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Carolinas

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April 30, 2009

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Subject: Duke Energy Carolinas, LLC
Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
2008 Annual Radioactive Effluent Release Report

Pursuant to Catawba Nuclear Station Technical Specification (TS) 5.6.3 and Selected Licensee Commitment 16.11-16, please find attached the Catawba Annual Radioactive Effluent Release Report for the period of January 1, 2008 through December 31, 2008. In accordance with Catawba TS 5.5.1, the Offsite Dose Calculation Manual (ODCM) is included in this submittal.

Attachment I	Summary of Gaseous and Liquid Effluents Report
Attachment II	Supplemental Information
Attachment III	Solid Waste Disposal Report
Attachment IV	Meteorological Data
Attachment V	Unplanned Offsite Releases
Attachment VI	Assessment of Radiation Dose from Radioactive Effluents to Members of the Public (includes fuel cycle dose calculation results)
Attachment VII	Revisions to UFSAR Section 16.11 Radiological Effluent Controls
Attachment VIII	Revisions to the Radioactive Waste Process Control Program Manual
Attachment IX	Information to Support the NEI Groundwater Protection Initiative
Enclosure	2008 Offsite Dose Calculation Manual (changes described in Chapter 7)

IE48
A009
NRR

Any questions concerning this report should be directed to Marc Sawicki at (803) 701-5191.

Sincerely,

James R. Morris

Attachments and Enclosure (Offsite Dose Calculation Manual (ODCM))

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(with attachments only)

ATTACHMENT I

Summary of Gaseous and Liquid Effluents Report

This attachment includes a summary of the quantities of radioactive liquid and gaseous effluents as outlined in Regulatory Guide 1.21, Appendix B.

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Gases						
1. Total Release	Ci	1.04E+00	7.66E-01	7.94E-01	9.93E-01	3.59E+00
2. Avg. Release Rate	µCi/sec	1.32E-01	9.74E-02	9.99E-02	1.25E-01	1.14E-01
B. Iodine-131						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Avg. Release Rate	µCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C. Particulates Half Life >= 8 days						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Avg. Release Rate	µCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Tritium						
1. Total Release	Ci	8.41E+01	5.58E+01	5.08E+01	6.80E+01	2.59E+02
2. Avg. Release Rate	µCi/sec	1.07E+01	7.10E+00	6.39E+00	8.55E+00	8.18E+00
E. Gross Alpha Radioactivity						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Avg. Release Rate	µCi/sec	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS EFFLUENTS - ELEVATED RELEASES - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
** No Nuclide Activities **		.....	.....	.....	.....	.....
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS EFFLUENTS - ELEVATED RELEASES - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
** No Nuclide Activities **		.....	.....	.....	.....	.....
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS EFFLUENTS - GROUND RELEASES - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
H-3	Ci	8.39E+01	5.56E+01	5.06E+01	6.69E+01	2.57E+02
Totals for Period...	Ci	8.39E+01	5.56E+01	5.06E+01	6.69E+01	2.57E+02
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS EFFLUENTS - GROUND RELEASES - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
AR-41	Ci	8.17E-01	6.15E-01	7.29E-01	8.60E-01	3.02E+00
KR-85	Ci	1.49E-02	0.00E+00	0.00E+00	0.00E+00	1.49E-02
XE-133	Ci	1.98E-01	1.47E-01	6.20E-02	1.23E-01	5.30E-01
XE-135	Ci	8.53E-03	4.31E-03	2.84E-03	9.54E-03	2.52E-02
Totals for Period...	Ci	1.04E+00	7.66E-01	7.94E-01	9.93E-01	3.59E+00
2. Iodines						
** No Nuclide Activities **		.....	.....	.....	.....	.....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Tritium						
H-3	Ci	1.81E-01	1.98E-01	1.98E-01	1.04E+00	1.62E+00
Totals for Period...	Ci	1.81E-01	1.98E-01	1.98E-01	1.04E+00	1.62E+00
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Products						
1. Total Release	Ci	3.43E-03	8.76E-03	2.69E-02	5.32E-03	4.44E-02
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	1.24E-10	3.01E-10	8.02E-10	1.99E-10	3.80E-10
B. Tritium						
1. Total Release	Ci	2.44E+02	1.94E+02	1.50E+02	8.21E+01	6.70E+02
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	2.07E-07	2.06E-07	3.45E-07	3.56E-07	2.80E-07
b. Batch Releases	μCi/ml	8.83E-06	6.65E-06	4.43E-06	3.04E-06	5.71E-06
C. Dissolved and Entrained Gases						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
D. Gross Alpha Radioactivity						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2. Average Diluted Concentration						
a. Continuous Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
b. Batch Releases	μCi/ml	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
E. Volume of Liquid Waste						
1. Continuous Releases	liters	9.43E+07	1.26E+08	6.33E+07	9.38E+07	3.77E+08
2. Batch Releases	liters	5.42E+05	8.52E+05	1.35E+06	5.86E+05	3.34E+06
F. Volume of Dilution Water						
1. Continuous Releases	liters	2.76E+09	2.91E+09	3.35E+09	2.67E+09	1.17E+10
2. Batch Releases	liters	2.76E+10	2.91E+10	3.35E+10	2.67E+10	1.17E+11

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID EFFLUENTS - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
** No Nuclide Activities **		.....	.....	.....	.....	.....
2. Tritium						
H-3	Ci	5.90E-01	6.24E-01	1.18E+00	9.84E-01	3.38E+00
Totals for Period...	Ci	5.90E-01	6.24E-01	1.18E+00	9.84E-01	3.38E+00
3. Dissolved and Entrained Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID EFFLUENTS - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2008	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
BA-140	Ci	1.30E-05	0.00E+00	0.00E+00	0.00E+00	1.30E-05
CO-57	Ci	0.00E+00	0.00E+00	2.35E-05	1.61E-05	3.96E-05
CO-58	Ci	4.92E-04	1.73E-03	4.83E-03	2.60E-03	9.65E-03
CO-60	Ci	6.89E-04	4.33E-04	1.67E-03	1.06E-03	3.85E-03
CR-51	Ci	0.00E+00	2.73E-04	2.28E-04	0.00E+00	5.01E-04
CS-137	Ci	0.00E+00	2.83E-05	0.00E+00	0.00E+00	2.83E-05
CS-138	Ci	0.00E+00	0.00E+00	2.18E-05	0.00E+00	2.18E-05
F-18	Ci	0.00E+00	0.00E+00	0.00E+00	9.26E-06	9.26E-06
FE-59	Ci	1.58E-05	0.00E+00	0.00E+00	0.00E+00	1.58E-05
I-131	Ci	0.00E+00	0.00E+00	6.90E-06	0.00E+00	6.90E-06
MN-54	Ci	9.02E-06	3.19E-05	4.20E-05	3.07E-05	1.14E-04
NA-24	Ci	0.00E+00	0.00E+00	3.24E-05	0.00E+00	3.24E-05
NB-97	Ci	2.20E-05	9.66E-06	0.00E+00	0.00E+00	3.17E-05
SB-122	Ci	5.59E-06	0.00E+00	0.00E+00	0.00E+00	5.59E-06
SB-124	Ci	8.50E-05	1.06E-04	5.73E-03	2.13E-04	6.14E-03
SB-125	Ci	2.08E-03	6.15E-03	1.43E-02	1.39E-03	2.39E-02
Y-91M	Ci	0.00E+00	7.62E-07	0.00E+00	0.00E+00	7.62E-07
ZR-95	Ci	1.03E-05	0.00E+00	0.00E+00	0.00E+00	1.03E-05
		---	---	---	---	---
Totals for Period...	Ci	3.43E-03	8.76E-03	2.69E-02	5.32E-03	4.44E-02
2. Tritium						
H-3	Ci	2.44E+02	1.94E+02	1.49E+02	8.11E+01	6.67E+02
		---	---	---	---	---
Totals for Period...	Ci	2.44E+02	1.94E+02	1.49E+02	8.11E+01	6.67E+02
3. Dissolved and Entrained Gases						
** No Nuclide Activities **		.....	.....	.....	.....	.....
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		.....	.....	.....	.....	.....

ATTACHMENT II

Supplemental Information

To the

Gaseous and Liquid Effluents Report

CATAWBA NUCLEAR STATION

2008 EFFLUENT AND WASTE DISPOSAL SUPPLEMENTAL INFORMATION

I. REGULATORY LIMITS - PER UNIT

A. NOBLE GASES - AIR DOSE

1. CALENDAR QUARTER - GAMMA DOSE = 5 MRAD
2. CALENDAR QUARTER - BETA DOSE = 10 MRAD
3. CALENDAR YEAR - GAMMA DOSE = 10 MRAD
4. CALENDAR YEAR - BETA DOSE = 20 MRAD

B. LIQUID EFFLUENTS - DOSE

1. CALENDAR QUARTER - TOTAL BODY DOSE = 1.5 MREM
2. CALENDAR QUARTER - ORGAN DOSE = 5 MREM
3. CALENDAR YEAR - TOTAL BODY DOSE = 3 MREM
4. CALENDAR YEAR - ORGAN DOSE = 10 MREM

C. GASEOUS EFFLUENTS - IODINE - 131 AND 133, TRITIUM, PARTICULATES WITH HALF-LIVES > 8 DAYS - ORGAN DOSE

1. CALENDAR QUARTER = 7.5 MREM
2. CALENDAR YEAR = 15 MREM

II. MAXIMUM PERMISSIBLE EFFLUENT CONCENTRATIONS

A. GASEOUS EFFLUENTS - INFORMATION FOUND IN OFFSITE DOSE CALCULATION MANUAL
B. LIQUID EFFLUENTS - INFORMATION FOUND IN 10CFR20, APPENDIX B, TABLE 2, COLUMN 2

III. AVERAGE ENERGY - NOT APPLICABLE

IV. MEASUREMENTS AND APPROXIMATIONS OF TOTAL RADIOACTIVITY

ANALYSES OF SPECIFIC RADIONUCLIDES IN SELECTED OR COMPOSITED SAMPLES AS DESCRIBED IN THE SELECTED LICENSEE COMMITMENTS ARE USED TO DETERMINE THE RADIONUCLIDE COMPOSITION OF THE EFFLUENT. SUPPLEMENTAL REPORT, PAGE 2, PROVIDES A SUMMARY DESCRIPTION OF THE METHOD USED FOR ESTIMATING OVERALL ERRORS ASSOCIATED WITH RADIOACTIVITY MEASUREMENTS.

V. BATCH RELEASES

A. LIQUID EFFLUENT

1. 6.20E+01 = TOTAL NUMBER OF BATCH RELEASES
2. 4.42E+03 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 8.70E+01 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 7.12E+01 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 3.60E+01 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.
6. 5.86E+04 = AVERAGE DILUTION WATER FLOW DURING RELEASES (GPM).

B. GASEOUS EFFLUENT

1. 5.70E+01 = TOTAL NUMBER OF BATCH RELEASES.
2. 1.02E+06 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 4.90E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 1.80E+04 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.08E+02 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.

VI. ABNORMAL RELEASES

A. LIQUID

1. NUMBER OF RELEASES = 0
2. TOTAL ACTIVITY RELEASED (CURIES) = 0

B. GASEOUS

1. NUMBER OF RELEASES = 0
2. TOTAL ACTIVITY RELEASED (CURIES) = 0

CATAWBA NUCLEAR STATION

The estimated percentage of error for both Liquid and Gaseous effluent release data at Catawba Nuclear Station has been determined to be ± 25.2%. This value was derived by taking the square root of the sum of the squares of the following discrete individual estimates of error:

(1) Flow rate determining devices = ± 20%

(2) Counting error = ± 15%

(3) Sample preparation error = ± 3%

ATTACHMENT III

Solid Radioactive Waste Disposal Report

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE SHIPPED TO A DISPOSAL FACILITY

REPORT PERIOD 1/1/2008 TO 12/31/2008

Type of Waste Shipped	Number of Shipments *	Number of Containers *	Waste Class *	Container Type *	Burial Volume (ft^3)	Burial Volume (m^3)	Total Activity (Curies)
1. Waste from Liquid Systems							
(A) Dewatered Secondary Resins	0	0	NA	NA	0.0	0.00	0.000
(B) Dewatered Primary Resins	1	1	1 B	1 HIC	120.3	3.41	56.337
(C) Evaporator Concentrates	0	0	NA	NA	0.0	0.00	0.000
(D) Dewatered Mechanical Filters	0	0	NA	NA	0.0	0.00	0.000
(E) Dewatered Demineralizers	0	0	NA	NA	0.0	0.00	0.000
(F) Solidified (Cement) Acids, Oils, Sludges	0	0	NA	NA	0.0	0.00	0.000
2. Dry Solid Waste							
(A) Dry Active Waste (compacted)	0	0	NA	NA	0.0	0.00	0.000
(B) Dry Active Waste (non-compacted)	0	0	NA	NA	0.0	0.00	0.000
(C) Dry Active Waste (brokered)	NA	NA	NA	NA	7323.4	207.40	3.463
(D) Irradiated Components	0	0	NA	NA	0.0	0.00	0.000
3. All Solid Waste	1 *	1 *	NA *	NA *	7443.7	210.81	59.800

* Does not included brokered Dry Active Waste totals.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2008 TO 12/31/2008

Type of Waste Shipped	Radionuclide	% Abundance *
1. Waste from Liquid Systems		
(A) Dewatered Secondary Resins	(None shipped this period)	
(B) Dewatered Primary Resins	H-3	0.0%
	Cr-51	0.0%
	Mn-54	0.4%
	Co-57	0.1%
	Co-58	0.1%
	Fe-59	0.0%
	Co-60	7.2%
	Zn-65	0.0%
	Nb-95	0.0%
	Zr-95	0.0%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-124	0.0%
	Sb-125	0.3%
	Ba-133	0.0%
	Cs-134	0.2%
	Cs-137	1.1%
	Np-237	0.0%
	Ce-144	0.0%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.0%
	Fe-55	18.7%
	Ni-59	0.6%
	Ni-63	71.2%
	Sr-89	0.0%
	Sr-90	0.0%
	Tc-99	0.0%
	I-129	0.0%
	Am-241	0.0%
	Pu-241	0.0%
	Cm-242	0.0%
	Cm-243	0.0%
(C) Evaporator Concentrates	(None shipped this period)	
(D) Dewatered Mechanical Filters	(None shipped this period)	
(E) Dewatered Demineralizers	(None shipped this period)	
(F) Solidified (Cement) Acids, Oils, Sludges	(None shipped this period)	

* Average percent abundance for all shipments during period.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2008 TO 12/31/2008

Type of Waste Shipped	Radionuclide	% Abundance *
2. Dry Solid Waste		
(A) Dry Active Waste (compacted)	(None shipped this period)	
(B) Dry Active Waste (non-compacted)	(None shipped this period)	
(C) Dry Active Waste (brokered)	H-3	2.6%
	Cr-51	0.1%
	Mn-54	1.8%
	Co-57	0.3%
	Co-58	20.6%
	Fe-59	0.0%
	Co-60	8.1%
	Zn-65	0.0%
	Nb-95	1.1%
	Zr-95	0.6%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-124	0.0%
	Sb-125	0.0%
	Ba-133	0.0%
	Cs-134	0.1%
	Cs-137	0.1%
	Np-237	0.0%
	Ce-144	0.7%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	2.4%
	Fe-55	43.5%
	Ni-59	0.0%
	Ni-63	17.9%
	Sr-89	0.0%
	Sr-90	0.2%
	Tc-99	0.0%
	I-129	0.0%
	Am-241	0.0%
	Pu-241	0.0%
	Cm-242	0.0%
	Cm-243	0.0%
(D) Irradiated Components	(None shipped this period)	

* Average percent abundance for all shipments during period.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2008 TO 12/31/2008

Type of Waste Shipped	Radionuclide	% Abundance *
3. All Solid Waste	H-3	0.2%
	Cr-51	0.0%
	Mn-54	0.5%
	Co-57	0.1%
	Co-58	1.3%
	Fe-59	0.0%
	Co-60	7.2%
	Zn-65	0.0%
	Nb-95	0.1%
	Zr-95	0.0%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-124	0.0%
	Sb-125	0.3%
	Ba-133	0.0%
	Cs-134	0.2%
	Cs-137	1.0%
	Np-237	0.0%
	Ce-144	0.0%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.2%
	Fe-55	20.2%
	Ni-59	0.6%
	Ni-63	68.1%
	Sr-89	0.0%
	Sr-90	0.0%
	Tc-99	0.0%
	I-129	0.0%
	Am-241	0.0%
	Pu-241	0.0%
	Cm-242	0.0%
	Cm-243	0.0%

* Average percent abundance for all shipments during period.

ATTACHMENT IV

Meteorological Data

Meteorological Joint Frequency Distributions of Wind Speed, Wind Direction and Atmospheric Stability using winds at the 10 M Level (Hours of Occurrence)

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY A

	WIND SPEED CLASS								
	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR									
-N-	.	.	.	5	10	10	4	1	30
-NNE-	.	.	1	5	4	11	19	8	48
-NE-	.	.	.	.	1	4	6	.	11
-E-	.	.	1	.	.	.	.	.	1
-ESE-	.	.	.	1	1	.	.	.	2
-SE-	.	.	.	5	.	1	.	.	6
-SSE-	.	.	.	18	.	.	.	.	18
-S-	.	.	1	7	9	7	.	.	24
-SSW-	.	.	1	33	62	16	1	.	113
-SW-	.	.	1	52	61	24	7	2	147
-WSW-	.	.	3	25	33	9	1	.	71
-W-	.	.	1	27	12	4	.	.	44
-WNW-	.	.	1	6	13	7	3	.	30
-NW-	1	4	.	4	5	2	3	1	20
-NNW-	.	.	2	1	7	6	7	5	28
TOTAL	1	4	12	189	218	101	51	17	593

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY B

	WIND SPEED CLASS							
	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	8.00-9.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR								
-N-	.	6	19	16	2	2	.	45
-NNE-	1	5	7	23	15	2	.	53
-NE-	.	.	5	10	11	1	.	27
-ENE-	.	1	3	.	1	.	.	5
-ESE-	.	3	1	.	.	.	.	4
-SE-	3	5	2	.	.	.	.	10
-SSE-	5	24	1	.	.	.	.	30
-S-	2	16	3	2	.	.	.	23
-SSW-	5	43	20	9	.	.	.	77
-SW-	3	41	7	8	2	2	.	63
-WSW-	2	9	6	1	.	.	.	18
-W-	1	15	3	.	1	.	.	20
-WNW-	.	12	4	1	1	1	.	19
-NW-	.	4	4	2	7	2	.	19
-NNW-	.	2	5	5	4	6	1	23
TOTAL	22	186	90	77	44	16	1	436

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY C

	WIND SPEED CLASS									
	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	8.00-9.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR										
-N-	.	1	2	19	28	14	4	1	.	69
-NNE-	.	1	1	9	22	53	8	1	3	98
-NE-	.	.	.	3	13	36	9	.	.	61
-ENE-	.	.	2	1	2	5	1	.	.	11
-E-	.	.	.	3	.	.	.	.	.	3
-ESE-	.	1	2	2	1	.	.	.	.	6
-SE-	.	.	8	9	3	.	.	.	.	20
-SSE-	.	.	14	27	2	.	.	.	.	43
-S-	.	.	13	30	5	2	.	.	.	50
-SSW-	.	1	18	50	12	7	1	.	.	89
-SW-	.	.	14	31	9	7	1	2	.	64
-WSW-	1	3	14	9	2	4	.	.	.	33
-W-	1	1	4	10	1	.	.	.	.	17
-WNW-	.	.	1	7	4	1	1	2	.	16
-NW-	.	1	1	14	6	6	6	3	.	37
-NNW-	.	1	1	13	8	3	6	5	.	37
TOTAL	2	10	95	237	118	138	37	14	3	654

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY D

	WIND SPEED CLASS											
	0.45-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	8.00-9.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR												
-N-	.	3	10	13	37	132	158	85	24	11	1	474
-NNE-	.	2	2	3	16	59	155	193	61	16	7	514
-NE-	.	.	2	2	7	27	67	71	30	6	.	212
-ENE-	.	.	1	.	6	13	19	17	17	5	.	78
-E-	.	.	4	3	8	8	12	3	.	.	.	38
-ESE-	.	1	2	5	16	13	4	2	.	.	.	43
-SE-	1	1	6	13	15	16	9	10	.	.	.	71
-SSE-	2	3	10	15	32	65	17	5	.	.	.	149
-S-	.	12	12	26	60	84	44	17	3	.	.	258
-SSW-	1	11	18	39	95	109	56	21	13	1	.	364
-SW-	1	6	17	30	63	75	31	30	6	1	.	260
-WSW-	2	10	12	15	26	29	9	6	.	.	.	109
-W-	1	6	7	20	17	22	3	3	.	.	.	79
-WNW-	.	9	7	18	25	25	10	4	1	1	.	100
-NW-	.	3	9	18	21	19	21	18	13	4	.	126
-NNW-	.	1	6	5	34	61	39	27	18	11	.	202
TOTAL	8	68	125	225	478	757	654	512	186	56	8	3077

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY E

	WIND SPEED CLASS										
	0.45-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR											
-N-	1	.	4	5	18	94	57	9	.	6	194
-NNE-	.	1	1	2	4	12	19	17	3	1	60
-NE-	.	.	2	2	1	3	4	12	13	2	39
-ENE-	.	1	.	2	.	4	5	1	2	.	15
-E-	.	1	1	2	2	3	5	3	.	.	17
-ESE-	.	.	2	4	3	4	7	4	.	.	24
-SE-	.	2	2	2	9	18	18	12	3	.	66
-SSE-	3	12	7	15	49	51	32	10	.	.	179
-S-	.	15	30	52	98	90	37	10	2	1	335
-SSW-	1	21	39	62	118	138	58	13	3	.	453
-SW-	4	30	35	51	44	48	13	4	1	1	231
-WSW-	3	24	31	28	22	10	3	.	.	.	121
-W-	5	17	19	26	28	11	2	.	.	.	108
-WNW-	3	13	22	19	48	34	15	4	.	.	158
-NW-	5	8	16	17	30	50	15	5	.	.	146
-NNW-	.	10	6	18	52	112	29	12	2	.	241
TOTAL	25	155	217	307	526	682	319	116	29	11	2387

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY F

	WIND SPEED CLASS									
	0.45-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR										
-N-	.	.	.	1	11	44	16	.	.	72
-NNE-	.	.	.	.	.	.	4	.	1	5
-NE-	.	.	.	.	.	.	1	.	.	1
-ENE-	.	.	.	.	1	.	.	.	.	1
-E-	.	.	.	.	.	1	.	.	.	1
-ESE-	.	.	1	.	.	2	.	.	.	3
-SE-	.	.	.	.	5	6	1	1	.	13
-SSE-	.	2	4	5	6	3	2	1	.	23
-S-	2	10	20	34	38	.	.	.	.	104
-SSW-	2	13	32	41	46	6	.	.	.	140
-SW-	2	29	24	23	8	1	1	.	.	88
-WSW-	5	16	25	17	10	3	.	.	.	76
-W-	.	11	8	6	13	9	.	.	.	47
-WNW-	4	6	7	23	18	16	.	.	.	74
-NW-	2	10	11	21	18	12	.	.	.	74
-NNW-	.	1	9	8	39	37	5	.	.	99
-CALM-	1	.	.	.	.	.	.	.	.	1
TOTAL	18	98	141	179	213	140	30	2	1	822

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

PASQUILL STABILITY G

	WIND SPEED CLASS								
	0.45-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR									
-N-	.	1	.	1	5	10	3	.	20
-SE-	.	.	.	.	.	1	1	1	3
-SSE-	1	.	1	.	1	2	.	.	5
-S-	2	8	19	30	17	1	.	.	77
-SSW-	5	18	23	28	15	.	.	.	89
-SW-	10	25	24	19	5	2	.	.	85
-WSW-	7	21	20	14	8	1	.	.	71
-W-	16	14	12	9	6	7	.	.	64
-WNW-	9	15	12	12	8	7	.	.	63
-NW-	10	22	18	22	3	2	.	.	77
-NNW-	1	1	6	18	28	20	2	.	76
-CALM-	6	.	.	.	.	.	.	.	6
TOTAL	67	125	135	153	96	53	6	1	636

CATAWBA NUCLEAR STN. METEOROLOGY (2008) PROG=XOQFREQ
10M WIND SPEED/DIRECTION/DELTA-T STABILITY
STABILITY CLASSES BASED ON DELTA-T BETWEEN UPPER-LOWER LEVELS

ALL STABILITY CLASSES

	WIND SPEED CLASS											
	0.45-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50-1.99	2.00-2.99	3.00-3.99	4.00-4.99	5.00-5.99	6.00-7.99	8.00-9.99	TOTAL
	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
SECTOR												
-N-	1	4	14	21	73	310	291	134	34	21	1	904
-NNE-	.	3	3	6	23	90	211	297	107	28	10	778
-NE-	.	.	4	4	8	33	91	133	69	9	.	351
-ENE-	.	1	1	2	9	19	29	23	21	5	.	110
-E-	.	1	5	5	11	15	17	6	.	.	.	60
-ESE-	.	1	5	10	21	25	14	6	.	.	.	82
-SE-	1	3	8	15	40	60	34	25	3	.	.	189
-SSE-	6	17	22	35	107	190	54	16	.	.	.	447
-S-	4	45	81	142	229	228	98	38	5	1	.	871
-SSW-	9	63	112	171	298	379	208	66	18	1	.	1325
-SW-	17	90	100	123	138	250	122	73	17	8	.	938
-WSW-	17	71	89	77	85	86	53	20	1	.	.	499
-W-	22	48	47	62	70	101	21	7	1	.	.	379
-WNW-	16	43	48	72	101	107	46	17	6	4	.	460
-NW-	17	43	55	83	73	105	51	33	29	10	.	499
-NNW-	1	13	27	50	156	246	95	53	37	27	1	706
-CALM-	7	.	.	.	.	.	.	.	.	.	.	7
TOTAL	118	446	621	878	1442	2244	1435	947	348	114	12	8605

ATTACHMENT V

Unplanned Offsite Releases

There were no unplanned liquid or gaseous radioactive effluent releases to the environment in 2008.

ATTACHMENT VI

Assessment of Radiation Dose from Radioactive Effluents to Members of the Public

(includes fuel cycle dose calculation results)

This attachment includes an assessment of radiation doses to the maximum exposed member of the public due to radioactive liquid and gaseous effluents released from the site for each calendar quarter for the calendar year of the report as well as the total dose for the calendar year.

This attachment also includes an assessment of radiation doses to the maximum exposed member of the public from all uranium fuel cycle sources within ten miles of Catawba for the calendar year of this report to show conformance with 40 CFR 190.

Methods for calculating the dose contribution from liquid and gaseous effluents are given in the Offsite Dose Calculation Manual (ODCM).

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

1st Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 1 2008 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	3.02E-01	1.50E+01	2.01E+00

Maximum Organ Dose Receptor Location: 0.5 Mile ENE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 1 2008 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Maximum Gamma Air Dose	8.55E-03	1.00E+01	8.55E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.89E+01

Q1 - Maximum Beta Air Dose	3.27E-03	2.00E+01	1.63E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.12E+01
XE-133	7.07E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
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GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

2nd Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 2 2008 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	2.00E-01	1.50E+01	1.34E+00

Maximum Organ Dose Receptor Location: 0.5 Mile ENE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 2 2008 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - Maximum Gamma Air Dose	6.43E-03	1.00E+01	6.43E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.90E+01

Q2 - Maximum Beta Air Dose	2.43E-03	2.00E+01	1.21E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.24E+01
XE-133	7.08E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
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GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

3rd Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 3 2008 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	1.82E-01	1.50E+01	1.22E+00

Maximum Organ Dose Receptor Location: 0.5 Mile ENE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 3 2008 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Gamma Air Dose	7.58E-03	1.00E+01	7.58E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.96E+01

Q3 - Maximum Beta Air Dose	2.74E-03	2.00E+01	1.37E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.71E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

4th Quarter 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 4 2008 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	2.44E-01	1.50E+01	1.63E+00

Maximum Organ Dose Receptor Location: 0.5 Mile ENE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Quarter 4 2008 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Maximum Gamma Air Dose	8.97E-03	1.00E+01	8.97E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.92E+01

Q4 - Maximum Beta Air Dose	3.31E-03	2.00E+01	1.65E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.49E+01

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

ANNUAL 2008

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Annual 2008 ========

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	9.29E-01	3.00E+01	3.10E+00

Maximum Organ Dose Receptor Location: 0.5 Mile ENE
Critical Pathway: Vegetation

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS========== Annual 2008 ========

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Gamma Air Dose	3.15E-02	2.00E+01	1.58E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.92E+01

Yr - Maximum Beta Air Dose	1.17E-02	4.00E+01	2.94E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.39E+01
XE-133	5.27E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

1st Quarter 2008

=== BATCH LIQUID RELEASES ========== Quarter 1 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	GI-LLI	1.34E-02	1.00E+01	1.34E-01
Q1 - Total Body Dose	CHILD		1.34E-02	3.00E+00	4.46E-01

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.88E+01

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.91E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 1 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	3.10E-04	1.00E+01	3.10E-03
Q1 - Total Body Dose	CHILD		3.10E-04	3.00E+00	1.03E-02

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

2nd Quarter 2008

=== BATCH LIQUID RELEASES ========== Quarter 2 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	1.11E-02	1.00E+01	1.11E-01
Q2 - Total Body Dose	CHILD		1.02E-02	3.00E+00	3.42E-01

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	8.99E+01
CS-137	9.43E+00

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.75E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 2 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	3.09E-04	1.00E+01	3.09E-03
Q2 - Total Body Dose	CHILD		3.09E-04	3.00E+00	1.03E-02

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

3rd Quarter 2008

=== BATCH LIQUID RELEASES ========== Quarter 3 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	ADULT	GI-LLI	7.46E-03	1.00E+01	7.46E-02
Q3 - Total Body Dose	CHILD		7.04E-03	3.00E+00	2.35E-01

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	8.25E+01
CO-60	9.01E+00
CO-58	7.96E+00

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.57E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 3 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	5.24E-04	1.00E+01	5.24E-03
Q3 - Total Body Dose	CHILD		5.24E-04	3.00E+00	1.75E-02

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

4th Quarter 2008

=== BATCH LIQUID RELEASES ========== Quarter 4 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	ADULT	GI-LLI	5.19E-03	1.00E+01	5.19E-02
Q4 - Total Body Dose	CHILD		4.85E-03	3.00E+00	1.62E-01

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	8.13E+01
CO-60	1.03E+01
CO-58	7.74E+00

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.52E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Quarter 4 2008 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	5.41E-04	1.00E+01	5.41E-03
Q4 - Total Body Dose	CHILD		5.41E-04	3.00E+00	1.80E-02

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/08 TO 1/1/09
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

ANNUAL 2008

=== BATCH LIQUID RELEASES ========== Annual 2008 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	3.61E-02	2.00E+01	1.80E-01
Yr - Total Body Dose	CHILD		3.54E-02	6.00E+00	5.90E-01

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.55E+01

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	9.74E+01

=== CONTINUOUS LIQUID RELEASES (WC) ========== Annual 2008 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	1.69E-03	2.00E+01	8.45E-03
Yr - Total Body Dose	CHILD		1.69E-03	6.00E+00	2.82E-02

Maximum Organ
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Total Body
Critical Pathway: Potable Water
Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

Catawba Nuclear Station
2008 Radioactive Effluent Releases
40CFR190 Uranium Fuel Cycle Dose Calculation Results

In accordance with the requirements of 40CFR190, the annual dose commitment to any member of the general public shall be calculated to assure that doses are limited to 25 millirems to the total body or any organ with the exception of the thyroid which is limited to 75 millirems. The fuel cycle dose assessment for Catawba Nuclear Station only includes liquid and gaseous effluent dose contributions from Catawba and direct and air-scatter dose from Catawba's Independent Spent Fuel Storage Installation (ISFSI) since no other uranium fuel cycle facility contributes significantly to Catawba's maximum exposed individual. The dose to a maximum exposed individual from Catawba's effluent releases is well below 40CFR190 limits as shown by the following summary:

I. 2008 Catawba 40CFR190 Effluent Dose Summary

The 40CFR190 effluent dose analysis to the maximum exposed individual from liquid and gas releases includes the dose from noble gases (i.e., total body and skin).

Maximum Total Body Dose = 9.83E-01 mrem

Maximum Location: 0.5 Mile, East-Northeast Sector
Critical Age: Child
Gas non-NG Contribution: 94%
Gas NG Contribution: 2%
Liquid Contribution: 4%

Maximum Organ (other than TB) Dose = 9.65E-01 mrem

Maximum Location: 0.5 Mile, East-Northeast Sector
Critical Age: Child
Critical Organ: Liver
Gas Contribution: 96%
Liquid Contribution: 4%

II. 2008 Catawba 40CFR190 ISFSI Dose Summary

Direct and air-scatter radiation dose contributions from the onsite Independent Spent Fuel Storage Installation (ISFSI) at Catawba have been calculated and documented in the "Catawba Nuclear Station 10CFR72.212 Written Evaluation" report. The estimated ISFSI cask loading schedule is given in three phases. For Phase I initial ISFSI cask loading began in July 2007 and is scheduled to be completed in October 2009. Estimated dose rates at 50 specific locations including the Exclusion Area Boundary (EAB) are provided in the 10CFR72.212 evaluation report. The maximum dose rate at the EAB for Phase I from the Catawba ISFSI is calculated to be less than 0.1 mrem/yr. The following excerpt, "C. 10CFR72.212(b)(2)(i)(C)- Requirements of 72.104", from the "Catawba Nuclear Station 10CFR72.212 Written Evaluation" report is provided to document the method used to estimate the Catawba ISFSI dose to the nearest "real individual".

The following four pages are taken from the Catawba Nuclear Site, "Independent Spent Fuel Storage Installation", 10CFR72.212 Evaluation report.

7.3 10CFR72.212(b)(2)(i)(C) - Requirements of §72.104

"(C) the requirements of §72.104 have been met. A copy of this record shall be retained until spent fuel is no longer stored under the general license issued under §72.210."

The requirements of §72.104 are as follows:

(a) During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other critical organ as a result of exposure to:

(1) Planned discharges of radioactive materials, radon and its decay products excepted, to the general environment,

(2) Direct radiation from ISFSI or MRS operations, and

(3) Any other radiation from uranium fuel cycle operations within the region.

Doses from storage casks located at the ISFSI have been calculated at the end of each of three storage phases at a number of locations. The three storage phases are (Reference 7.3-3):

Phase I	1 Pad	24 Casks	Filled 2009
Phase II	7 Pads	168 Casks	Filled 2042
Phase III	11 Pads	264 Casks	Filled 2047

The best estimate loading schedule by cask is shown below (Reference 7.3-3, as supplemented by revised cask loading schedule prepared by Catawba Reactor Engineering). This loading schedule may change as plant needs dictate.

Storage Phase	Year	Month	Unit 1	Unit 2	Storage Phase	Year	Unit 1	Unit 2
Phase I	2007	April			Phase II	2011	5	4
	2007	May				2012	4	5
	2007	June				2013		
	2007	July	2			2014		
	2007	August	1			2015	5	4
	2007	September				2016	4	5
	2007	October				2017		
	2007	November	1			2018		
	2007	December	2			2019	5	4
	2008	January	1			2020	4	5
	2008	February	2			2021		
	2008	March				2022		
	2008	April				2023	5	4
	2008	May				2024	4	5
	2008	June				2025		
	2008	July				2026		
	2008	August				2027	5	4
	2008	September				2028	4	5
	2008	October				2029		
	2008	November		2		2030		
	2008	December		1		2031	5	4
	2009	January		2		2032	4	5
	2009	February		1		2033		
	2009	March				2034		
	2009	April	1			2035	5	4
	2009	May	2			2036	4	5
	2009	June				2037		
	2009	July				2038		
	2009	August		2		2039	5	4
	2009	September		2		2040	4	5
	2009	October		2		2041		
						2042		
					Phase III	2043	20	
						2044	20	
						2045	8	12
						2046		20
						2047		16

The methodology and results of the dose calculations are discussed in detail in References 7.3-3 – 7.3.6. A summary of the methodolgy and results is presented below.

There are four calculations that are used to estimate the doses. The first calculation (Reference 7.3-3) determines the source term for the base canister. The results of this calculation include the fractional probability energy spectra for photons and neutrons, the photon and neutron release rates per canister as a function of burnup and decay, and the release rates for each filled canister at the end of Phase I, II and III as a fraction of the base canister release rate. This calculation uses the representative design basis PWR fuel assembly characteristics for a Westinghouse 17x17 assembly as described in the NAC-UMS FSAR.

The next calculation (Reference 7.3-4) uses the results from Reference 7.3-1 to generate the photon surface source and neutron-to-photon ratios as a function of distance for a base canister to be used to generate dose contours for the various phases of the CNS ISFSI Project.

A detailed MCNP model of the NAC UMS with the Duke specified loading scheme is developed to collect a photon and neutron surface source for use in radiological analysis for the various phases of the ISFSI project. The representative PWR fuel assembly dimensions (standard WE 17x17) based on UMS FSAR are used to calculate photon and neutron energy spectra, release rates and fractional release rates for use as source term inputs for MCNP5. The zone specific photon and neutron energy spectra are used in the detailed cask model to assimilate the zone loading scheme. The surface source is generated on the surface of an ellipsoid that can be overlaid onto each cask position on the ISFSI pad.

The third calculation (Reference 7.3-5) uses the photon surface source generated in Reference 7.3-4. Each cask is modeled in MCNP as a simple solid concrete cylinder with the same dimension of an actual NAC-UMS cask with an ellipsoid over the cylinder for the placement of the surface source. The origin of the problem (X = 0, Y = 0) is located at the lower left corner of ISFSI pad 1. Therefore all dimensions in the model are relative to that point. For Phase I, detectors of various sizes are placed out from -1000 ft to 1800 ft in the X and -1200 ft to 1200 ft in the Y direction to collect dose tally in the units of mrem/hr.

A photon case is run and the dose tally is calculated for each detector of interest. A cask specific neutron-to-photon ratio is then applied to the photon dose tally to account for the neutron contribution to the total dose. It is important to note that fractional release rates are used only for the casks analyzed for that phase. Therefore, the Phase II dose is a summation of the Phase II dose tallies and Phase I dose tallies adjusted with a time decay factor. Phase III dose is a summation of dose tallies of all three phases at each detector location along with the appropriate decay factors for Phases I and II.

Phases II and III are modeled using the same detector layout so the dose from each phase can be added to determine the total dose at a specific location. The tallies are collected in the same manner for the dose contour maps. The resulting dose contours are shown on FANP drawings 5055506E-00, 5055507E-00, and 5055508E-00 (Reference 7.3-7 through 7.3-9).

The final calculation (Reference 7.3-6) provides dose rates at 50 specific locations, including the Exclusion Area Boundary (EAB). Doses are calculated at 3 locations on the EAB for each phase:

2500' Exclusion Area Boundary	Occupancy (hrs/yr)	Point	X Coord.	Y Coord.
*Entrance Road	8766	RP12	26+50	44+00
*Crepe Myrtle Road	8766	RP13	75+00	48+00
*Security Practice Range	144	RP14	25+00	89+00

The dose rates at these locations are:

Description of data point location	**Phase 1* [mrem/yr]**	**Phase 2* [mrem/yr]**	**Phase 3* [mrem/yr]**
2500' Exclusion Area Boundary			
*Entrance Road	0.06	0.29	0.85
*Crepe Myrtle Road	0.08	0.32	0.79
*Security Practice Range	0.01	0.03	0.03

*Maximum values from Table 2 or 3, Reference 7.3-6

The above information will be added to the plant generated dose to prove compliance with 72.104. General Office Radiological Protection has responsibility for this function.

ATTACHMENT VIII

Revisions to the Radioactive Waste Process Control Program Manual

The following letter dated April 8, 2009 from David L. Vaught, Senior Engineer, Nuclear Chemistry, documents that no changes were made to the Process Control Program (PCP) during the period of January 1, 2008 through December 31, 2008.

April 8, 2009

RD Hart
Regulatory Compliance Manager
Catawba Regulatory Compliance

ATTENTION: MJ Sawicki

SUBJECT: Catawba Nuclear Station
2009 Submittal Annual Radioactive Effluent Release Report
Process Control Program Changes 1/1/08-12/31/08
File: GS-764.25, CN-215.06

This memo documents that no changes were made to the Process Control Program (PCP) during the period of January 1, 2008 through December 31, 2008. This information is to be included in the Annual Radioactive Effluent Release Report for Catawba Nuclear Station.

CNS SLC 16.11-16 "Annual Radiological Environmental Operating Report and Radioactive Effluent Release Report requires that the Radioactive Effluent Release Reports shall include any changes made to the PCP during the reporting period.

If you have any questions, please call David Vaught at 980-373-5302.

Dewey P Rochester
Technical Manager II
Nuclear Chemistry

David L Vaught

by: David L Vaught
Senior Engineer

xc: Barry N. Kimray (CNS)
Edgar B. Greene (CNS)
Rufus Wallace (CNS)
Caryl D. Ingram (NGO)

ATTACHMENT IX

Information to Support the Nuclear Energy Institute (NEI)

Groundwater Protection Initiative

ARERR Groundwater Well Data Section

Duke Energy implemented a Ground Water Protection program in 2007. This initiative was developed to ensure timely and effective management of situations involving inadvertent releases of licensed material to ground water. As part of this program, Catawba has forty-six ground water monitoring wells in place. These wells are currently sampled quarterly (with the exception of the five LMW wells which are sampled semi-annually). All samples are being analyzed for tritium and gamma emitters. No gamma activity (other than naturally occurring radionuclides) was identified in any of the well samples during 2008.

Results from sampling during 2007 identified ground water contamination at location C-213. This contamination was identified as coming from backflow from the Monitor Tank Building (MTB) truck bay sump into the WL trench entering the MTB from the east side. Additional wells were installed near C-213 to identify the extent of the contamination and determine the direction of ground water flow in the affected area. Ground water, and therefore the contamination, appears to be moving toward the turbine building drain system where it is collected. The contamination and resulting investigation activities were reported to the NRC and to state and local officials. Monitoring of this area is on-going.

Results from sampling during 2008 are shown in the table below.

Well Name	Well Location	Avg. Tritium Conc.(pCi/l)	Conc. Range	# of Samples
C100R	U-1 SFP			*0
C100DR	U-1 SFP	126	< - 126	2
C101R	U-1 SFP	931	846 - 1,010<	3
C101DR	U-1 SFP	355	285 - 428<	3
C102	E of U1 SFP O/S protected area	387	< - 424<	3
C103	E of U1 SFP @ Cooling Towers	408	< - 601	3
C104	U-1 RMWST	648	638 - 838<	4
C105	Engr. Bldg.	1,094	903 - 1,550<	4
C105R	Engr. Bldg.	1,124	987 - 1330<	4
C106	W Parking Lot	<	<	4
C106R	W Parking Lot	229	< - 239	4
C107	MET Tower Hill	655	592 - 703	4
C200R	U-2 SFP	1,025	907 - 1,200	4
C200DR	U-2 SFP	527	457- -587	4
C201R	U-2 SFP	2,553	2,290 - 3,040	4
C201DR	U-2 SFP	640	521 - 788	4
C202	S of RMC Tent	817	737 - 866	4
C203	E of RMC tent @ Cooling Towers	671	458 - 955	4

C204	S of RMC Tent	295	< - 318	4
C205	Adm. Parking	<	<	4
C205R	Adm Parking	355	< - 355	4
C206	W Parking Lot	<	<	4
C207R	Mon. Tank B	502	409 - 638	4
C207	Mon. Tank B	384	326 - 466	4
C208	N of MTB	175	< - 175	4
C209	MTUville S of light pole 23A	<	<	4
C210	N of U2 Mech Equip Bldg	244	< - 370	4
C211	W of RL intake O/S protected area	1,300	553 - 2,840	4
C212	Behind Aquatic Center	<	<	4
C213	Mon. Tank B	36,500	45,400 - 25,400	4
C213R	Mon. Tank B	<	<	4
C214	N of U2 TB	673	589 - 719	3
C215	N of U2 TB	6,500	2,740 - 10,900	4
C217	N of U2 TB	742	660 - 812	4
C218	N of U2 TB	6,223	1,320 - 11,000	4
C220	N of U2 TB	16,525	10,300 - 19,100	4
C221	N of U2 TB	243	163 - 343	4
WCMW-2	WC Ponds	4,023	3,490 - 4,760	4
WCMW-3	WC Ponds	515	402 - 612	4
WCMW-4	WC Ponds	377	325 - 448	4
WCMW-5	WC Ponds	393	< - 393	4
LMW 2A	Landfill	<	<	2
LMW 3A	Landfill	<	<	2
LMW 4	Landfill	<	<	2
LMW 5S	Landfill	<	<	2
LMW 5D	Landfill	<	<	2

* Well dry.

pCi/l - pico curies per liter

< - less than minimum detectable activity, typically 250 pCi/liter

20,000 pCi/l - the Environmental Protection Agency drinking water standard for tritium. This standard applies only to water that is used for drinking.

1,000,000 pCi/l - the 10CFR20, Appendix B, Table 2, Column 2, Effluent Concentration limit for tritium.