission Gases Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
KR-85M		3.23E-01	6.45E-01		
XE-135		2.43E+01	1.58E+01		
XE-135M		3.56E+00	4.52E+00		

N/A = Not Applicable

N/D = Not Detectable

Installation: Brunswick

Location: 20 M S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Ground Release

Iodines Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
I-131		2.12E-06	9.36E-08		
I-133		6.07E-05	2.21E-05		

N/A = Not Applicable

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Gaseous Effluents - Ground Release

Particulates Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
CR-51		1.62E-04	8.14E-04		
MN-54		2.31E-05	2.51E-05		
CO-58		1.47E-05	4.65E-05		
CO-60		4.44E-04	2.88E-03		
SR-89		2.63E-06	2.44E-06		
CS-137		2.80E-06	2.00E-06		
AM-241		2.84E-06			
H-3		7.18E-01	1.95E+00		

N/A = Not Applicable

Page No. 20

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Liquid Effluents - Summation of All Releases

		Quarter 1	Quarter 2	Est Total Error%
A. Fission and Activation Products				
1. Total Release (Not including Tritium, Gases, Alpha)	Ci	9.90E-03	1.91E-02	4.00E+01
2. Average Diluted Concentration During Period	uci/ml	5.00E-10	6.45E-10	
3. Percent of Applicable Limit	%	2.58E-02	4.78E-02	
B. Tritium				
1. Total Release	Ci	3.43E+00	5.80E+00	4.50E+01
2. Average Diluted Concentration During Period	uci/ml	1.73E-07	1.96E-07	
3. Percent of Applicable Limit	%	1.73E-02	1.96E-02	
C. Dissolved and Entrained Gases				
1. Total Release	Ci	N/D	1.50E-03	4.00E+01
2. Average Diluted Concentration During Period	uci/ml	N/D	5.07E-11	
3. Percent of Applicable Limit	%	0.00E+00	2.54E-05	
D. Gross Alpha Radioactivity				
1. Total Release	Ci	N/D	N/D	4.00E+01
E. Volume of Waste Released (Prior to Dilution)	liters	5.92E+06	8.53E+06	1.50E+01
F. Volume of Dilution Water Used During Period	liters	1.98E+10	2.96E+10	1.30E+01

N/A = Not Applicable

Page No. 21

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Liquid Effluents - Summation of All Releases

		Quarter 3	Quarter 4	Est Total Error%
A. Fission and Activation Products	Unit			
1. Total Release (Not including Tritium, Gases, Alpha)	Ci	2.59E-02	4.94E-02	4.00E+01
2. Average Diluted Concentration During Period	uci/ml	1.10E-09	1.74E-09	
3. Percent of Applicable Limit	%	5.89E-02	6.42E-02	
B. Tritium				
1. Total Release	Ci	1.09E+01	2.71E+01	4.50E+01
2. Average Diluted Concentration During Period	uci/ml	4.61E-07	9.56E-07	
3. Percent of Applicable Limit	%	4.61E-02	9.56E-02	
C. Dissolved and Entrained Gases				
1. Total Release	Ci	2.21E-03	3.30E-03	4.00E+01
2. Average Diluted Concentration During Period	uci/ml	9.36E-11	1.16E-10	
3. Percent of Applicable Limit	%	4.68E-05	5.80E-05	
D. Gross Alpha Radioactivity				
1. Total Release	Ci	N/D	N/D	4.00E+01
E. Volume of Waste Released (Prior to Dilution)	liters	6.40E+06	7.13E+06	1.50E+01
F. Volume of Dilution Water Used During Period	liters	2.36E+10	2.83E+10	1.30E+01

N/A = Not Applicable

Page No. 22

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Liquid Effluents

Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		1	2	1	2
MN-54				6.60E-04	3.68E-04
FE-55				1.14E-03	
CO-60				7.83E-03	1.81E-02
NB-95				4.73E-06	1.76E-06
CS-134					1.11E-04
CS-137				2.69E-04	5.40E-04
XE-133					2.03E-04
XE-135					1.30E-03

N/A = Not Applicable

Page No. 23

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Liquid Effluents

Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
NA-24				5.80E-06	
CR-51				4.05E-04	1.97E-02
MN-54				2.29E-04	8.54E-04
FE-55				2.51E-03	
MN-56					7.99E-04
CO-58					1.32E-03
CO-60				2.19E-02	2.44E-02
AS-76				4.47E-05	1.22E-04
SR-82					6.22E-06
TC-99M					6.97E-04
AG-110M					2.83E-05
SB-125					1.77E-04
I-131					1.18E-06
I-133					1.54E-07
CS-134				1.53E-04	1.92E-05

N/A = Not Applicable

Page No. 24

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Liquid Effluents

Nuclide Released	Unit Ci	Continuous Mode		Batch Mode	
		Quarter	Quarter	Quarter	Quarter
		3	4	3	4
CS-137				6.42E-04	2.65E-04
BA-140				4.28E-06	
CE-144					2.20E-05
W-187					1.06E-03
KR-85M					4.23E-06
XE-133				3.80E-04	6.80E-04
XE-135M					1.36E-05
XE-135				1.83E-03	2.61E-03

N/A = Not Applicable

Page No. 25

N/D = Not Detectable

Installation: Brunswick
Unit Number: 1&2

Location: 20 Mi S Wilmington, NC

Effluent and Waste Disposal Annual Report for 1993 Solid Waste and Irradiated Fuel Shipments

Solid Waste Shipped Offsite for Burial or Disposal (not irradiated fuel)

Type of Waste	Unit		Description	Est Total Error %
	First	Six Months		
A. Spent Resins, Filter Sludges, Evaporator Bottoms, etc.	m3	5.89E+00		
	m3			
	Ci	2.53E+00		1.00E+01
B. Dry Compressible Waste, Contaminated Equipment, etc.	m3	1.31E+02		
	m3			
	Ci	1.14E+01		1.00E+01
C. Irradiated Components, Control Rods, etc.	m3			
	m3			
	Ci			
D. Other (describe)	m3			
	m3			
	Ci			

Fill in a brief description for each waste volume (Ex. compacted, non-compacted, burial volume, incineration).

N/A = Not Applicable

Page No. 26

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Solid Waste and Irradiated Fuel Shipments

Solid Waste Shipped Offsite for Burial or Disposal (not irradiated fuel)

Type of Waste	Unit	Second Six Months	Description	Est Total Error %
A. Spent Resins, Filter Sludges, Evaporator Bottoms, etc.	m3	1.08E+02		
	m3			
	Ci	1.05E+03		1.00E+01
B. Dry Compressible Waste, Contaminated Equipment, etc.	m3	1.16E+02		
	m3			
	Ci	4.32E+00		1.00E+01
C. Irradiated Components, Control Rods, etc.	m3	3.11E+01		
	m3			
	Ci	1.03E+03		1.00E+01
D. Other (describe)	m3			
	m3			
	Ci			

Fill in a brief description for each waste volume (Ex. compacted, non-compacted, burial volume, incineration).

N/A = Not Applicable

Page No. 27

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Solid Waste and Irradiated Fuel Shipments

First Six Months

Estimate of Major Nuclide Composition

Type A	Nuclide	Estimate, %
	CR-51	2.46E+00
	MN-54	6.72E+00
	FE-55	4.60E+00 4.60E1
	CO-58	1.11E+00
	CO-60	3.73E+01
	NI-63	1.19E+00
	CS-137	2.49E+00

N/A = Not Applicable

Page No. 28

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993
Solid Waste and Irradiated Fuel Shipments

First Six Months

Estimate of Major Nuclide Composition

<u>Type B</u>	<u>Nuclide</u>	<u>Estimate, %</u>
	MN-54	6.12E+00
	FE-55	6.57E+01
	CO-58	3.17E+00
	CO-60	2.19E+01
	NI-63	1.69E+00

N/A = Not Applicable

Page No. 29

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Solid Waste and Irradiated Fuel Shipments

First Six Months

Solid Waste Disposition

Number of Shipments

44

Mode of Transportation

Sole use

Destination

CNSI, Barnwell, SC

Irradiated Fuel Shipments (Disposition)

Number of Shipments

2

Mode of Transportation

Railcar

Destination

CP&L/SHNPP

N/A = Not Applicable

N/D = Not Detectable

Installation: Brunswick
Unit Number: 1&2

Location: 20 Mi S Wilmington, NC

Effluent and Waste Disposal Annual Report for 1993
Solid Waste and Irradiated Fuel Shipments

Second Six Months
Estimate of Major Nuclide Composition

<u>Type A</u>	<u>Nuclide</u>	<u>Estimate, %</u>
	FE-55	6.46E+01
	CO-60	2.37E+01
	NI-63	1.08E+00
	CS-137	1.15E+00

N/A = Not Applicable
N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Solid Waste and Irradiated Fuel Shipments

Second Six Months

Estimate of Major Nuclide Composition

<u>Type B</u>	Nuclide	Estimate, %
	FE-55	4.91E+01
	CO-60	4.36E+01
	NI-63	2.25E+00

N/A = Not Applicable

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Solid Waste and Irradiated Fuel Shipments

Second Six Months

Estimate of Major Nuclide Composition

<u>Type C</u>	Nuclide	Estimate, %
	FE-55	3.15E+01
	CO-60	6.57E+01
	NI-63	2.83E+00

N/A = Not Applicable

N/D = Not Detectable

Installation: Brunswick

Location: 20 Mi S Wilmington, NC

Unit Number: 1&2

Effluent and Waste Disposal Annual Report for 1993

Solid Waste and Irradiated Fuel Shipments

Second Six Months

Solid Waste Disposition

Number of Shipments

60

Mode of Transportation

Sole use

Destination

CNSI, Bamwell, SC

Irradiated Fuel Shipments (Disposition)

Number of Shipments

8

Mode of Transportation

Railcar

Destination

CP&L/SHNPP

N/A = Not Applicable

N/D = Not Detectable