

EFFLUENT AND WASTE DISPOSAL

SEMIANNUAL REPORT

7/1/86 - 12/31/86

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON SEG PLANT - UNIT 2

FACILITY OPERATING LICENSE NO. DPR-23

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TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
I. EXECUTIVE SUMMARY.....	4
A. Significant Variances.....	4
B. Regulatory Compliance.....	6
II. SUPPLEMENTAL INFORMATION.....	7
A. Regulatory Limits.....	7
B. Measurements and Approximations.....	7
C. Estimated Total Errors.....	9
III. GASEOUS EFFLUENTS.....	10
A. Batch Releases.....	10
B. Abnormal Releases.....	10
C. Data Tables.....	10
IV. LIQUID EFFLUENTS.....	14
A. Batch Releases.....	14
B. Abnormal Releases.....	14
C. Data Tables.....	14
V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS.....	18
A. Waste Class A.....	18
B. Waste Class B.....	20
C. Irradiated Fuel Shipments.....	20
VI. ANNUAL GASEOUS DOSE ASSESSMENTS.....	22
A. Population Distribution.....	22
B. Food Production Distribution.....	22
C. Food Production Total.....	33
D. Source Terms and Meteorological Inputs.....	33
E. Maximum Individual Doses.....	33
F. Integrated Population Doses.....	33
VII. ANNUAL LIQUID DOSE ASSESSMENTS.....	36
A. Environmental Inputs and Assumptions.....	36
B. Recreational Activities.....	40
C. Maximum Individual Doses.....	41
D. Integrated Population Doses.....	41

TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
VIII. METEOROLOGICAL DATA.....	45
A. Continuous Release Diffusion Analysis.....	45
B. Mixed Mode Batch Release Diffusion Analysis	54
C. Ground Level Batch Release Diffusion Analysis	63

I. EXECUTIVE SUMMARY

Significant Variances

A. The following are explanations of significant variances in this Semiannual Report:

1. A minimum time for release of 17 minutes was reported for gaseous batch releases. This release was a low volume Waste Gas Decay Tank released because of its hydrogen/oxygen ratio.
2. The Total Fission and Activation Gases released in Gaseous Effluents in the Third Quarter was 2.16E+01 Curies. The Total Fission and Activation Gases released in the Fourth Quarter was 2.62E+02 Curies, a factor of 12 higher. This variance was due to a trip of the Unit causing an increase in the concentration of gases in gaseous effluents.
3. The Total Tritium released in liquid effluents in the Third Quarter was 2.53E+02 Curies. The Total Tritium released in the Fourth Quarter was 3.12E+01 Curies, a factor of 8 lower than the Third Quarter. This variance was due to the following:
 - a. The number of releases: Third Quarter 90 releases
Fourth Quarter 27 releases
 - b. The tritium concentrations from monthly composite tritium analysis:

	<u>Third Quarter</u>	<u>Fourth Quarter</u>
July	1.03E-01 uCi/ml	October 2.54E-02 uCi/ml
August	1.03E-01 uCi/ml	November 3.93E-02 uCi/ml
September	4.09E-02 uCi/ml	December 7.86E-02 uCi/ml

The higher concentrations in the Third Quarter were due to the processing and release of more CVCS Tanks versus Waste Tanks.

4. The Total Dissolved and Entrained Gases released in Liquid Effluents in the Third Quarter was 7.23 E-05 Curies. The Fourth Quarter Dissolved and Entrained Gases released was 1.02 E-02 Curies, a factor of 141 higher. This increase was due to a trip of the Unit causing an increase of gaseous activity in Liquid Effluents.
5. The Volume of Radwaste shipped offsite for this reporting period was reduced from 306 m³ for the first six months, 1986, to 147 m³, a reduction of 52 percent.

6. The 10CFR50 Appendix I, Percent of Limits, were calculated from the last posted release for the period indicated using the Nuclear Data LRW/GRW (ODCM methodology) release permit generating system. The following is a summary of the comparison of the annual dose commitment of the ODCM and LADTAP/GASPAR dose programs.

<u>GASEOUS</u>	<u>UNITS</u>	<u>LRW/GRW</u>	<u>LADTAP/GASPAR</u>
Annual Beta Air Dose	mrad	2.12E+00	1.12E-01
Annual Gamma Air Dose	mrad	7.41E-01	4.20E-02
I-131, 133, Tritium & Part. >8 Day Dose	mrad	4.94E+00	3.44E-01
 <u>LIQUID</u>			
Total Body Dose	mrem	2.36E-01	6.60E-02
Critical Organ Dose	mrem	3.30E-01	9.70E-02

The annual gaseous dose commitment was calculated with GASPAR using batch mixed mode, continuous mixed mode, and continuous ground level concurrent meteorology. The ODCM (GRW software) provides day-by-day dose estimates that are higher because all releases are assigned to the limiting receptor, continuous ground level, and annual average meteorology from 1978.

The annual liquid dose commitment are lower with LADTAP when total annual dilution flow is used. Day-by-day dose estimates provided by LRW software utilize dilution flow during actual release periods.

B. Regulatory Compliance

Whether projected on a day-by-day basis utilizing conservative meteorological conditions or estimated with concurrent conditions, the dose commitment from gaseous and liquid effluents is a small fraction of the 10CFR50, Appendix I limits. The direct radiation assessment to the likely most exposed member of the public is reported in the Annual Radiological Environmental Operating Report. The results of the assessment demonstrates no measurable affect above background from Plant operations, and since no 10CFR50 Appendix I limits have been exceeded, and there are no other nearby uranium fuel cycle sources to be considered, this demonstrates conformance with 40CFR190, Environmental Radiation Protection Standards for Nuclear Power Operation.

There were no changes to the waste solidification process control program (PCP) during 1986.

There were no changes to the Radioactive Waste Systems (liquid, gaseous, or solid) during 1986.

There were no reportable instrumentation inoperability events during 1986.

Revision 3 of the Offsite Dose Calculation Manual (ODCM) was reviewed and approved by the Plant Nuclear Safety Committee (PNSC) on August 22, 1986. These changes do not reduce the accuracy or reliability of the dose calculations or setpoint determinations.

II. SUPPLEMENTAL INFORMATION

A. Regulatory Limits

1. Fission and Activation Gases:
 - 10CFR20 Limits (Instantaneous Release Rate)
 - Total Body Dose <500 mrem/yr
 - Skin Dose <3000 mrem/yr
 - 10CFR50, Appendix I
 - For Calendar Quarter
 - Gamma Dose <5 mrad
 - Beta Dose <10 mrad
 - For Calendar Year
 - Gamma Dose <10 mrad
 - Beta Dose <20 mrad
2. Iodine - 131, 133, and 135; Tritium, and Particulates ≥ 8 day half-lives:
 - 10CFR20 Limits (Instantaneous Release Rate)
 - Dose from Inhalation (only) to a child to any organ <1500 mrem/yr
 - 10CFR50, Appendix I (Organ Doses)
 - For Calendar Quarter <7.5 mrem
 - For Calendar Year <15 mrem
3. Liquids:

Concentrations are specified in 10CFR20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2.00E-04$ $\mu\text{Ci/ml}$ total activity.

 - 10CFR50, Appendix I
 - For Calendar Quarter
 - Total Body Dose <1.5 mrem
 - Any Organ Dose <5 mrem
 - For Calendar Year
 - Total Body Dose <3 mrem
 - Any Organ Dose <10 mrem

B. Measurements and Approximations of Total Radioactivity

1. Continuous Gaseous Releases
 - a. Fission and Activation Gases - The total activity released is determined from the net count rate of the gaseous monitor, its calibration factor, and the total exhaust flow. The activity of radiogas is determined by the fraction of that radiogas in the isotopic analysis for that period.

- b. Iodines - The activity released as iodine-131, 133, and 135 is based on isotopic analysis of the charcoal cartridge and particulate filter and the total vent flow.
- c. Particulates - The activity released via particulates with half-lives greater than eight days is determined by isotopic analysis of particulate filters and the total vent flow.
- d. Tritium - The activity released as tritium is based on weekly grab sample analysis and total vent flow.

2. Batch Gaseous Releases

- a. Fission and Activation Gases - The activity released is based on the volume released and the activity of the individual nuclides obtained from an isotopic analysis of the grab sample taken prior to the release.
- b. Iodines - The iodines from batch releases are included in the iodine determination from the continuous Auxiliary Building release.
- c. Particulates - The particulates from batch releases are included in the particulate determination from the continuous Auxiliary Building release.
- d. Tritium - The activity released as tritium is based on the grab sample analysis of each batch and the batch volume.

3. Liquid Releases

- a. Fission and Activation Products - The total release values (not including tritium, strontium, iron-55, and alpha) are comprised of the sum of the individual radionuclide activities in each batch released to the discharge canal for the respective quarter. These values represent the activity known to be present in the liquid radwaste effluent.
- b. Tritium & Alpha - The measured tritium and alpha concentrations in a composite sample are used to calculate the total release and average diluted concentration during each period.
- c. Strontium-89, 90, and Iron-55 - The total release values are measured quarterly from composite samples.

C. Estimated Total Errors

1. Estimated total errors for gaseous effluents are based on uncertainties in counting equipment calibration, counting statistics, vent flow rates, vent sample flow rates, non-steady release rates, chemical yield factors, and sample losses for such items as charcoal cartridges.
2. Estimated total errors for liquid effluents are based on uncertainties in counting equipment calibration, counting statistics, non-steady release flow rate, sampling and mixing losses, and volume determinations.
3. Estimated total errors for solid waste are based on uncertainties in equipment calibration, dose rate measurements, geometry, and volume determinations.

III. GASEOUS EFFLUENTS

A. Batch Releases

1. Number of Batch Releases	<u>9.90E+01</u>
2. Total Time Period for Batch Releases	<u>5.13E+04</u> Min
3. Maximum Time Period for a Batch Release	<u>1.71E+03</u> Min
4. Average Time Period for Batch Releases	<u>5.18E+02</u> Min
5. Minimum Time Period for a Batch Release	<u>1.70E+01</u> Min

B. Abnormal Releases

1. Number of Releases	<u>1.00E+00</u>
2. Total Activity Released	<u>4.88E-07</u> Curies
3. This abnormal release occurred during the decontamination of a Reactor Coolant Pump Shaft. The Shaft was housed in a temporary structure and the release was monitored.	

C. Data Tables

The following tables provide the details of gaseous releases:

Table III-A	Summation of all Releases
Table III-B	Ground Level and Mixed Mode Releases
Table III-C	Lower Limits of Detection

TABLE III-A
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	3RD QUARTER	4TH QUARTER
A. Fission and Activation Gases:			
1. Total Release	Ci	<u>2.16E+01</u>	<u>2.62E+02</u>
2. Estimated Total Error	%	<u>6.00E+01</u>	<u>6.00E+01</u>
3. Average Release Rate for Period	μCi/sec	<u>2.71E+00</u>	<u>3.30E+01</u>
4. Percent of 10CFR50, Appendix I*			
<u>Quarterly Limit</u>			
Gamma Air	%	<u>1.00E+00</u>	<u>7.80E+00</u>
Beta Air	%	<u>1.10E+00</u>	<u>8.10E+00</u>
<u>Yearly Limit</u>			
Gamma Air	%	<u>3.50E+00</u>	<u>7.40E+00</u>
Beta Air	%	<u>6.50E+00</u>	<u>1.06E+01</u>
B. Iodines, Particulates, and Tritium:			
<u>Iodines</u>			
1. Total Iodine - 131	Ci	<u>9.90E-04</u>	<u>4.46E-03</u>
2. Estimated Total Error	%	<u>4.00E+01</u>	<u>4.00E+01</u>
3. Average Release Rate	μCi/sec	<u>1.24E-04</u>	<u>5.61E-04</u>
<u>Particulates</u>			
1. Particulates with Half-Lives >8 days	Ci	<u>2.51E-05</u>	<u>1.09E-06</u>
2. Estimated Total Error	%	<u>4.00E+01</u>	<u>4.00E+01</u>
3. Average Release Rate for Period	μCi/sec	<u>3.15E-06</u>	<u>1.37E-07</u>
4. Gross Alpha Radioactivity	Ci	<u>0.00E+00</u>	<u>0.00E+00</u>
<u>Tritium</u>			
1. Total Release	Ci	<u>3.59E+00</u>	<u>3.24E+00</u>
2. Estimated Total Error	%	<u>3.00E+01</u>	<u>3.00E+01</u>
3. Average Release Rate for Period	μCi/sec	<u>4.52E-01</u>	<u>4.08E-01</u>
Percent of 10CFR50, Appendix I*			
<u>Quarterly Limit</u>			
Organ Thyroid	%	<u>2.60E+00</u>	<u>1.06E+01</u>
<u>Yearly Limit</u>			
Organ Thyroid	%	<u>2.73E+01</u>	<u>3.29E+01</u>

*The percent of 10CFR50, Appendix I Limits are based on the methodology used in the Offsite Dose Calculation Manual.

TABLE III-B
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 GASEOUS EFFLUENTS - GROUND LEVEL AND MIXED MODE RELEASES

UNITS	CONTINUOUS MODE		BATCH MODE		
	3RD QUARTER	4TH QUARTER	3RD QUARTER	4TH QUARTER	
1. FISSION GASES					
Ar-41	Ci	<LLD	<LLD	1.92E+00	1.95E+00
Kr-85m	Ci	<LLD	1.94E+00	7.55E-04	9.06E-02
Kr-85	Ci	1.67E+01	<LLD	1.59E-02	2.11E-01
Kr-87	Ci	<LLD	<LLD	<LLD	3.47E-04
Kr-88	Ci	<LLD	<LLD	<LLD	3.37E-04
Xe-131m	Ci	<LLD	<LLD	8.25E-04	4.54E-01
Xe-133m	Ci	<LLD	<LLD	8.51E-03	2.37E-01
Xe-133	Ci	1.17E+00	2.10E+02	1.21E+00	2.11E+01
Xe-135m	Ci	<LLD	<LLD	1.82E-04	<LLD
Xe-135	Ci	4.14E-01	2.58E+01	1.77E-01	4.48E-01
Total	Ci	1.83E+01	2.38E+02	3.33E+00	2.45E+01
2. IODINES ¹					
I-131	Ci	9.90E-04	4.46E-03		<LLD
I-133	Ci	6.00E-04	2.39E-04		<LLD
I-135	Ci	<LLD	<LLD		<LLD
Total	Ci	1.59E-03	4.70E-03		<LLD
3. PARTICULATES ¹					
H-3	Ci	2.15E+00	2.11E+00	1.44E+00	1.13E+00
Cr-51	Ci	4.32E-06	<LLD		<LLD
Mn-54	Ci	<LLD	<LLD		1.58E-08
Co-58	Ci	2.02E-05	6.04E-07		7.95E-08
Co-60	Ci	5.50E-07	<LLD		3.92E-07
Total	Ci	2.15E+00	2.11E+00	1.44E+00	1.13E+00

¹Continuous Accountability includes Containment and Auxiliary Building Batch Accountability (excludes H-3). Batch particulates in fourth quarter are from abnormal release.

TABLE III-C
TYPICAL LOWER LIMITS OF DETECTION FOR GASEOUS EFFLUENTS

<u>Nuclide</u>	<u>LLD ($\mu\text{Ci/cc}$)</u>
H-3	1.00E-06
Ar-41	2.00E-06
Cr-51	1.40E-13
Mn-54	1.00E-11
Co-58	1.00E-11
Fe-59	1.00E-11
Co-60	1.00E-11
Zn-65	1.00E-11
Kr-85	8.90E-05
Kr-85m	3.50E-04
Kr-87	1.00E-04
Kr-88	1.00E-04
Sr-89	1.00E-11
Sr-90	1.00E-11
Nb-95	3.70E-14
Mo-99	1.00E-11
Ru-103	3.00E-13
I-131	1.00E-12
Xe-131m	1.20E-06
I-133	1.00E-10
Xe-133	1.00E-04
Xe-133m	1.00E-04
Cs-134	1.00E-11
I-135	1.60E-09
Xe-135	1.00E-04
Xe-135m	9.30E-05
Cs-137	1.00E-11
Xe-138	1.00E-04
Ba/La-140	1.00E-13
Ce-141	1.00E-11
Ce-144	1.00E-11
Gross Alpha	1.00E-11

IV. LIQUID EFFLUENTS

A. Batch Releases

1. Number of Batch Releases	<u>1.17E+02</u>
2. Total Time Period for Batch Releases	<u>2.81E+04</u> Min
3. Maximum Time Period for a Batch Release	<u>1.04E+03</u> Min
4. Average Time Period for Batch Releases	<u>2.40E+02</u> Min
5. Minimum Time Period for a Batch Release	<u>9.00E+01</u> Min
6. Average Stream Flow During Release Periods	<u>4.00E+05</u> GPM

B. Abnormal Releases

1. Number of Releases	<u>0.00E+00</u>
2. Total Activity Released	<u>0.00E+00</u> Curies

C. Data Tables

The following tables provide the details of liquid releases:

Table IV-A	Summation of all Releases
Table IV-B	Liquid Effluents
Table IV-C	Lower Limits of Detection

TABLE IV-A
 EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT - 1986
 LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	UNITS	3rd QUARTER	4th QUARTER
A. FISSION AND ACTIVATION PRODUCTS			
1. Total Releases	Ci	1.40E-02	1.05E-02
2. Total Estimated Error	%	2.00E+01	2.00E+01
3. Average Diluted Concentration	µCi/ml	4.56E-11	4.11E-11
B. TRITIUM			
1. Total Release	Ci	2.53E+02	3.12E+01
2. Estimated Total Error	%	1.00E+01	1.00E+01
3. Average Diluted Concentration	µCi/ml	8.25E-07	1.22E-07
C. DISSOLVED AND ENTRAINED GASES			
1. Total Release	Ci	7.23E-05	1.02E-02
2. Estimated Total Error	%	2.00E+01	2.00E+01
3. Average Diluted Concentration	µCi/ml	2.36E-13	3.99E-11
4. Percent of Applicable Limit	%	1.18E-07	1.99E-05
D. GROSS ALPHA RADIOACTIVITY			
1. Total Release	Ci	<LLD	<LLD
2. Estimated Total Error	%	6.00E+01	6.00E+01
E. VOLUME OF WASTE RELEASED			
	Liters	2.91E+06	8.44E+05
F. VOLUME OF DILUTION WATER			
	Liters	3.07E+11	2.56E+11
G. PERCENT OF 10CFR50 APPENDIX I*			
<u>Quarterly Limit</u>			
Organ Liver	%	1.35E-01	1.29E-01
Total Body	%	3.31E-01	3.06E-01
<u>Yearly Limit</u>			
Organ Liver	%	3.28E+00	3.30E+00
Total Body	%	7.80E+00	7.90E+00

*The percent of 10CFR50 Appendix I Limits are based on the methodology used in the Offsite Dose Calculation Manual.

TABLE IV-B
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT - 1986
 LIQUID EFFLUENTS

NUCLIDES RELEASED	UNITS	CONTINUOUS MODE		BATCH MODE	
		3rd QUARTER	4th QUARTER	3rd QUARTER	4th QUARTER
Mn-54	Ci	<LLD	<LLD	1.19E-04	2.28E-04
Mn-56	Ci	<LLD	<LLD	2.79E-06	<LLD
Fe-55	Ci	<LLD	<LLD	1.06E-03	1.23E-04
Co-57	Ci	<LLD	<LLD	1.30E-06	5.44E-06
Co-58	Ci	<LLD	<LLD	5.79E-03	7.50E-03
Co-60	Ci	<LLD	<LLD	5.62E-03	8.37E-04
Sr-92	Ci	<LLD	<LLD	2.34E-05	<LLD
Nb-95	Ci	<LLD	<LLD	8.79E-05	<LLD
Ag-110m	Ci	<LLD	<LLD	3.19E-05	<LLD
I-131	Ci	<LLD	<LLD	1.90E-04	7.38E-04
I-133	Ci	<LLD	<LLD	2.11E-05	<LLD
Cs-134	Ci	<LLD	<LLD	2.28E-04	2.71E-04
Cs-137	Ci	<LLD	<LLD	7.75E-04	7.54E-04
Ce-144	Ci	<LLD	<LLD	7.34E-06	<LLD
Total	Ci	<LLD	<LLD	1.40E-02	1.05E-02
Kr-87	Ci	<LLD	<LLD	6.86E-06	<LLD
Xe-133	Ci	<LLD	<LLD	6.54E-05	1.01E-02
Xe-133m	Ci	<LLD	<LLD	<LLD	7.20E-05
Xe-135	Ci	<LLD	<LLD	<LLD	1.34E-05
Total	Ci	<LLD	<LLD	7.23E-05	1.02E-02

TABLE IV-C
TYPICAL LOWER LIMITS OF DETECTION FOR LIQUID EFFLUENTS

<u>NUCLIDE</u>	<u>LLD ($\mu\text{Ci/ml}$)</u>
H-3	1.00E-05
Na-24	2.10E-07
Cr-51	7.10E-06
Mn-54	5.00E-07
Fe-55	1.00E-06
Co-57	1.20E-07
Co-58	5.00E-07
Fe-59	5.00E-07
Co-60	5.00E-07
Zn-65	5.00E-07
Sr-89	5.00E-08
Sr-90	5.00E-08
Nb-95	1.10E-07
Zr-95	2.00E-07
Nb-97	3.00E-07
Mo-99	5.00E-07
Tc-99m	6.60E-08
I-131	1.00E-06
Xe-133	1.00E-05
Xe-133m	1.00E-05
Cs-134	5.00E-07
Xe-135	1.00E-05
Cs-137	5.00E-07
Ba/La-140	2.40E-07
Ce-141	5.00E-07
Ce-144	5.00E-07
Gross Alpha	1.00E-07

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
REPORT TIME PERIOD JULY 1 TO DECEMBER 31 YEAR 1986

A. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

WASTE CLASS A

1. Type of waste	Unit	6-month Period	Est. Total Error %	Solid. Agent	Cont. Type	Form	No. Ship.
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	9.86E+01 1.70E+01	2.00E+01	cement	STP	Solidified	13
b. Dry compressible waste, contaminated equip., etc.	m ³ Ci	4.51E+01 2.10E+01	2.00E+01	NA	STP	Compacted Uncompacted	8
c. Irradiated components, control rods, etc.	m ³ Ci	0.00E+00 0.00E+00	0.00E+00	NA	NA	NA	NA
d. Other (describe)	m ³ Ci	0.00E+00 0.00E+00	0.00E+00	NA	NA	NA	NA

2. Estimate of major nuclide composition (by type of waste) 3. Solid Waste Disposition

		Ci	
a.	Co-58	29.37%	4.98E+00
	Co-60	13.55%	2.30E+00
	Cr-51	1.37%	2.33E-01
	Cs-134	2.21%	3.76E-01
	Cs-137	6.20%	1.05E+00
	Fe-55	14.00%	2.38E+00
	Ni-63	1.82%	3.08E-01
	H-3	29.45%	5.00E+00
	Others*	2.03%	3.45E-01
b.	Co-58	1.94%	4.09E-01
	Co-60	3.40%	7.15E-01
	Cs-134	2.16%	4.53E-01
	Cs-137	3.32%	6.97E-01
	Fe-55	84.51%	1.78E+01
	Ni-63	3.96%	8.33E-01
	Others **	0.72%	1.51E-01

Number of Shipments ***
 Mode of Transportation
 Destination

14
 Sole Use Vehicle
 Barnwell, S. C.

* Others include: Ag-110m, Co-57, Mn-54, Zn-65, Nb-95, Sb-124, Sn-113, Zr-95, Sr-89, Pu-241, C-14, Sb-125, Te-125m, I-131, Xe-131m, Cm-242, Pu-238, Pu-239, Sr-90, Fe-59, Tc-99.

** Others include: Ag-110m, Co-57, Cr-51, Mn-54, Nb-95, Zr-95, Sr-89, C-14, H-3, Sb-124, Pu-238.

*** Total number of shipments in Section 1 does not add to total in Section 3 because of seven mixed waste shipments.

V. SOLID WASTE AND IRRADIATED FUEL SHIPMENTS
 REPORT TIME PERIOD JULY 1 TO DECEMBER 31 YEAR 1986

B. SOLID WASTE SHIPPED OFFSITE FOR BURIAL OR DISPOSAL (not irradiated fuel)

WASTE CLASS B

1. Type of waste	Unit	6-month Period	Est. Total Error %	Solid. Agent	Cont. Type	Form	No. Ship.
a. Spent resins, filter sludges, evaporator bottoms, etc.	m ³ Ci	3.37E+00 2.48E+01	2.00E+01	NA	HIC, STP	Dewatered Filters	1
b. Dry compressible waste, contaminated equip., etc.	m ³ Ci	0.00E+00 0.00E+00	2.00E+01	NA	NA	NA	NA
c. Irradiated components, control rods, etc.	m ³ Ci	0.00E+00 0.00E+00	0.00E+00	NA	NA	NA	NA
d. Other (describe)	m ³ Ci	0.00E+00 0.00E+00	0.00E+00	NA	NA	NA	NA

2. Estimate of major nuclide composition (by type of waste) 3. Solid Waste Disposition

		Ci	
a.	Cr-51	2.00%	5.04E-01
	Fe-55	9.15%	2.26E+00
	Co-58	71.10%	1.76E+01
	Co-60	12.30%	3.05E+00
	Nb-95	1.30%	3.13E-01
	Others*	4.20%	1.03E+00

Number of Shipments 1
 Mode of Transportation Sole Use Vehicle
 Destination Barnwell, S. C.

* Others include: Mn-54, Fe-59, Co-57, Ni-63, Zn-65, Sr-89, Sr-90, Zr-95, Tc-99, Ag-110m, Cd-109, Sn-113, Sb-124, I-129, Cs-134, Cs-137, Pu-238, Pu-239, Pu-241, Am-241, Cm-242, Cm-244, C-14, H-3.

C. IRRADIATED FUEL SHIPMENTS (Disposition)

Number of Shipments 0
 Mode of Transportation NA
 Destination NA

VI. ANNUAL GASEOUS DOSE ASSESSMENTS

A. Population Distribution

The population distribution was taken from the updated FSAR 2.1.3 based on the 1980 U. S. Bureau of the Census data projected for the year 1986.

B. Food Production Distribution

Food yields of agricultural commodities were calculated with the aid of factors published by the USDA⁽¹⁾. The commodities are summarized in Tables VI-A and VI-B.

(1) USDA:ERS, "Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products," Statistical Bulletin No. 362 (June 1963).

TABLE VI-A

H. B. Robinson Unit #2

September, 1976

page 1 of 8

Agricultural Production in Counties Within 50 Miles of the Robinson Nuclear Plant

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier ^h	Preparation Modifier ^a	Food Yield (kg)
<u>Anson County, N. Carolina</u>						
Grain	43,200	0.27	4.7E7	Tg	b	5.6E6
Vegetables & Berries						6.7E5
leafy	165	1.08	7.1E5	l		1.2E6
exposed	300	1.37	1.6E6	Tg		6.9E5
root	90	1.92	6.9E5	Tc		3.5E6
Fruits	1099	0.93	4.1E6	l		
Meat						7.2E5
hogs	13,650				c	1.9E6
cattle	10,170				d	1.0E7
poultry	3.5E6				e	1.5E5
Eggs			1.5E5		f	2.4E6(1)
Milk			2.4E6(1)		g	
<u>Richmond County, N. Carolina</u>						
Grain	14,900	0.22	1.3E7	Tg	b	3.5E6
Vegetables & Berries						1.2E4
leafy	5	0.60	1.2E4	l		3.2E6
exposed	865	1.38	4.8E6	Tg		2.8E5
root	40	1.73	2.8E5	Tc		3.0E6
Fruit	1600	0.55	3.5E6	l		
Meat						7.9E5
hogs	15,000				c	2.6E5
cattle	1,400				d	5.5E6
poultry	4.8E6				e	1.0E6
Eggs			1.0E6		f	1.4E5
Nuts	250	0.19	1.9E5	Tg		

TABLE VI-A (Cont.)

H. B. Robinson Unit #2

September, 1976
page 2 of 8

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier ^h	Preparation Modifier ^a	Food Yield (kg)
<u>Scotland County, N. Carolina</u>						
Grain	16,215	9.29	1.9E7	Tg	b	2.7E6
Vegetables & Berries			4.5E5	l		4.5E5
leafy	125	0.90	7.0E6	Tc		5.6E6
exposed	830	2.10				
Meat					c	2.4E6
hogs	45,100				d	1.6E5
cattle	875				e	3.3E3
poultry	3,000		3.2E5		f	3.2E5
Eggs						
<u>Union County, N. Carolina</u>						
Grain	112,850	0.30	1.4E8	Tg	b	1.8E7
Vegetables & Berries			8.2E5	l		8.1E5
leafy	115	1.78	1.6E6	Tg		8.8E5
exposed	267	1.48	4.1E5	Tc		4.1E5
root	76	1.35	5.9E4			5.9E4
Fruits	33	0.45				
Meat					c	2.1E6
hogs	39,950				d	1.4E6
cattle	7,400				e	2.6E7
poultry	2.4E7				f	1.3E6
Eggs			1.3E6		g	1.4E7(1)
Milk			1.4E7(1)			1.1E4
Nuts	75	0.09	2.7E4	Tg		

TABLE VI-A (Cont.)

H. B. Robinson Unit #2

September, 1976

page 3 of 8

Enclosure 1 to Serial: RNP/87-508
Page 25 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Chesterfield County</u>						
Grain	61,970	0.127	3.1E7	Tg	b	5.5E6
Vegetables & Berries						
leafy	228	0.71	6.8E4	l		5.8E4
exposed	3,603	1.04	1.5E7	Tg		1.2E7
Fruit				l		
Meat						
hogs	9,933				c	5.2E5
cattle	3,646				d	6.7E5
poultry					e	1.2E7
Eggs			2.3E6		f	2.3E6
Milk			1.4E5(1)		g	1.4E5(1)
<u>Clarendon County</u>						
Grain	101,590	0.235	9.5E7	Tg	b	1.38E7
Vegetables & Berries						
leafy	52	1.43	3.0E5	l		3.0E5
exposed	41	0.86	1.4E5	Tg		1.0E5
Meat						
hogs					c	2.0E6
cattle					d	2.6E5
poultry					e	1.6E7
Eggs			5.2E6		f	5.2E6
Milk			3.0E6		g	3.0E6
Nuts	140	0.11	6.2E4	Tg		4.4E4

TABLE VI-A (Cont.)

September, 1976

page 4 of 8

H. B. Robinson Unit #2

Enclosure 1 to Serial: RNP/87-508
Page 26 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Darlington County</u>						
Grain	89,690	0.158	5.67E7	Tg	b	9.88E6
Vegetables & Berries				l		4.0E5
leafy	97	1.12	4.3E5	Tg		1.9E6
exposed	524	1.17	2.4E6			
Meat					c	9.4E5
hogs	17,931				d	3.0E5
cattle	1,648				e	1.3E7
poultry			2.4E6		f	2.4E6
Eggs			5.3E6(1)		g	5.3E6(1)
Milk						
<u>Dillon County</u>						
Grain	57,560	0.181	4.17E7	Tg	b	7.20E6
Vegetables & Berries				l		1.20E5
leafy	21	1.43	1.20E5	Tg		5.30E4
exposed	21	0.85	7.16E4			
Meat					c	5.20E5
hogs	9,930				d	1.60E5
cattle	890				e	1.60E6
poultry	1,438,080		3.04E5		f	3.04E5
Eggs			3.21E5(1)		g	3.21E5
Milk						

TABLE VI-A (Cont.)

September, 1976

page 5 of 8

H. B. Robinson Unit #2

Enclosure 1 to Serial: RNP/87-508
Page 27 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Florence County</u>						
Grain	121,510	0.22	1.05E8	Tg	b	1.53E7
Vegetables & Berries				l		1.13E6
leafy	296	1.05	1.24E6	Tg		1.03E5
exposed	69	0.69	1.89E5			1.44E6
Meat					c	2.26E5
hogs	27,348				d	2.70E7
cattle	1,236				e	5.18E6
poultry	2.45E7				f	3.01E6(1)
Eggs			5.18E6		g	7.59E5
Milk			3.01E6(1)			
Nuts	1,530	0.18	1.07E6	Tg		
<u>Kershaw County</u>						
Grain	26,030	0.15	1.57E7	Tg	b	2.22E6
Vegetables & Berries				l		2.00E5
leafy	38	1.33	2.02E5	Tg		4.25E6
exposed	1,341	1.00	5.37E6			4.81E5
Meat					c	5.13E5
hogs	9,159				d	8.00E6
cattle	2,802				e	1.54E6
poultry	727,636				f	4.52E5(1)
Eggs			1.54E6		g	8.70E4
Milk			4.52E5(1)			
Nuts	135	0.23	1.23E5	Tg		

TABLE VI-A (Cont.)

H. B. Robinson Unit #2

September, 1976

page 6 of 8

Enclosure 1 to Serial: RNP/87-508
Page 28 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Lancaster County</u>						
Grain	5,670	0.20	4.62E6	Tg	b	5.73E5
Vegetables & Berries						1.10E5
leafy	26	1.19	1.24E5	l		1.12E6
exposed	357	0.99	1.41E6	Tg		
Meat					c	1.96E5
hogs	3,741				d	4.79E5
cattle	2,616				e	7.64E6
poultry	6.94E6				f	1.47E6
Eggs			1.47E6		g	5.67E5(1)
Milk			5.76E(1)			
<u>Lee County</u>						
Grain	70,650	0.154	4.35E7	Tg	b	8.78E6
Vegetables & Berries						4.36E5
leafy	104	1.10	4.59E5	l		2.75E5
exposed	111	0.818	3.63E5	Tg		
Meat					c	6.23E5
hogs	11,868				d	1.47E5
cattle	803				e	7.03E5
poultry	639,520				f	1.35E5
Eggs			1.35E5		g	2.19E6(1)
Milk			2.19E6(1)			1.45E6
Nuts	2,200	0.233	2.05E6	Tg		

H. B. Robinson Unit #2

TABLE VI-A (Cont.)

September, 1976

page 7 of 8

Enclosure 1 to Serial: RNP/87-508
Page 29 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Marion County</u>						
Grain	40,360	0.204	3.29E7	Tg	b	4.40E6
Vegetables & Berries						7.69E4
leafy	14	1.37	7.69E4	l		1.72E4
exposed	6	0.896	2.15E4	Tg		
Meat					c	1.07E6
hogs	20,382				d	1.51E5
cattle	824				e	3.55E6
poultry	3.23E6		6.83E5		f	6.83E5
Eggs			3.79E5(1)		g	3.79E5(1)
Milk						
<u>Marlboro County</u>						
Grain	70,810	0.159	4.51E7	Tg	b	6.91E6
Vegetables & Berries						7.61E5
leafy	125	1.53	7.64E5	l		1.13E6
exposed	450	0.816	1.47E6	Tg		
Meat					c	3.86E5
hogs	7,353				d	3.02E5
cattle	1,648				e	7.04E5
poultry	640,080		1.35E5		f	1.35E5
Eggs			1.18E6		g	1.18E6
Milk						

H. B. Robinson Unit #2

TABLE VI-A (Cont.)

September, 1976

page 8 of 8

Enclosure 1 to Serial: RRPD/87-508
Page 30 of 71

Commodity	Acreage or Slaughter	Specific Yield (kg/m ²)	Total Yield (kg)	Absorption Modifier	Preparation Modifier	Food Yield (kg)
<u>Richland County</u>						
Grain	41,150	0.222	3.65E7	Tg	b	7.73E6
Vegetables & Berries						2.31E5
leafy	59	1.12	2.64E5	l		1.72E5
exposed	94	0.757	2.85E5	Tg		
Meat					c	4.94E5
hogs	9,417				d	4.18E5
cattle	2,287				e	1.32E7
poultry	1.20E7		2.53E6		f	2.53E6
Eggs			4.86E6(1)		g	4.86E(1)
Milk						
<u>Sumpter County</u>						
Grain	93,540	0.222	8.31E7	Tg	b	1.17E7
Vegetables & Berries						3.04E5
leafy	60	1.29	3.10E5	l		5.25E5
exposed	201	0.862	6.93E5	Tg		
Meat					c	1.42E6
hogs	26,961				d	3.66E5
cattle	1,998				e	2.30E6
poultry	2,091,600		4.42E5		f	4.42E5
Eggs			8.54E6(1)		g	8.54E6(1)
Milk			4.53E6	Tg		3.21E6
Nuts	5,600	0.202				

Notes to Table VI-A

- a. Factors for converting total yield to edible food yield were obtained from "Conversion Factors and Weights and Measures for Agricultural Commodities and Their Products," USDA Statistical Bulletin 362 (revised 1965).
- b. Soybeans - total food yield = 0.17 x total crop yield
Corn - total food yield = 0.087 x total crop yield
Wheat - total food yield = 0.58 x total crop yield
Oats - total food yield = 0.095 x total crop yield
Barley - total food yield = 0.32 x total crop yield
- c. Hogs^a: average live weight = 109 kg yield, edible weight = 52.5 kg
boneless, skinless meat/live weight = 0.48
- d. Cattle^a: average live weight = 468 kg yield, edible weight = 183 kg
boneless, skinless meat/live weight = 0.39
- e. Poultry^a: broiler: average live weight = 1.5 kg; average ready-to-eat
weight = 1.1 kg
turkeys: average live weight = 7.9 kg; average ready-to-eat
weight = 6.3 kg
- f. Eggs^a: average weight per dozen sold at retail = 0.71 kg
- g. Milk: 44 liter/hundred weight
- h. Absorption modifier is fraction of each radionuclide deposited on plant
which reaches the portion eaten. Factors per HERMES-HEDL-TME-71-168,
Table III-6. Tg refers to factors for grain and exposed-above-ground
vegetables. Tc refers to factors for root crop vegetables.

TABLE VI-B

<u>COUNTY</u>	<u>HOGS (KG)</u>	<u>CATTLE (KG)</u>	<u>POULTRY (KG)</u>	<u>EGGS (KG)</u>	<u>MILK (LITERS)</u>
Anson	720000	1900000	10000000	150000	2400000
Richmond	790000	260000	5500000	1000000	
Scotland	2400000	160000	3300	320000	
Union	2100000	1400000	26000000	1300000	14000000
Chesterfield	520000	670000	12000000	2300000	140000
Clarendon	2000000	260000	16000000	5200000	3000000
Darlington	940000	300000	13000000	2400000	5300000
Dillon	520000	160000	1600000	304000	321000
Florence	1440000	226000	27000000	5180000	3010000
Kershaw	481000	513000	8000000	1540000	452000
Lancaster	196000	479000	7640000	1470000	567000
Lee	623000	147000	703000	135000	2190000
Marion	1070000	151000	3550000	683000	379000
Marlboro	386000	302000	704000	135000	1180000
Richland	494000	418000	13200000	2530000	4860000
Sumter	1420000	366000	2300000	442000	8540000
Total	1.61E+07	7.71E+06	1.47E+08	2.51E+07	4.63E+07

<u>COUNTY</u>	<u>GRAIN (KG)</u>	<u>LEAFY VEGS (KG)</u>	<u>EXPOSED PRODUCE (KG)</u>	<u>ROOT CROPS (KG)</u>	<u>FRUIT (KG)</u>	<u>NUTS (KG)</u>
Anson	5600000	670000	1200000	690000	3500000	
Richmond	3500000	12000	3200000	280000	3000000	140000
Scotland	2700000	450000	5600000			
Union	18000000	810000	880000	410000	59000	11000
Chesterfield	5500000	58000	12000000			
Clarendon	13800000	300000	100000			44000
Darlington	98800000	400000	1900000			
Dillon	7200000	120000	53000			
Florence	15300000	1130000	103000			759000
Kershaw	2220000	200000	4250000			87000
Lancaster	573000	110000	1121000			
Lee	8780000	436000	275000			1450000
Marion	4400000	76900	17200			
Marlboro	6910000	761000	1130000			
Richland	7730000	231000	172000			
Sumter	11700000	304000	525000			3210000
Total	2.13E+08	6.07E+06	3.25E+07	1.38E+06	6.56E+06	5.70E+06

C. Food Production Totals

The total quantity of vegetable products within a 50 mile radius of the Robinson Plant is $2.65E+08$ kilograms per year.

The total quantity of meat and egg production within a 50 mile radius of the Plant is $1.96E+08$ kilograms per year.

The total quantity of milk production within a 50 mile radius of the Plant is $4.63E+07$ liters per year.

D. Source Terms and Meteorological Inputs

The source terms were segregated by modes of release (mixed mode batch, mixed mode continuous, ground level continuous, and one single ground level batch) for the year for dose calculations.

The concurrent meteorology calculations were performed using the XOQDOQ program to match the above source terms. The mixed mode batch release meteorology used the appropriate $\frac{X}{Q}$ probability level to adjust the more adverse diffusion conditions since our batch releases are not random.

E. Maximum Individual Doses

In demonstrating conformance with 10CFR50, Appendix I, the site boundary was used as a hypothetical situation for each mode of release. Doses were calculated for the true worst case nearest resident, garden, and meat pathways and found to be less than the hypothetical case in this report. There are no cow-goat-milk-man pathways within a 5 mile radius of the H. B. Robinson Plant. Doses to maximum individual are provided in Table VI-C. The recreational airborne pathways were evaluated, found to be insignificant in comparison to the liquid recreational pathways and therefore not reported.

F. Integrated Population Doses

Integrated population doses are provided in Table VI-D. The integrated recreational onsite doses in comparison to the liquid recreational doses were insignificant and were not reported.

TABLE VI-C

H.B. ROBINSON UNIT NO. 2
MAXIMUM INDIVIDUAL DOSE FOR 1986 FROM IODINE 131, IODINE-133, PARTICULATES >8 DAY HALF LIVES & TRITIUM
(MILLIREM)

<u>AGE GROUP</u>	<u>T. BODY</u>	<u>GI-TRACT</u>	<u>BONE</u>	<u>LIVER</u>	<u>KIDNEY</u>	<u>THYROID</u>	<u>LUNG</u>	<u>SKIN</u>
Adult	1.23E-02	1.16E-02	3.50E-03	1.29E-02	1.28E-02	2.75E-01	1.13E-02	1.15E-02
Teen	1.26E-02	1.20E-02	3.79E-03	1.38E-02	1.34E-02	2.37E-01	1.19E-02	1.20E-02
Child	1.56E-02	1.49E-02	5.44E-03	1.80E-02	1.70E-02	3.45E-01	1.49E-02	1.50E-02
Infant	3.81E-03	3.78E-03	2.39E-03	3.87E-03	3.88E-03	3.08E-02	3.83E-03	4.19E-03

MAXIMUM INDIVIDUAL AIR DOSE FOR 1986 FROM RADIONOBLE GASES
(MILLIRADS)

Annual Beta Air Dose	1.12E-01
Annual Gamma Air Dose	4.15E-02

TABLE VI-D

H.B. ROBINSON UNIT NO. 2ANNUAL INTEGRATED POPULATION DOSE SUMMARY
(MANREM)

<u>PATHWAY</u>	<u>T. BODY</u>	<u>GI-TRACT</u>	<u>BONE</u>	<u>LIVER</u>	<u>KIDNEY</u>	<u>THYROID</u>	<u>LUNG</u>	<u>SKIN</u>
Plume	2.93E-02	2.93E-02	2.93E-02	2.93E-02	2.93E-02	2.93E-02	3.22E-02	1.85E-01
Ground	8.57E-04	8.57E-04	8.57E-04	8.57E-04	8.57E-04	8.57E-04	8.57E-04	1.01E-03
Inhal	9.22E-03	9.11E-03	2.02E-04	9.33E-03	9.48E-03	8.52E-02	9.28E-03	9.07E-03
Veget	7.78E-03	7.54E-03	5.28E-04	8.09E-03	8.21E-03	1.43E-01	7.44E-03	7.41E-03
Cow Milk	1.43E-03	1.28E-03	3.06E-04	1.61E-03	1.72E-03	8.82E-02	1.24E-03	1.23E-03
Meat	1.71E-03	1.70E-03	4.06E-05	1.73E-03	1.72E-03	9.70E-03	1.68E-03	1.67E-03
Total	5.03E-02	4.98E-02	3.12E-02	5.09E-02	5.13E-02	3.57E-01	5.27E-02	2.05E-01

VII. ANNUAL LIQUID DOSE ASSESSMENTS

A. Environmental Inputs and Assumptions

In this section, parameters which are used in making dose calculations to individuals and populations are described. Extensive use has been made of the parameters outlined in NRC Regulatory Guide 1.109, but these have been supplemented, particularly in the case of population doses, with the site specific information. In the calculation of population doses considerable reliance has been placed on the selection of clearly conservative assumptions.

1. Characteristics of Individuals and Populations

In the calculation of doses to individuals and populations exposed to liquid discharges from H. B. Robinson Unit #2 the usage factors given in Reg. Guide 1.109 have been assumed.

2. Mixing Ratios

For all calculations, the mixing ratios used to determine concentrations of isotopes at the point of exposure have been conservatively estimated. For calculation of doses to individuals, the mixing ratio of 0.835 was used to account for dilution by the discharge flow, initial dilution in the lake, and accumulation in the lake. For calculation of population doses, a mixing ratio of 0.817 was used. The method of estimating concentrations of radionuclides in Lake Robinson and downstream of the lake are given below.

Lake Robinson is supplied by surface runoff in several creeks and discharges as a continuance of Black Creek. Condenser cooling water is drawn from the lower end of the lake and is returned near the upper end. Liquid waste enters the lake via the condenser cooling water; since the cooling water flow exceeds the flow through the lake, complete mixing may be assumed.

Assuming zero initial concentration and complete mixing, the time dependent concentration of each radionuclide in the lake due to Plant releases will be

$$C_1 = \frac{Q(1 - e^{-\Lambda t})}{V \Lambda}$$

where: C_1 = Average concentration of each radionuclide in the lake
 (Ci/m³)
 Q = Rate of addition of each radionuclide into cooling water
 (Ci/yr)
 V = Volume of water in lake (m³)
 Λ = Effective loss rate constant of each radionuclide from the lake
 t = Time in years

After equilibrium is reached, the average concentration of each radionuclide in the lake will be $C_1 = \frac{Q}{V \Lambda}$

Assuming removal of radioactivity from the lake by outflow, but not by radioactive decay, the effective loss rate constant is

$$\Lambda = \frac{f_2}{V}$$

where: f_2 = average volumetric flow from lake (m³/yr)

After equilibrium is reached, the concentration of each radionuclide in Lake Robinson is represented by $C_1 = \frac{Q}{V \Lambda} = \frac{Q}{f_2}$

The concentration of each radionuclide in the discharge canal is determined by: $C_d = C_1 + C_a = C_1 + \frac{Q}{f_1} = \frac{Q}{f_2} + \frac{Q}{f_1}$

where: C_d is the concentration in the discharge canal (Ci/m³)
 C_1 is the equilibrium concentration in the lake (Ci/m³)
 C_a is the concentration added to the water while passing through the plant = Q/f_1 (Ci/m³)
 f_1 is the cooling water flow rate (m³/yr)

Assuming each gallon of water from discharge canal is diluted with 9 gallons of lake water, the concentration at the edge of the mixing zone C_m is

$$\begin{aligned} C_m &= (C_d + 9C_1) \div 10 \\ &= \left(\frac{Q}{f_1} + \frac{Q}{f_2} + \frac{9Q}{f_2} \right) \div 10 \\ &= \frac{Q}{f_2} + \frac{Q}{10f_1} \end{aligned}$$

The mixing ratio at the edge of the mixing zone M_m is the ratio:

$$\begin{aligned}
 M_m &= \frac{\text{concentration at edge of mixing zone}}{\text{concentration in discharge canal}} = \frac{C}{C_d^m} \\
 &= \frac{\frac{Q}{f_2} + \frac{Q}{10f_1}}{\frac{Q}{f_2} + \frac{Q}{f_1}} \\
 &= \frac{10f_1 + f_2}{10(f_1 + f_2)}
 \end{aligned}$$

For Robinson $f_1 = 9.59E8 \text{ m}^3/\text{yr}$

and $f_2 = 2.15E8 \text{ m}^3/\text{yr}$

thus $M_m = 0.835$

The mixing ratio for the lake in general M_1 is the ratio

$$\begin{aligned}
 \frac{\text{Equilibrium lake concentration}}{\text{Concentration in discharge canal}} &= \frac{C_1}{C_d} \\
 &= \frac{\frac{Q}{f_2}}{\frac{Q}{f_1} + \frac{Q}{f_2}} = \frac{f_1}{f_1 + f_2}
 \end{aligned}$$

For Robinson $M_1 = 0.817$

The validity of ignoring radioactive decay was checked by determining which isotopes were the most significant dose contributors. They were Co^{60} , Cs^{134} , and Cs^{137} . All of these isotopes have decay constants which are at least 12 times smaller than the loss rate constant of the lake

$\frac{f_2}{v} = \frac{2.15E8 \text{ m}^3/\text{yr}}{5.06E7 \text{ m}^3} = 4.24$ per year. Thus, ignoring decay should have little effect.

For Auburndale Plantation the equation for mixing ratio is $e^{-0.02}$ (distance downstream [Km]). Equation was derived from EPA-520/5-76-005 study.

3. Potable Water Use

There is no potable water use of any water resource which is affected by the Robinson liquid discharge. Therefore, no pathways involving potable water are evaluated.

4. Irrigated Foods

Located ten miles east of Robinson Site, the Auburndale Plantation uses water from Black Creek for irrigating. Based on observation, the following are conservative assumptions that were used for dose calculations:

a. Meat (beef)

1. No drinking water for cattle from creek,
2. Total 50-mile-production population served = $4.47E+05$,
Total population served from irrigated
production = $1.86E+03$,
3. Transit time = $0.00E+00$ hours,
4. Irrigation rate = $1.00E+02$ liter/m²/month
5. Non-irrigated feed fraction = $0.00E+00$
6. Total 50 mile production $1.50E+08$ kg/yr
7. Total meat irrigated $1.50E+05$ kg/yr
8. Food process time = $4.80E+00$ hours

b. Produce

1. Total 50-mile-production population served = $3.04E+04$
Total population served from irrigated
production = $3.04E+01$
2. Irrigation rate = $1.00E+02$ liters/m²/month
3. Total 50 mile productin = $6.00E+06$ kg/yr
4. Total crop irrigation = $6.00E+03$ kg
5. Non-irrigated feed fraction = $0.00E+00$

c. Leafy Vegetables

1. Total 50-mile-production population served = $3.95E+04$
Total population served from irrigated
production = $3.95E+01$
2. Irrigation rate = $1.00E+02$ liter/m²/month
3. Non-irrigated feed fraction = $0.00E+00$
4. Total 50 mile production = $6.00E+06$ kg/yr
Total crop irrigated = $6.00E+03$ kg/yr

5. Other Pathways

No other pathways which would be likely to produce 10% of the dose calculated by these pathways described above were identified for the liquid discharge for H. B. Robinson Unit #2.

B. Recreational Activities

1. Seasonal Population Variations

Within the 10-mile area surrounding the Plant, there are no major seasonal population variations. During the entire year, Lake Robinson is used for fishing, boating, picnicing, and other recreational activities. Based on a 1975 creek and recreational survey, the daily summer peak transient population is approximately 550-650 people. This figure would include people who are boating on Lake Robinson, as well as those using shore facilities. Also, during the winter months, Prestwood Lake, located on the north side of Hartsville, is utilized by local residents for recreation. Prestwood Lake is a comparatively small body of water, and it is estimated that 50-100 people would be using the area on a peak day.

2. Water Recreation

Because suitable statistics are unavailable, assumptions were made for purposes of evaluating doses from each of the swimming, boating, and shoreline recreational pathways. These assumptions are summarized as follows:

Boating

Adult - 120 days/yr x 2 hrs/day = 240 hrs/yr
Teen - 180 days/yr x 2 hrs/day = 360 hrs/yr
Child - 90 days/yr x 2 hrs/day = 180 hrs/yr

Swimming

Adult - 90 days/yr x 2 hrs/day = 180 hrs/yr
Teen - 180 days/yr x 2 hrs/day = 360 hrs/yr
Child - 90 days/yr x 3 hrs/day = 270 hrs/yr

Fresh water fish and shoreline exposure: default to NRC Regulatory Guide 1.109 values.

3. Population Doses

The following assumptions/site specifics are listed:

<u>Water Recreation Data</u>		
<u>Activity</u>	<u>Location</u>	<u>Usage</u>
Swimming	Lake Robinson	1000 people/day, 180 days/yr, 2 hr/day
	Lake Prestwood	100 people/day, 180 days/yr, 2 hr/day
	River	10 people/mile, 50 miles, 180 days/yr, 2 hr/day
Boating	Lake Robinson	100 boats/day, 4 people/boat, 365 days/yr, 2 hr/day
	Lake Prestwood	10 boats/day, 4 people/boat, 365 days/yr, 2 hr/day
	River	none
Shoreline	Lake Robinson	1000 people/day, 180 days/yr, 4 hr/day
	Lake Prestwood	100 people/day, 180 days/yr, 4 hr/day
	River	10 people/mile, 50 miles, 365 days/yr, 4 hr/day

4. Aquatic Foods (Fish)

There are no shellfish or aquatic plants harvested in Lake Robinson or within 50 miles downstream of the lake. However, approximately 8000 fish are taken from the lake each year. Assuming an edible yield of 1 kg per fish, this amounts to 8000 kg per year. An additional 800 kg per year are assumed to come from Lake Prestwood and another 8000 kg from the river downstream of Lake Robinson.

C. Maximum Individual Doses

The maximum individual doses for 1986 are provided in Table VII-A.

D. Integrated Population Doses

The integrated population doses for 1986 are provided in Table VII-B.

TABLE VII-A
LIQUID PATHWAY
MAXIMUM INDIVIDUAL DOSES FOR 1986
(MREM)

A D U L T D O S E S

<u>PATHWAY</u>	<u>SKIN</u>	<u>BONE</u>	<u>LIVER</u>	<u>TOTAL BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
Fish	0.00E+00	5.62E-02	9.17E-02	6.58E-02	1.33E-03	3.08E-02	1.08E-02	1.54E-02
Drinking	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Shoreline	5.75E-04	4.89E-04	4.89E-04	4.89E-04	4.89E-04	4.89E-04	4.89E-04	4.89E-04
Swimming	0.00E+00	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05
Boating	0.00E+00	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05	4.19E-05
Total	5.75E-04	5.68E-02	9.23E-02	6.64E-02	1.92E-03	3.08E-02	1.14E-02	1.60E-02

	USAGE (KG/YR, HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR = 0.3
Fish	21.0	1.2	24.00	
Shoreline	12.0	1.2	0.0	
Swimming	180.0	1.2	0.0	
Boating	240.0	1.2	0.0	

T E E N A G E R D O S E S

(MREM)

<u>PATHWAY</u>	<u>SKIN</u>	<u>BONE</u>	<u>LIVER</u>	<u>TOTAL BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
Fish	0.00E+00	5.96E-02	9.44E-02	3.73E-02	1.15E-03	3.15E-02	1.26E-02	1.10E-02
Drinking	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Shoreline	3.21E-03	2.73E-03	2.73E-03	2.73E-03	2.73E-03	2.73E-03	2.73E-03	2.73E-03
Swimming	0.00E+00	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04	1.26E-04
Boating	0.00E+00	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05	6.29E-05
Total	3.21E-03	6.25E-02	9.73E-02	4.02E-02	4.07E-03	3.44E-02	1.55E-02	1.39E-02

	USAGE (KG/YR, HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR = 0.3
Fish	16.0	1.2	24.00	
Shoreline	67.0	1.2	0.0	
Swimming	360.0	1.2	0.0	
Boating	360.0	1.2	0.0	

TABLE VII-A (Cont.)

C H I L D D O S E S

(MREM)

<u>PATHWAY</u>	<u>SKIN</u>	<u>BONE</u>	<u>LIVER</u>	<u>TOTAL BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>
Fish	0.00E+00	7.42E-02	8.33E-02	1.48E-02	1.09E-03	2.68E-02	1.00E-02	4.14E-03
Drinking	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Shoreline	6.71E-04	5.71E-04	5.71E-04	5.71E-04	5.71E-04	5.71E-04	5.71E-04	5.71E-04
Swimming	0.00E+00	9.44E-05	9.44E-05	9.44E-05	9.44E-05	9.44E-05	9.44E-05	9.44E-05
Boating	0.00E+00	3.14E-05	3.14E-05	3.14E-05	3.14E-05	3.14E-05	3.14E-05	3.14E-05
Total	6.71E-04	7.49E-02	8.40E-02	1.55E-02	1.79E-03	2.75E-02	1.07E-02	4.84E-03

	USAGE (KG/YR, HR/YR)	DILUTION	TIME(HR)	SHOREWIDTH FACTOR = 0.3
Fish	6.9	1.2	24.00	
Shoreline	14.0	1.2	0.0	
Swimming	270.0	1.2	0.0	
Boating	180.0	1.2	0.0	

TABLE VII-B

TOTAL INTEGRATED AND RECREATION POPULATION DOSES
(MANREM)

	<u>BONE</u>	<u>LIVER</u>	<u>TOTAL BODY</u>	<u>THYROID</u>	<u>KIDNEY</u>	<u>LUNG</u>	<u>GI-LLI</u>	<u>SKIN</u>
Fish	7.72E-02	1.17E-01	6.92E-02	1.25E-03	3.90E-02	1.40E-02	1.55E-02	0.00E+00
Shoreline	5.18E-02	5.18E-02	5.18E-02	5.18E-02	5.18E-02	5.18E-02	5.18E-02	6.07E-02
Swimming	1.58E-04	1.58E-04	1.58E-04	1.58E-04	1.58E-04	1.58E-04	1.58E-04	0.00E+00
Boating	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05	5.59E-05
Irr. Produce	6.31E-05	2.18E-05	1.80E-04	1.34E-04	1.59E-04	1.45E-04	1.89E-04	0.00E+00
Irr. Leafy Veg.	1.16E-05	4.53E-05	3.95E-05	3.51E-05	3.35E-05	3.07E-05	4.41E-05	0.00E+00
Irr. Meat	8.29E-05	3.30E-04	2.97E-04	2.43E-04	2.56E-04	2.63E-04	4.17E-04	0.00E+00
Hydrophere H-3	7.33E-09	7.33E-09	7.33E-09	7.33E-09	7.33E-09	7.33E-09	7.33E-09	0.00E+00
Total	1.29E-01	1.70E-01	1.22E-01	5.37E-02	9.15E-02	6.59E-02	6.82E-02	6.08E-02

VIII. METEOROLOGICAL DATA

A. Continuous Release Diffusion Analysis

Table VIII-A presents the number and frequency of wind direction occurrences by wind speed class as recorded at the onsite meteorological system during the period January 1 through December 31, 1986.

The frequencies are presented as a percent of total occurrences for each stability class as well as a summary for all classes for the lower (10 meter) sensor elevation.

Pertinent information available from the tables is as follows:

1. Stability

Percent occurrence Pasquill Stability categories based on lower level (10m) wind distribution:

<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>
6.7	5.4	6.6	34.2	26.3	10.3	10.5

2. Wind Speed10 Meter

Average Speed (mph)	5.0
Percent Calm	2.2
Percent Less than 3.5 mph	34.4

3. Wind Direction10 Meter

Prevailing Direction	NNE
Percent Occurrence	11.8

4. Data Recovery10 Meter

Percent Good Hours	98.3
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TABLE VIII-A

U

39

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IMDO1226 (MDFREQ) - 19 SEP 1985									
JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN		YEAR=86		PERIOD=YRC 1986		SUMMARY OVER ALL STAB			
LOWNDSPD									
LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	8.5/ 0.10	128/ 1.49	345/ 4.01	139/ 1.61	5/ 0.06	/	/	625.5/ 7.27	5.67143
NNE	10.0/ 0.12	150/ 1.74	546/ 6.34	285/ 3.31	24/ 0.28	/	/	1015/ 11.79	6.36062
NE	6.7/ 0.08	101/ 1.17	354/ 4.11	121/ 1.41	3/ 0.03	/	/	585.7/ 6.80	5.63083
ENE	6.3/ 0.07	95/ 1.10	271/ 3.15	52/ 0.60	/	/	/	424.3/ 4.93	5.01800
E	5.1/ 0.06	76/ 0.88	156/ 1.81	8/ 0.09	/	/	/	245.1/ 2.85	4.36694
ESE	4.9/ 0.06	73/ 0.85	132/ 1.53	7/ 0.08	/	/	/	216.9/ 2.52	4.17920
SE	5.3/ 0.06	80/ 0.93	157/ 1.82	25/ 0.29	/	/	/	267.3/ 3.10	4.52705
SSE	9.3/ 0.11	140/ 1.63	242/ 2.81	50/ 0.58	1/ 0.01	/	/	442.3/ 5.14	4.64908
S	15.4/ 0.18	231/ 2.68	266/ 3.09	107/ 1.24	22/ 0.26	/	/	641.4/ 7.45	5.15738
SSW	18.8/ 0.22	282/ 3.28	355/ 4.12	137/ 1.59	16/ 0.19	2/ 0.02	/	810.8/ 9.42	5.08846
SW	15.8/ 0.18	237/ 2.75	355/ 4.12	152/ 1.77	5/ 0.06	/	/	764.8/ 8.88	5.07079
WSW	14.3/ 0.17	214/ 2.49	236/ 2.74	108/ 1.25	3/ 0.03	/	/	575.3/ 6.68	4.95069
W	10.7/ 0.12	160/ 1.86	151/ 1.75	47/ 0.55	1/ 0.01	/	/	369.7/ 4.29	4.34021
WNW	10.3/ 0.12	155/ 1.80	105/ 1.22	51/ 0.63	2/ 0.02	/	/	326.3/ 3.79	4.34869
NW	19.5/ 0.23	293/ 3.40	147/ 1.71	52/ 0.60	8/ 0.09	/	/	519.5/ 6.03	3.81253
NNW	24.0/ 0.28	360/ 4.18	331/ 3.84	64/ 0.74	/	/	/	779.0/ 9.05	3.95125
TOTAL	185.0/ 2.15	2775/ 32.23	4149/ 48.19	1408/ 16.35	90/ 1.05	2/ 0.02	/	8609/ 100	4.98501
NUMBER OF BAD RECORDS: 151									

Enclosure 1 to Serial: RMPD/87-508
Page 46 of 71

TABLE VIII-A (Cont.)

U

41

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IMDO1#2G (MDFREQ) - 19 SEP 1985									
JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN YEAR=86 PERIOD=YRC 1986 STAB=A									
LOWNDSPD									
LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	20/ 0.23	25/ 0.29	2/ 0.02	/	/	47.0/ 0.55	8.42147
NNE	/	/	24/ 0.28	23/ 0.27	1/ 0.01	/	/	48.0/ 0.56	7.80077
NE	/	/	26/ 0.30	19/ 0.22	/	/	/	45.0/ 0.52	7.18729
ENE	/	/	44/ 0.51	28/ 0.33	/	/	/	72.0/ 0.84	6.94035
E	/	/	24/ 0.28	3/ 0.03	/	/	/	27.0/ 0.31	6.23954
ESE	/	3/ 0.03	24/ 0.28	/	/	/	/	27.0/ 0.31	5.03647
SE	/	1/ 0.01	29/ 0.34	3/ 0.03	/	/	/	33.0/ 0.38	6.09699
SSE	/	2/ 0.02	14/ 0.16	10/ 0.12	/	/	/	26.0/ 0.30	6.59240
S	/	/	8/ 0.09	12/ 0.14	3/ 0.03	/	/	23.0/ 0.27	8.95882
SSW	/	/	11/ 0.13	22/ 0.26	4/ 0.05	/	/	37.0/ 0.43	8.98467
SW	/	/	18/ 0.21	36/ 0.42	2/ 0.02	/	/	56.0/ 0.65	8.62514
WSW	/	/	12/ 0.14	39/ 0.45	2/ 0.02	/	/	53.0/ 0.62	8.91735
W	/	/	15/ 0.17	14/ 0.16	1/ 0.01	/	/	30.0/ 0.35	7.80001
WNW	/	/	4/ 0.05	8/ 0.09	2/ 0.02	/	/	14.0/ 0.16	8.82465
NW	/	/	4/ 0.05	13/ 0.15	6/ 0.07	/	/	23.0/ 0.27	10.37185
NNW	/	/	5/ 0.06	9/ 0.10	/	/	/	14.0/ 0.16	8.52926
TOTAL	/	6/ 0.07	282/ 3.28	264/ 3.07	23/ 0.27	/	/	575.0/ 6.68	7.79140
NUMBER OF BAD RECORDS: 1									

Enclosure 1 to Serial: RNP/87-508
Page 47 of 71

TABLE VIII-A (Cont.)

W

43

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IMDO1#26 (MDFREQ) - 19 SEP 1985									
JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN		YEAR=86		PERIOD=YRC 1986		STAB=B			
LOWNDSPD									
LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	1/ 0.01	20/ 0.23	24/ 0.28	1/ 0.01	/	/	46.0/ 0.53	7.69116
NNE	/	3/ 0.03	32/ 0.37	14/ 0.16	/	/	/	49.0/ 0.57	6.20877
NE	/	/	21/ 0.24	10/ 0.12	/	/	/	31.0/ 0.36	6.70443
ENE	/	1/ 0.01	29/ 0.34	3/ 0.03	/	/	/	33.0/ 0.38	5.51033
E	/	2/ 0.02	14/ 0.16	/	/	/	/	16.0/ 0.19	4.90766
ESE	/	3/ 0.03	10/ 0.12	1/ 0.01	/	/	/	14.0/ 0.16	4.72855
SE	/	5/ 0.06	18/ 0.21	3/ 0.03	/	/	/	26.0/ 0.30	4.88706
SSE	/	2/ 0.02	7/ 0.08	3/ 0.03	/	/	/	12.0/ 0.14	5.92240
S	/	/	10/ 0.12	5/ 0.06	4/ 0.05	/	/	19.0/ 0.22	8.64379
SSW	/	/	21/ 0.24	16/ 0.19	2/ 0.02	/	/	39.0/ 0.45	7.93260
SW	/	2/ 0.02	20/ 0.23	30/ 0.35	1/ 0.01	/	/	53.0/ 0.62	7.79163
WSW	/	/	20/ 0.23	20/ 0.23	/	/	/	40.0/ 0.46	7.72455
W	/	/	26/ 0.30	12/ 0.14	/	/	/	38.0/ 0.44	6.77180
WNW	/	/	14/ 0.16	9/ 0.10	/	/	/	23.0/ 0.27	7.21157
NW	/	1/ 0.01	6/ 0.07	5/ 0.06	2/ 0.02	/	/	14.0/ 0.16	8.12906
NNW	/	1/ 0.01	5/ 0.06	9/ 0.10	/	/	/	15.0/ 0.17	7.87505
TOTAL	/	21/ 0.24	273/ 3.17	164/ 1.90	10/ 0.12	/	/	468.0/ 5.44	6.92569
NUMBER OF BAD RECORDS: 7									

Enclosure 1 to Serial: RNPD/87-508
Page 48 of 71

TABLE VIII-A (Cont.)

11

45

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IMDO1#26 (MDFREQ) - 19 SEP 1985									
JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN YEAR=86 PERIOD=YRC 1986 STAB=C									
LOWNDSPD									
LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	1/ 0.01	44/ 0.51	16/ 0.19	1/ 0.01	/	/	62.0/ 0.72	6.76978
NNE	/	4/ 0.05	46/ 0.53	18/ 0.21	6/ 0.07	/	/	74.0/ 0.86	7.16800
NE	/	/	19/ 0.22	13/ 0.15	/	/	/	32.0/ 0.37	6.95556
ENE	/	6/ 0.07	21/ 0.24	4/ 0.05	/	/	/	31.0/ 0.36	5.14720
E	/	5/ 0.06	20/ 0.23	1/ 0.01	/	/	/	26.0/ 0.30	4.69465
ESE	/	10/ 0.12	14/ 0.16	/	/	/	/	24.0/ 0.28	4.31280
SE	/	5/ 0.06	23/ 0.27	5/ 0.06	/	/	/	33.0/ 0.38	5.15510
SSE	/	2/ 0.02	12/ 0.14	4/ 0.05	/	/	/	18.0/ 0.21	6.21422
S	/	1/ 0.01	13/ 0.15	9/ 0.10	/	/	/	23.0/ 0.27	7.20505
SSW	/	2/ 0.02	18/ 0.21	23/ 0.27	4/ 0.05	/	/	47.0/ 0.55	8.60004
SW	/	/	28/ 0.33	29/ 0.34	1/ 0.01	/	/	58.0/ 0.67	7.64683
WSW	/	3/ 0.03	27/ 0.31	23/ 0.27	/	/	/	53.0/ 0.62	7.15483
W	/	4/ 0.05	16/ 0.19	13/ 0.15	/	/	/	33.0/ 0.38	6.88071
WNW	/	2/ 0.02	11/ 0.13	4/ 0.05	/	/	/	17.0/ 0.20	6.15700
NW	/	/	7/ 0.08	11/ 0.13	/	/	/	18.0/ 0.21	8.53204
NNW	/	1/ 0.01	10/ 0.12	4/ 0.05	/	/	/	15.0/ 0.17	6.28870
TOTAL	/	46/ 0.53	329/ 3.82	177/ 2.06	12/ 0.14	/	/	564.0/ 6.55	6.75908
NUMBER OF BAD RECORDS: 4									

Enclosure 1 to Serial: RNP/87-508
Page 49 of 71

TABLE VIII-A (Cont.)



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ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IMDC1#26 (MDFREQ) - 19 SEP 1985
 JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

10:05 WEDNESDAY, FEBRUARY 18, 1987

9

SITE=ROBN YEAR=8G PERIOD=YRC 1986 STAB=D

LOWNDSPD

LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	19/ 0.22	183/ 2.13	61/ 0.71	1/ 0.01	/	/	264.0/ 3.07	6.25142
NNE	/	50/ 0.58	352/ 4.09	199/ 2.31	16/ 0.19	/	/	617.0/ 7.17	6.83667
NE	/	41/ 0.48	225/ 2.61	65/ 0.76	3/ 0.03	/	/	334.0/ 3.88	5.82951
ENE	/	44/ 0.51	145/ 1.68	14/ 0.16	/	/	/	203.0/ 2.36	4.82277
E	/	42/ 0.49	75/ 0.87	4/ 0.05	/	/	/	121.0/ 1.41	4.37808
ESE	/	26/ 0.30	56/ 0.65	4/ 0.05	/	/	/	86.0/ 1.00	4.43710
SE	/	34/ 0.39	62/ 0.72	9/ 0.10	/	/	/	105.0/ 1.22	4.53036
SSE	/	23/ 0.27	112/ 1.30	21/ 0.24	/	/	/	156.0/ 1.81	5.41296
S	/	13/ 0.15	83/ 0.96	38/ 0.44	9/ 0.10	/	/	143.0/ 1.66	6.85319
SSW	/	16/ 0.19	110/ 1.28	57/ 0.66	4/ 0.05	2/ 0.02	/	189.0/ 2.20	6.67882
SW	/	21/ 0.24	107/ 1.24	51/ 0.59	1/ 0.01	/	/	180.0/ 2.09	6.14224
WSW	/	30/ 0.35	98/ 1.14	18/ 0.21	1/ 0.01	/	/	147.0/ 1.71	5.44259
W	/	26/ 0.30	62/ 0.72	8/ 0.09	/	/	/	96.0/ 1.12	4.83152
WNW	/	26/ 0.30	51/ 0.59	29/ 0.34	/	/	/	106.0/ 1.23	5.70846
NW	/	16/ 0.19	37/ 0.43	18/ 0.21	/	/	/	71.0/ 0.82	5.78857
NNW	/	15/ 0.17	93/ 1.08	22/ 0.26	/	/	/	130.0/ 1.51	5.81945
TOTAL	/	442/ 5.13	1851/21.50	618/ 7.18	35/ 0.41	2/ 0.02	/	2948/34.24	5.90588

NUMBER OF BAD RECORDS: 20

Enclosure 1 to Serial: RMPD/87-508
Page 50 of 71

TABLE VIII-A (Cont.)

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ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY 11
 PROGRAM IMDO1#26 (MDFREQ) - 19 SEP 1985 10:05 WEDNESDAY, FEBRUARY 18, 1987
 JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

SITE=ROBN YEAR=86 PERIOD=YRC 1986 STAB=E

LOWNDSPD

LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	0.3/ 0.00	43/ 0.50	74/ 0.86	13/ 0.15	/	/	/	130.3/ 1.51	4.59033
NNE	0.5/ 0.01	62/ 0.72	89/ 1.03	31/ 0.36	1/ 0.01	/	/	183.5/ 2.13	5.18869
NE	0.4/ 0.00	49/ 0.57	59/ 0.69	14/ 0.16	/	/	/	122.4/ 1.42	4.49149
ENE	0.3/ 0.00	34/ 0.39	30/ 0.35	3/ 0.03	/	/	/	67.3/ 0.78	4.06177
E	0.2/ 0.00	23/ 0.27	22/ 0.26	/	/	/	/	45.2/ 0.53	3.45711
ESE	0.2/ 0.00	26/ 0.30	27/ 0.31	2/ 0.02	/	/	/	55.2/ 0.64	3.69976
SE	0.2/ 0.00	23/ 0.27	21/ 0.24	5/ 0.06	/	/	/	49.2/ 0.57	4.00420
SSE	0.4/ 0.00	56/ 0.65	85/ 0.99	12/ 0.14	1/ 0.01	/	/	154.4/ 1.79	4.40235
S	0.7/ 0.01	84/ 0.98	130/ 1.51	43/ 0.50	6/ 0.07	/	/	263.7/ 3.06	5.23526
SSW	0.9/ 0.01	119/ 1.38	169/ 1.96	19/ 0.22	2/ 0.02	/	/	309.9/ 3.60	4.41336
SW	0.7/ 0.01	87/ 1.01	143/ 1.66	6/ 0.07	/	/	/	236.7/ 2.75	4.02970
WSW	0.6/ 0.01	79/ 0.92	64/ 0.74	8/ 0.09	/	/	/	151.6/ 1.76	3.89976
W	0.3/ 0.00	40/ 0.46	24/ 0.28	/	/	/	/	64.3/ 0.75	3.19932
WNW	0.4/ 0.00	45/ 0.52	18/ 0.21	3/ 0.03	/	/	/	66.4/ 0.77	3.21345
NW	0.3/ 0.00	35/ 0.41	74/ 0.86	5/ 0.06	/	/	/	114.3/ 1.33	4.27747
NNW	0.6/ 0.01	77/ 0.89	151/ 1.75	19/ 0.22	/	/	/	247.6/ 2.88	4.55973
TOTAL	7.0/ 0.08	882/10.25	1180/13.71	183/ 2.13	10/ 0.12	/	/	2262/26.27	4.39471

NUMBER OF BAD RECORDS: 13

Enclosure 1 to Serial: RNPD/87-508
 Page 51 of 71

TABLE VIII-A (Cont.)

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ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY 13
 PROGRAM IMDO1426 (MDFREQ) - 19 SEP 1985 10:05 WEDNESDAY, FEBRUARY 18, 1987
 JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

SITE=ROBN YEAR=86 PERIOD=YRC 1986 STAB=F

LOWNDSPD

LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	0.7/ 0.01	23/ 0.27	3/ 0.03	/	/	/	/	26.7/ 0.31	2.19241
NNE	0.5/ 0.01	17/ 0.20	3/ 0.03	/	/	/	/	20.5/ 0.24	2.14781
NE	0.2/ 0.00	6/ 0.07	4/ 0.05	/	/	/	/	10.2/ 0.12	2.89850
ENE	0.2/ 0.00	7/ 0.08	2/ 0.02	/	/	/	/	9.2/ 0.11	2.76224
E	0.1/ 0.00	2/ 0.02	1/ 0.01	/	/	/	/	3.1/ 0.04	2.22422
ESE	0.1/ 0.00	2/ 0.02	1/ 0.01	/	/	/	/	3.1/ 0.04	2.18119
SE	0.1/ 0.00	4/ 0.05	4/ 0.05	/	/	/	/	8.1/ 0.09	2.93665
SSE	1.0/ 0.01	32/ 0.37	11/ 0.13	/	/	/	/	44.0/ 0.51	2.93820
S	2.2/ 0.03	70/ 0.81	20/ 0.23	/	/	/	/	92.2/ 1.07	2.77759
SSW	3.1/ 0.04	98/ 1.14	23/ 0.27	/	/	/	/	124.1/ 1.44	2.62654
SW	2.7/ 0.03	87/ 1.01	36/ 0.42	/	/	/	/	125.7/ 1.46	2.97715
WSW	2.1/ 0.02	66/ 0.77	11/ 0.13	/	/	/	/	79.1/ 0.92	2.57133
W	1.4/ 0.02	46/ 0.53	8/ 0.09	/	/	/	/	55.4/ 0.64	2.45278
WNW	1.3/ 0.02	41/ 0.48	6/ 0.07	1/ 0.01	/	/	/	49.3/ 0.57	2.53836
NW	2.7/ 0.03	86/ 1.00	16/ 0.19	/	/	/	/	104.7/ 1.22	2.47026
NNW	2.6/ 0.03	82/ 0.95	44/ 0.51	1/ 0.01	/	/	/	129.6/ 1.51	2.98483
TOTAL	21.0/ 0.24	669/ 7.77	193/ 2.24	2/ 0.02	/	/	/	885.0/ 10.28	2.70105

NUMBER OF BAD RECORDS: 1

Enclosure 1 to Serial: RNP/87-508
Page 52 of 71

TABLE VIII-A (Cont.)

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ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY 15
 PROGRAM IMDO1#26 (MDFREQ) - 19 SEP 1985 10:05 WEDNESDAY, FEBRUARY 18, 1987
 JOINT OCCURRENCE FREQUENCIES FOR NAME1 AND NAME2
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

SITE=ROBN YEAR=86 PERIOD=YRC 1986 STAB=G

LOWNDSPD

LOWNDDEG	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	9.1/ 0.11	41/ 0.48	1/ 0.01	/	/	/	/	51.1/ 0.59	1.29265
NNE	3.1/ 0.04	14/ 0.16	/	/	/	/	/	17.1/ 0.20	1.16015
NE	1.1/ 0.01	5/ 0.06	/	/	/	/	/	6.1/ 0.07	1.42896
ENE	0.7/ 0.01	3/ 0.03	/	/	/	/	/	3.7/ 0.04	1.05342
E	0.4/ 0.00	2/ 0.02	/	/	/	/	/	2.4/ 0.03	1.25754
ESE	0.7/ 0.01	3/ 0.03	/	/	/	/	/	3.7/ 0.04	0.87766
SE	1.8/ 0.02	8/ 0.09	/	/	/	/	/	9.8/ 0.11	1.04385
SSE	5.1/ 0.06	23/ 0.27	1/ 0.01	/	/	/	/	29.1/ 0.34	1.36631
S	14.0/ 0.16	63/ 0.73	2/ 0.02	/	/	/	/	79.0/ 0.92	1.84052
SSW	10.4/ 0.12	47/ 0.55	3/ 0.03	/	/	/	/	60.4/ 0.70	1.65556
SW	8.9/ 0.10	40/ 0.46	3/ 0.03	/	/	/	/	51.9/ 0.60	1.74931
WSW	8.0/ 0.09	36/ 0.42	4/ 0.05	/	/	/	/	48.0/ 0.56	1.65563
W	9.7/ 0.11	44/ 0.51	/	/	/	/	/	53.7/ 0.62	1.29647
WNW	9.1/ 0.11	41/ 0.48	1/ 0.01	/	/	/	/	51.1/ 0.59	1.45940
NW	34.3/ 0.40	155/ 1.80	3/ 0.03	/	/	/	/	192.3/ 2.23	1.63791
NNW	40.7/ 0.47	184/ 2.14	23/ 0.27	/	/	/	/	247.7/ 2.88	1.94160
TOTAL	157.0/ 1.82	709/ 8.24	41/ 0.48	/	/	/	/	907.0/ 10.54	1.66540

NUMBER OF BAD RECORDS: 10

Enclosure 1 to Serial: RNPD/87-508
 Page 53 of 71

VIII. METEOROLOGICAL DATA

B. Mixed Mode Batch Release

Table VIII-B presents the number and frequency of wind direction occurrences by wind speed class as recorded at the onsite meteorological system during mixed mode batch releases for the period January 1 through December 31, 1986.

The frequencies are presented as a percent of total occurrences for each stability class as well as a summary for all classes for the lower (10 meter) sensor elevation.

TABLE VI-B

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24/34 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

16:08 WEDNESDAY, FEBRUARY 11, 1987

LOWNDEG=	SITE=ROBN PERIOD=YRMB1986 SUMMARY OVER ALL STAB							TOTAL	AVERAGE LOWNDSPD
	CALM	75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25		
N	1.9/ 0.09	38/ 1.72	75/ 3.39	44/ 1.99	1/ 0.05	/	/	159.9/ 7.23	5.70443
NNE	2.2/ 0.10	44/ 1.99	130/ 5.88	60/ 2.71	/	/	/	236.2/ 10.68	5.99597
NE	1.6/ 0.07	31/ 1.40	81/ 3.66	21/ 0.95	/	/	/	134.6/ 6.08	5.25609
ENE	1.4/ 0.06	27/ 1.22	53/ 2.40	7/ 0.32	/	/	/	88.4/ 4.00	4.54100
E	1.2/ 0.05	24/ 1.08	33/ 1.49	4/ 0.18	/	/	/	62.2/ 2.81	4.14515
ESE	0.8/ 0.04	16/ 0.72	18/ 0.81	1/ 0.05	/	/	/	35.8/ 1.62	3.73416
SE	1.4/ 0.06	28/ 1.27	40/ 1.81	9/ 0.41	/	/	/	78.4/ 3.54	4.35219
SSE	2.7/ 0.12	53/ 2.40	68/ 3.07	9/ 0.41	/	/	/	132.7/ 6.00	4.20810
S	4.1/ 0.19	81/ 3.66	98/ 4.43	26/ 1.18	2/ 0.09	/	/	211.1/ 9.54	4.53146
SSW	4.3/ 0.19	85/ 3.84	98/ 4.43	43/ 1.94	3/ 0.14	/	/	233.3/ 10.55	4.90714
SW	3.3/ 0.15	65/ 2.94	86/ 3.89	44/ 1.99	3/ 0.14	/	/	201.3/ 9.10	5.20825
WSW	2.8/ 0.13	56/ 2.53	55/ 2.49	17/ 0.77	/	/	/	130.8/ 5.91	4.47700
W	2.2/ 0.10	43/ 1.94	33/ 1.49	12/ 0.54	/	/	/	90.2/ 4.08	4.18621
WNW	2.1/ 0.09	41/ 1.85	35/ 1.58	10/ 0.45	/	/	/	88.1/ 3.98	4.12326
NW	4.5/ 0.20	89/ 4.02	25/ 1.13	9/ 0.41	/	/	/	127.5/ 5.76	3.02852
NNW	4.7/ 0.21	93/ 4.20	83/ 3.75	21/ 0.95	/	/	/	201.7/ 9.12	3.95604
TOTAL	41.0/ 1.85	814/ 36.80	1011/ 45.71	337/ 15.24	9/ 0.41	/	/	2212/ 100	4.69656
NUMBER OF BAD RECORDS: 19									

TABLE VIII-B (Cont.)
 ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

16:08 WEDNESDAY, FEBRUARY 11, 1987

2

LOWNDEG=	SITE=ROBN PERIOD=YRMB1986 STAB=A							TOTAL	AVERAGE LOWNDSPD
	CALM	75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25		
N	/	/	7/ 0.32	4/ 0.18	/	/	/	11.0/ 0.50	7.53862
NNE	/	/	6/ 0.27	1/ 0.05	/	/	/	7.0/ 0.32	6.64856
NE	/	/	2/ 0.09	3/ 0.14	/	/	/	5.0/ 0.23	7.25029
ENE	/	/	4/ 0.18	3/ 0.14	/	/	/	7.0/ 0.32	6.75814
E	/	/	3/ 0.14	1/ 0.05	/	/	/	4.0/ 0.18	6.64916
ESE	/	/	2/ 0.09	/	/	/	/	2.0/ 0.09	5.18592
SE	/	/	4/ 0.18	/	/	/	/	4.0/ 0.18	5.18592
SSE	/	1/ 0.05	2/ 0.09	1/ 0.05	/	/	/	4.0/ 0.18	4.98582
S	/	/	2/ 0.09	3/ 0.14	1/ 0.05	/	/	6.0/ 0.27	9.03507
SSW	/	/	1/ 0.05	4/ 0.18	2/ 0.09	/	/	7.0/ 0.32	10.15269
SW	/	/	4/ 0.18	12/ 0.54	1/ 0.05	/	/	17.0/ 0.77	9.62932
WSW	/	/	3/ 0.14	4/ 0.18	/	/	/	7.0/ 0.32	7.75387
W	/	/	/	1/ 0.05	/	/	/	1.0/ 0.05	8.43755
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	1/ 0.05	/	/	/	/	1.0/ 0.05	5.70285
NNW	/	/	1/ 0.05	1/ 0.05	/	/	/	2.0/ 0.09	7.57879
TOTAL	/	1/ 0.05	42/ 1.90	38/ 1.72	4/ 0.18	/	/	85.0/ 3.84	7.80272
NUMBER OF BAD RECORDS: 0									

TABLE VIII-B (Cont.)

237

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987									
JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN PERIOD=YRMB1986 STAB=B									
LOWNDSPD									
LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	2/ 0.09	4/ 0.18	/	/	/	6.0/ 0.27	7.99288
NNE	/	/	8/ 0.36	2/ 0.09	/	/	/	10.0/ 0.45	6.30648
NE	/	/	2/ 0.09	1/ 0.05	/	/	/	3.0/ 0.14	6.99794
ENE	/	/	4/ 0.18	1/ 0.05	/	/	/	5.0/ 0.23	5.88627
E	/	/	2/ 0.09	/	/	/	/	2.0/ 0.09	6.50325
ESE	/	1/ 0.05	/	/	/	/	/	1.0/ 0.05	3.30165
SE	/	1/ 0.05	6/ 0.27	2/ 0.09	/	/	/	9.0/ 0.41	5.38602
SSE	/	/	1/ 0.05	1/ 0.05	/	/	/	2.0/ 0.09	7.35367
S	/	/	2/ 0.09	3/ 0.14	1/ 0.05	/	/	6.0/ 0.27	8.35417
SSW	/	/	/	3/ 0.14	1/ 0.05	/	/	4.0/ 0.18	10.33850
SW	/	/	2/ 0.09	11/ 0.50	1/ 0.05	/	/	14.0/ 0.63	8.96281
WSW	/	/	2/ 0.09	2/ 0.09	/	/	/	4.0/ 0.18	6.77839
W	/	/	/	3/ 0.14	/	/	/	3.0/ 0.14	10.21622
WNW	/	/	2/ 0.09	/	/	/	/	2.0/ 0.09	5.26096
NW	/	1/ 0.05	/	/	/	/	/	1.0/ 0.05	2.33450
NNW	/	/	1/ 0.05	/	/	/	/	1.0/ 0.05	6.05302
TOTAL	/	3/ 0.14	34/ 1.54	33/ 1.49	3/ 0.14	/	/	73.0/ 3.30	7.32284
NUMBER OF BAD RECORDS: 0									

Enclosure 1 to Serial: RNPD/87-508
Page 57 of 71

TABLE VIII-B (Cont.)

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24-31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

16:08 WEDNESDAY, FEBRUARY 11, 1987

Enclosure 1 to Serial: RMPD/87-508
Page 58 of 71

230
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		SITE=ROBN		PERIOD=YRMB1986		STAB=C			
		LOWNDSPD							
LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	10/ 0.45	4/ 0.18	/	/	/	14.0/ 0.63	6.69620
NNE	/	/	8/ 0.36	3/ 0.14	/	/	/	11.0/ 0.50	6.73822
NE	/	/	3/ 0.14	4/ 0.18	/	/	/	7.0/ 0.32	7.61095
ENE	/	2/ 0.09	3/ 0.14	/	/	/	/	5.0/ 0.23	4.69568
E	/	/	2/ 0.09	1/ 0.05	/	/	/	3.0/ 0.14	5.91407
ESE	/	5/ 0.23	3/ 0.14	/	/	/	/	8.0/ 0.36	3.74979
SE	/	1/ 0.05	4/ 0.18	1/ 0.05	/	/	/	6.0/ 0.27	5.85015
SSE	/	1/ 0.05	1/ 0.05	/	/	/	/	2.0/ 0.09	4.75237
S	/	/	3/ 0.14	3/ 0.14	/	/	/	6.0/ 0.27	7.76221
SSW	/	1/ 0.05	4/ 0.18	10/ 0.45	/	/	/	15.0/ 0.68	8.30526
SW	/	/	4/ 0.18	7/ 0.32	1/ 0.05	/	/	12.0/ 0.54	9.41582
WSW	/	1/ 0.05	4/ 0.18	7/ 0.32	/	/	/	12.0/ 0.54	7.49402
W	/	1/ 0.05	2/ 0.09	5/ 0.23	/	/	/	8.0/ 0.36	8.09363
WNW	/	1/ 0.05	4/ 0.18	1/ 0.05	/	/	/	6.0/ 0.27	6.45600
NW	/	/	1/ 0.05	1/ 0.05	/	/	/	2.0/ 0.09	6.11139
NNW	/	/	2/ 0.09	/	/	/	/	2.0/ 0.09	5.42771
TOTAL	/	13/ 0.59	58/ 2.62	47/ 2.12	1/ 0.05	/	/	119.0/ 5.38	7.03867
NUMBER OF BAD RECORDS: 0									

TABLE VIII-B (Cont.)

11

239

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IEM24-31 (EMFREQ) - 24 JAN 1987									
16:08 WEDNESDAY, FEBRUARY 11, 1987									
JOINT OCCURRENCE FREQUENCIES FOR LOWNDDEG AND LOWNDSPD									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN PERIOD=YRMB1986 STAB=D									
LOWNDSPD									
LOWNDDEG=	CALM	75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	6/ 0.27	45/ 2.03	26/ 1.18	1/ 0.05	/	/	78.0/ 3.53	6.74375
NNE	/	13/ 0.59	91/ 4.11	47/ 2.12	/	/	/	151.0/ 6.83	6.66072
NE	/	13/ 0.59	59/ 2.67	10/ 0.45	/	/	/	82.0/ 3.71	5.39090
ENE	/	10/ 0.45	34/ 1.54	3/ 0.14	/	/	/	47.0/ 2.12	4.70058
E	/	14/ 0.63	22/ 0.99	2/ 0.09	/	/	/	38.0/ 1.72	4.24423
ESE	/	3/ 0.14	9/ 0.41	1/ 0.05	/	/	/	13.0/ 0.59	4.58819
SE	/	11/ 0.50	20/ 0.90	6/ 0.27	/	/	/	37.0/ 1.67	4.86775
SSE	/	7/ 0.32	31/ 1.40	7/ 0.32	/	/	/	45.0/ 2.03	5.57908
S	/	4/ 0.18	19/ 0.86	6/ 0.27	/	/	/	29.0/ 1.31	5.62062
SSW	/	5/ 0.23	30/ 1.36	22/ 0.99	/	/	/	57.0/ 2.58	6.56702
SW	/	6/ 0.27	23/ 1.04	11/ 0.50	/	/	/	40.0/ 1.81	5.96423
WSW	/	9/ 0.41	20/ 0.90	3/ 0.14	/	/	/	32.0/ 1.45	5.22761
W	/	9/ 0.41	18/ 0.81	3/ 0.14	/	/	/	30.0/ 1.36	4.85632
WNW	/	4/ 0.18	21/ 0.95	8/ 0.36	/	/	/	33.0/ 1.49	5.95348
NW	/	4/ 0.18	6/ 0.27	6/ 0.27	/	/	/	16.0/ 0.72	6.01655
NNW	/	1/ 0.05	26/ 1.18	11/ 0.50	/	/	/	38.0/ 1.72	6.28735
TOTAL	/	119/ 5.38	474/21.43	172/ 7.78	1/ 0.05	/	/	766.0/34.63	5.83207
NUMBER OF BAD RECORDS: 0									

Enclosure 1 to Serial: RNP/87-508
Page 59 of 71

TABLE VIII-B (Cont.)
 ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM2431 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

16:08 WEDNESDAY, FEBRUARY 11, 1987

LOWNDEG=		LOWNDSPD						TOTAL	AVERAGE LOWNDSPD
CALM	7.5-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25			
N	/	6/ 0.27	11/ 0.50	6/ 0.27	/	/	/	23.0/ 1.04	5.15910
NNE	/	21/ 0.95	15/ 0.68	7/ 0.32	/	/	/	43.0/ 1.94	4.61704
NE	/	15/ 0.68	13/ 0.59	3/ 0.14	/	/	/	31.0/ 1.40	4.45330
ENE	/	11/ 0.50	8/ 0.36	/	/	/	/	19.0/ 0.86	3.73344
E	/	9/ 0.41	4/ 0.18	/	/	/	/	13.0/ 0.59	2.76420
ESE	/	6/ 0.27	4/ 0.18	/	/	/	/	10.0/ 0.45	2.83475
SE	/	8/ 0.36	6/ 0.27	/	/	/	/	14.0/ 0.63	3.26830
SSE	/	17/ 0.77	26/ 1.18	/	/	/	/	43.0/ 1.94	4.14781
S	/	36/ 1.63	56/ 2.53	11/ 0.50	/	/	/	103.0/ 4.66	4.65362
SSW	/	34/ 1.54	53/ 2.40	4/ 0.18	/	/	/	91.0/ 4.11	4.23655
SW	/	24/ 1.08	38/ 1.72	3/ 0.14	/	/	/	65.0/ 2.94	4.09153
WSW	/	19/ 0.86	19/ 0.86	1/ 0.05	/	/	/	39.0/ 1.76	4.14181
W	/	10/ 0.45	9/ 0.41	/	/	/	/	19.0/ 0.86	3.44909
WNW	/	13/ 0.59	7/ 0.32	1/ 0.05	/	/	/	21.0/ 0.95	3.40885
NW	/	6/ 0.27	13/ 0.59	2/ 0.09	/	/	/	21.0/ 0.95	4.74285
NNW	/	19/ 0.86	43/ 1.94	9/ 0.41	/	/	/	71.0/ 3.21	4.92265
TOTAL	/	254/11.48	325/14.69	47/ 2.12	/	/	/	626.0/28.30	4.30212
NUMBER OF BAD RECORDS: 0									

Enclosure 1 to Serial: RMPD/87-508
 Page 60 of 71

TABLE VIII-B (Cont.)

U

241

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987									
16:08 WEDNESDAY, FEBRUARY 11, 1987									
JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN PERIOD=YRMB1986 STAB=F									
LOWNDSPD									
LOWNDEG=	CALM	75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	0.3/ 0.01	8/ 0.36	/	/	/	/	/	8.3/ 0.38	1.84579
NNE	0.1/ 0.00	4/ 0.18	2/ 0.09	/	/	/	/	6.1/ 0.28	2.93452
NE	0.1/ 0.00	2/ 0.09	2/ 0.09	/	/	/	/	4.1/ 0.19	3.29635
ENE	0.1/ 0.00	3/ 0.14	/	/	/	/	/	3.1/ 0.14	2.06151
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	0.1/ 0.00	2/ 0.09	/	/	/	/	/	2.1/ 0.09	2.01092
SSE	0.5/ 0.02	15/ 0.68	7/ 0.32	/	/	/	/	22.5/ 1.02	2.83659
S	0.5/ 0.02	17/ 0.77	15/ 0.68	/	/	/	/	32.5/ 1.47	3.34654
SSW	1.1/ 0.05	33/ 1.49	9/ 0.41	/	/	/	/	43.1/ 1.95	2.67050
SW	0.8/ 0.04	24/ 1.08	13/ 0.59	/	/	/	/	37.8/ 1.71	2.87841
WSW	0.6/ 0.03	20/ 0.90	6/ 0.27	/	/	/	/	26.6/ 1.20	2.49685
W	0.4/ 0.02	12/ 0.54	4/ 0.18	/	/	/	/	16.4/ 0.74	2.46870
WNW	0.3/ 0.01	9/ 0.41	/	/	/	/	/	9.3/ 0.42	2.03641
NW	0.8/ 0.04	25/ 1.13	4/ 0.18	/	/	/	/	29.8/ 1.35	2.62826
NNW	0.4/ 0.02	12/ 0.54	7/ 0.32	/	/	/	/	19.4/ 0.88	2.87858
TOTAL	6.0/ 0.27	186/ 8.41	69/ 3.12	/	/	/	/	261.0/11.80	2.73504
NUMBER OF BAD RECORDS: 0									

Enclosure 1 to Serial: RNPD/87-508
Page 61 of 71

TABLE VIII-B (Cont.)
 ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24731 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

16:08 WEDNESDAY, FEBRUARY 11, 1987

8

SITE=ROBN PERIOD=YRMB1986 STAB=G

LOWNDSPD

AVERAGE

LOWNDSPD

LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	2.6/ 0.12	18/ 0.81	/	/	/	/	/	20.6/ 0.93	1.25020
NNE	0.9/ 0.04	6/ 0.27	/	/	/	/	/	6.9/ 0.31	1.19683
NE	0.1/ 0.00	1/ 0.05	/	/	/	/	/	1.1/ 0.05	1.48936
ENE	0.1/ 0.00	1/ 0.05	/	/	/	/	/	1.1/ 0.05	1.32261
E	0.1/ 0.00	1/ 0.05	/	/	/	/	/	1.1/ 0.05	1.77739
ESE	0.1/ 0.00	1/ 0.05	/	/	/	/	/	1.1/ 0.05	1.04975
SE	0.7/ 0.03	5/ 0.23	/	/	/	/	/	5.7/ 0.26	0.97049
SSE	1.8/ 0.08	12/ 0.54	/	/	/	/	/	13.8/ 0.62	1.37929
S	3.5/ 0.16	24/ 1.08	1/ 0.05	/	/	/	/	28.5/ 1.29	1.80524
SSW	1.8/ 0.08	12/ 0.54	1/ 0.05	/	/	/	/	14.8/ 0.67	1.93335
SW	1.6/ 0.07	11/ 0.50	2/ 0.09	/	/	/	/	14.6/ 0.66	2.03979
WSW	1.0/ 0.05	7/ 0.32	1/ 0.05	/	/	/	/	9.0/ 0.41	1.89906
W	1.6/ 0.07	11/ 0.50	/	/	/	/	/	12.6/ 0.57	1.62513
WNW	2.1/ 0.09	14/ 0.63	1/ 0.05	/	/	/	/	17.1/ 0.77	1.54020
NW	7.8/ 0.35	53/ 2.40	/	/	/	/	/	60.8/ 2.75	1.48275
NNW	9.0/ 0.41	61/ 2.76	3/ 0.14	/	/	/	/	73.0/ 3.30	1.68984
TOTAL	35.0/ 1.58	238/ 10.76	9/ 0.41	/	/	/	/	282.0/ 12.75	1.60298

NUMBER OF BAD RECORDS: 4

VIII. METEOROLOGICAL DATA

C. Ground Level Batch Release Diffusion Analysis

Table VIII-C presents the number and frequency of wind direction occurrences by wind speed class as recorded at the onsite meteorological system during the ground level batch releases for the period January 1 through December 31, 1986.

The frequencies are presented as a percent of total occurrences for each stability class as well as a summary for all classes for the lower (10 meter) sensor elevation.

TABLE VIII-C

37

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

10:19 WEDNESDAY, FEBRUARY 4, 1987

SITE=ROBN PERIOD=H2GB1986 SUMMARY OVER ALL STAB

LOWNDSPD

LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	/
NNE	/	/	/	/	/	/	/	/	/
NE	/	/	/	/	/	/	/	/	/
ENE	/	/	/	/	/	/	/	/	/
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	/	/	/	/	/	/	/	/	/
SSE	/	/	/	/	/	/	/	/	/
S	/	/	/	/	/	/	/	/	/
SSW	/	/	/	/	/	/	/	/	/
SW	/	/	/	/	/	/	/	/	/
WSW	/	/	/	/	/	/	/	/	/
W	/	/	2/ 100	/	/	/	/	2.0/ 100	6.98682
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	/	/	/	/	/	/	/
NNW	/	/	/	/	/	/	/	/	/
TOTAL	/	/	2/ 100	/	/	/	/	2.0/ 100	6.98682

NUMBER OF BAD RECORDS: 0

TABLE VIII-C (Cont.)

38

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987 10:19 WEDNESDAY, FEBRUARY 4, 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

2

SITE=ROBN PERIOD=H2GB1986 STAB=A

LOWNDSPD

LOWNDDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	
NNE	/	/	/	/	/	/	/	/	
NE	/	/	/	/	/	/	/	/	
ENE	/	/	/	/	/	/	/	/	
E	/	/	/	/	/	/	/	/	
ESE	/	/	/	/	/	/	/	/	
SE	/	/	/	/	/	/	/	/	
SSE	/	/	/	/	/	/	/	/	
S	/	/	/	/	/	/	/	/	
SSW	/	/	/	/	/	/	/	/	
SW	/	/	/	/	/	/	/	/	
WSW	/	/	/	/	/	/	/	/	
W	/	/	2/ 100	/	/	/	/	2.0/ 100	6.98682
WNW	/	/	/	/	/	/	/	/	
NW	/	/	/	/	/	/	/	/	
NNW	/	/	/	/	/	/	/	/	
TOTAL	/	/	2/ 100	/	/	/	/	2.0/ 100	6.98682

NUMBER OF BAD RECORDS: 0

Enclosure 1 to Serial: RMPD/87-508
 Page 65 of 71

TABLE VIII-C (Cont.)

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

10:19 WEDNESDAY, FEBRUARY 4, 1987

SITE=ROBN PERIOD=H2GB1986 STAB=C

LOWNDSPD

AVERAGE
LOWNDSPD

LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	/
NNE	/	/	/	/	/	/	/	/	/
NE	/	/	/	/	/	/	/	/	/
ENE	/	/	/	/	/	/	/	/	/
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	/	/	/	/	/	/	/	/	/
SSE	/	/	/	/	/	/	/	/	/
S	/	/	/	/	/	/	/	/	/
SSW	/	/	/	/	/	/	/	/	/
SW	/	/	/	/	/	/	/	/	/
WSW	/	/	/	/	/	/	/	/	/
W	/	/	/	/	/	/	/	/	/
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	/	/	/	/	/	/	/
NNW	/	/	/	/	/	/	/	/	/
TOTAL	/	/	/	/	/	/	/	/	/

NUMBER OF BAD RECORDS: 0

TABLE VIII-C (Cont.)

41

5

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

10:19 WEDNESDAY, FEBRUARY 4, 1987

SITE=ROBN PERIOD=H2GB1986 STAB=D

LOWNDSPD

LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	/
NNE	/	/	/	/	/	/	/	/	/
NE	/	/	/	/	/	/	/	/	/
ENE	/	/	/	/	/	/	/	/	/
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	/	/	/	/	/	/	/	/	/
SSE	/	/	/	/	/	/	/	/	/
S	/	/	/	/	/	/	/	/	/
SSW	/	/	/	/	/	/	/	/	/
SW	/	/	/	/	/	/	/	/	/
WSW	/	/	/	/	/	/	/	/	/
W	/	/	/	/	/	/	/	/	/
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	/	/	/	/	/	/	/
NNW	/	/	/	/	/	/	/	/	/
TOTAL	/	/	/	/	/	/	/	/	/

NUMBER OF BAD RECORDS: 0

TABLE VIII-C (Cont.)

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY
 PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987
 JOINT OCCURRENCE FREQUENCIES FOR LOWNDDEG AND LOWNDSPD
 RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT

10:19 WEDNESDAY, FEBRUARY 4, 1987

6

SITE=ROBN PERIOD=H2GB1986 STAB=E

LOWNDSPD

LOWNDDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	/
NNE	/	/	/	/	/	/	/	/	/
NE	/	/	/	/	/	/	/	/	/
ENE	/	/	/	/	/	/	/	/	/
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	/	/	/	/	/	/	/	/	/
SSE	/	/	/	/	/	/	/	/	/
S	/	/	/	/	/	/	/	/	/
SSW	/	/	/	/	/	/	/	/	/
SW	/	/	/	/	/	/	/	/	/
WSW	/	/	/	/	/	/	/	/	/
W	/	/	/	/	/	/	/	/	/
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	/	/	/	/	/	/	/
NNW	/	/	/	/	/	/	/	/	/
TOTAL	/	/	/	/	/	/	/	/	/

NUMBER OF BAD RECORDS: 0

TABLE VIII-C (Cont.)

43

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987									
JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
SITE=ROBN PERIOD=H2GB1986 STAB=F									
LOWNDSPD									
LOWNDEG=	CALM	.75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12	N	/	/	/	/	/	/	/	/
13									
14	NNE	/	/	/	/	/	/	/	/
15									
16	NE	/	/	/	/	/	/	/	/
17									
18	ENE	/	/	/	/	/	/	/	/
19									
20	E	/	/	/	/	/	/	/	/
21									
22	ESE	/	/	/	/	/	/	/	/
23									
24	SE	/	/	/	/	/	/	/	/
25									
26	SSE	/	/	/	/	/	/	/	/
27									
28	S	/	/	/	/	/	/	/	/
29									
30	SSW	/	/	/	/	/	/	/	/
31									
32	SW	/	/	/	/	/	/	/	/
33									
34	WSW	/	/	/	/	/	/	/	/
35									
36	W	/	/	/	/	/	/	/	/
37									
38	WNW	/	/	/	/	/	/	/	/
39									
40	NW	/	/	/	/	/	/	/	/
41									
42	NNW	/	/	/	/	/	/	/	/
43									
44	TOTAL	/	/	/	/	/	/	/	/
45									
46									
47	NUMBER OF BAD RECORDS:	0							
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
60									

TABLE VIII-C (Cont.)

ENVIRONMENTAL MONITORING SYSTEM - CAROLINA POWER & LIGHT COMPANY									
PROGRAM IEM24#31 (EMFREQ) - 24 JAN 1987									
JOINT OCCURRENCE FREQUENCIES FOR LOWNDEG AND LOWNDSPD									
RANGES INCLUDE LOWER END POINT, EXCLUDE UPPER END POINT									
		SITE=ROBN		PERIOD=H2GB1986		STAB=G			
		LOWNDSPD							
LOWNDEG=	CALM	75-3.5	3.5-7.5	7.5-12.5	12.5-18.5	18.5-25	>= 25	TOTAL	AVERAGE LOWNDSPD
N	/	/	/	/	/	/	/	/	/
NNE	/	/	/	/	/	/	/	/	/
NE	/	/	/	/	/	/	/	/	/
ENE	/	/	/	/	/	/	/	/	/
E	/	/	/	/	/	/	/	/	/
ESE	/	/	/	/	/	/	/	/	/
SE	/	/	/	/	/	/	/	/	/
SSE	/	/	/	/	/	/	/	/	/
S	/	/	/	/	/	/	/	/	/
SSW	/	/	/	/	/	/	/	/	/
SW	/	/	/	/	/	/	/	/	/
WSW	/	/	/	/	/	/	/	/	/
W	/	/	/	/	/	/	/	/	/
WNW	/	/	/	/	/	/	/	/	/
NW	/	/	/	/	/	/	/	/	/
NNW	/	/	/	/	/	/	/	/	/
TOTAL	/	/	/	/	/	/	/	/	/
NUMBER OF BAD RECORDS: 0									

Enclosure 1 to Serial: RMPD/87-508
Page 71 of 71

CHANGES TO ODCM, PCP, AND
RADIOACTIVE WASTE SYSTEMS

TABLE OF CONTENTS

<u>Description</u>	<u>Page</u>
I. CHANGES TO ODCM.....	2
A. Justifications.....	2
B. Comments	3
C. ODCM - Revised Pages for Revision 3.....	6
II. CHANGES TO LAND USE CENSUS.....	45
III. CHANGES TO RADIOACTIVE WASTE SYSTEMS.....	46
IV. CHANGE TO PCP	47

I. CHANGES TO ODCM

A. Justification for Change 3 in ODCM Revision 3

The justifications for Revision 3 of the Offsite Dose Calculation Manual (ODCM) are as follows:

1. The Waste Disposal System Liquid Effluent Monitor (RMS-18) monitors batch releases, with grab sample and analysis performed prior to discharge. The Condensate Polisher Liquid Waste Monitor (RMS-37), similar to Steam Generator Blowdown Monitor (RMS-19), is a potential continuous release monitor. When a primary to secondary release is involved, a source term can be determined by sampling and analysis in lieu of using the most conservative mix (I-131).
2. The equation, $\frac{cf}{F} = < C$ was changed to $\frac{cf}{f+F} < C$ to be consistent with Nuclear Data software and NUREG-0133, Addendum Page AA-1.
3. The Steam Generator Blowdown flow rate has been reduced from 750 gpm to 480 gpm, the maximum blowdown rate per Westinghouse recommendations. Plant Operations is not to exceed 160 gpm/steam generator.
4. The statistical variance on the background count rate at a 99.9% confidence level with the RC time constant has been added to the monitor setpoints to prevent inadvertent high/trip alarms due to background counts.
5. The allocation fractions for RMS-18 and RMS-19 have been changed from 0.05 and 0.70 to 0.25 and 0.50, respectively, for additional dilution.
6. Mixed mode $\overline{X/Q}$ was changed to an elevated mode with windspeed ≤ 9 mph. The exit velocity of the Plant stack is 45 mph. When the exit velocity is at least five times the horizontal windspeed, the release may be evaluated as an elevated release consistent with Regulatory Guide 1.111.
7. The condenser vacuum pump vent flow rate was changed from 45 cfm to 200 cfm in the event of two pumps running simultaneously.
8. Typographical correction for projected dose terms 31 (DA) + (DB), was changed to 31 (DA + DB), and TA in the definitions was deleted as applicable.

9. The Pi values in Table 3.2-4 were changed from an infant to a child inhalation pathway consistent with Technical Specification 3.9.3.1.

B. Comments

Page No. Comments For Changes in ODCM, Revision 3

<u>Title Page</u>	
	Changed revision and date.
ii.	Changed title on Page 3-22 from infant to child. (See Justification 1.)
1-1	First paragraph: removed 10CFR50.36a as not applicable.
2-1	Section 2.1.1: changed the equation; removed Waste Disposal System Effluent Monitor (RMS-18) and added the Condensate Polisher Liquid Waste Monitor (RMS-37). (See Justifications 1 and 2.)
2-2	Section 2.1.1.1: minor editorial changes and changed the equation. (See Justification 2.)
2-3	Changed Steam Generator Blowdown flow rate from 750 gpm to 480 gpm and added the statistical variance for background to the monitor alarm/trip setpoint. The allocation fraction for Steam Generator Blowdown Monitor has been changed to RMS-18. Allocation has been removed. (See Justifications 1, 3, 4, and 5.)
2-4	The equation for the statistical variance for monitor setpoint and definition has been added; Section 2.1.2.1: minor editorial changes. (See Justification 4.)
2-5	Minor editorial changes; Section 2.1.2.3: changed the equation of Steam Generator Blowdown flow rate from 750 gpm to 480 gpm. (See Justifications 2 and 3.)
2-6	Minor editorial changes; changed allocation fraction on RMS-18 and RMS-19 and changed the equation in the last paragraph. (See Justifications 5 and 2.)
2-7	Minor editorial changes and added statistical variance for background to the monitor alarm setpoint. (See Justification 4.)
2-11	Minor editorial changes.

<u>Page No.</u>	<u>Comments For Changes in ODCM, Revision 3</u>
2-20	The projected dose equation was changed. (See Justification 8.)
3-1	Minor editorial changes.
3-2	Minor editorial changes and $\overline{X/Q}$ mixed mode was changed to elevated; ≥ 9 mph was changed to ≤ 9 mph. (See Justification 6.)
3-3	Minor editorial changes.
3-4	Added flow rate for the E&RC Building Hood Exhaust and changed condenser vacuum pump vent from 45 cfm to 200 cfm. (See Justification 7.)
3-5	Minor editorial changes and added definition for batch containment purge.
3-6	Minor editorial change.
3-7	Minor editorial change.
3-8	Minor editorial change and changed flow rate for the condenser vacuum pump. (See Justification 7.)
3-9	Editorial change and typing correction in equation 3.1-9.
3-10	Editorial change.
3-11	Editorial change.
3-12	Editorial change.
3-15	$\overline{X/Q}$ for mixed mode changed to elevated. (See Justification 6.)
3-16	Q_{je} definition, added Fuel Handling Basement Exhaust and the Environmental and Radiation Control Building Hood Exhaust to be consistent with procedures and software.
3-18	P_{iI} definition; last sentence changed Table 3.3-18 to Table 3.3-4. (See Justification 9.)
3-22	Added Table 3.2-4, P_i values from an infant to a child inhalation pathway only. (See Justification 9.)

<u>Page No.</u>	<u>Comments For Changes in ODCM, Revision 3</u>
3-23	Editorial change.
3-24	(X/Q) definition changed mixed mode to elevated and >9 mph to ≤ 9 mph. (See Justification 6.)
3-26	Equation 3.3-7, (Projected Dose). (See Justification 8.)
3-28	All mixed mode releases have been changed to elevated mode and >9 mph changed ≤ 9 mph. (See Justification 6.)
3-32	Equation 3.3-11 (Project Dose). (See Justification 8.)
4-4	Sample Point 21; Editorial.
4-5	Sample Point 29; Editorial.
4-7	Sample Point 54, Auburndale Plantation milk sample was discontinued. The dairy closed.
4-8	Footnote 8 changed since dairy closed.
B-1	Editorial change.

C. Offsite Dose Calculation Manual

Revised pages for Revision 3.