Duke Energy® Carolinas

JAMES R. MORRIS, VICE PRESIDENT

Duke Energy Carolinas, LLC
Catawba Nuclear Station / CNO1VP
4800 Concord Road
York, SC 29745

803-831-4251
803-831-3221 fax

April 29, 2010

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
2009 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, 2009 through December 31, 2009. 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 (Compact Disc)
Attachment IX	Information to Support the NEI Groundwater Protection Initiative
Attachment X	Inoperable Equipment
Enclosure	2008 Offsite Dose Calculation Manual (changes described in Chapter 7)

A009
IE48
NRR

Any questions concerning this report should be directed to Toni Pasour at (803) 701-3566.

Sincerely,

James R. Morris

Attachments and Enclosures (Process Control Program [PCP] Revision Compact Disc [CD] and Offsite Dose Calculation Manual [ODCM]) xc (with attachments and enclosures):

L.A. Reyes
Regional Administrator
U.S. Nuclear Regulatory Commission - Region II
Marquis One Tower
245 Peachtree Center Ave., NE Suite 1200
Atlanta, GA 30303-1257

J.H. Thompson (addressee only)
NRC Project Manager
U.S. Nuclear Regulatory Commission
Mail Stop 8-G9A
11555 Rockville Pike
Rockville, MD 20852-2738

xc (with attachments and CD):

G. A. Hutto, III
NRC Senior Resident Inspector

Russell Keown, Supervisor
Analytical & Radiological Environmental Services Division
2600 Bull Street
Columbia, SC 29201
803-896-0856/KEOWNRH@dhec.sc.gov

xc (with attachments only):

Sandra Flemming, Director
Analytical & Radiological Environmental Services Division
8231 Parklane Road
Columbia, SC 29201
803-896-3890/FLEMMISA@dhec.sc.gov

Susan E. Jenkins, Manager
Radioactive & Infectious Waste Management Division of Waste Management
S.C. Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
803-896-4271/JENKINSE@dhec.sc.gov

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. Radioactive liquid and gaseous wastes are sampled and analyzed per the requirements in Selected Licensee Commitment (SLC) Table 16.11-1-1, "Radioactive Liquid Waste Sampling and Analysis Program," and SLC Table 16.11-6-1, "Radioactive Gaseous Waste Sampling and Analysis Program."

TABLE 1A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Gases						
1. Total Release	Ci	1.04E+00	8.34E-01	1.13E+00	8.85E-01	3.89E+00
2. Avg. Release Rate	µCi/sec	1.34E-01	1.06E-01	1.42E-01	1.11E-01	1.23E-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	7.72E+01	8.57E+01	7.43E+01	8.68E+01	3.24E+02
2. Avg. Release Rate	µCi/sec	9.93E+00	1.09E+01	9.35E+00	1.09E+01	1.03E+01
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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - ELEVATED RELEASES - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - ELEVATED RELEASES - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	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 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - GROUND RELEASES - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	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	7.70E+01	8.56E+01	7.41E+01	8.63E+01	3.23E+02
Totals for Period...	Ci	7.70E+01	8.56E+01	7.41E+01	8.63E+01	3.23E+02
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		....	....	....	....	....

TABLE 1C

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS EFFLUENTS - GROUND RELEASES - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Gases						
AR-41	Ci	8.36E-01	6.61E-01	9.02E-01	6.63E-01	3.06E+00
KR-85	Ci	5.11E-03	2.99E-03	0.00E+00	0.00E+00	8.10E-03
XE-133	Ci	1.87E-01	1.59E-01	2.12E-01	1.96E-01	7.53E-01
XE-135	Ci	1.01E-02	1.14E-02	1.79E-02	2.69E-02	6.64E-02
Totals for Period...	Ci	1.04E+00	8.34E-01	1.13E+00	8.85E-01	3.89E+00
2. Iodines						
** No Nuclide Activities **		....	....	....	....	....
3. Particulates Half Life >= 8 days						
** No Nuclide Activities **		....	....	....	....	....
4. Tritium						
H-3	Ci	1.77E-01	9.51E-02	1.82E-01	4.89E-01	9.42E-01
Totals for Period...	Ci	1.77E-01	9.51E-02	1.82E-01	4.89E-01	9.42E-01
5. Gross Alpha Radioactivity						
** No Nuclide Activities **		....	....	....	....	....

TABLE 2A

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
A. Fission and Activation Products						
1. Total Release	Ci	1.07E-02	1.61E-02	1.66E-02	2.54E-02	6.88E-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	3.20E-10	5.01E-10	4.94E-10	8.07E-10	5.27E-10
B. Tritium						
1. Total Release	Ci	1.13E+02	1.08E+02	9.28E+01	1.69E+02	4.84E+02
2. Average Diluted Concentration						
a. Continuous Releases	µCi/ml	9.00E-08	0.00E+00	8.91E-07	0.00E+00	2.53E-07
b. Batch Releases	µCi/ml	3.38E-06	3.38E-06	2.68E-06	5.38E-06	3.68E-06
C. Dissolved and Entrained Gases						
1. Total Release	Ci	0.00E+00	0.00E+00	0.00E+00	2.53E-05	2.53E-05
2. Average Diluted Concentration						
a. Continuous Releases	µCi/ml	0.00E+00	0.00E+00	0.00E+00	8.03E-13	1.94E-13
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	4.58E+07	0.00E+00	3.47E+07	0.00E+00	8.05E+07
2. Batch Releases	liters	9.09E+05	7.96E+05	1.04E+06	1.12E+06	3.86E+06
F. Volume of Dilution Water						
1. Continuous Releases	liters	3.34E+09	3.21E+09	3.35E+09	3.15E+09	1.31E+10
2. Batch Releases	liters	3.34E+10	3.21E+10	3.35E+10	3.15E+10	1.31E+11

TABLE 2B

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - CONTINUOUS MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
** No Nuclide Activities **		....	....	....	....	....
2. Tritium						
H-3	Ci	3.05E-01	0.00E+00	3.02E+00	0.00E+00	3.32E+00
Totals for Period...	Ci	3.05E-01	0.00E+00	3.02E+00	0.00E+00	3.32E+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 1/1/09 TO 1/1/10
LIQUID EFFLUENTS - BATCH MODE

Catawba Nuclear Station Units 1 & 2

REPORT FOR 2009	Unit	QTR 1	QTR 2	QTR 3	QTR 4	YEAR
1. Fission and Activation Products						
AG-110M	Ci	0.00E+00	5.05E-05	0.00E+00	0.00E+00	5.05E-05
CO-57	Ci	6.23E-05	2.35E-05	4.58E-05	1.25E-04	2.57E-04
CO-58	Ci	4.11E-03	7.13E-03	8.66E-03	1.17E-02	3.16E-02
CO-60	Ci	3.81E-03	2.55E-03	3.87E-03	7.41E-03	1.76E-02
CR-51	Ci	0.00E+00	1.14E-03	0.00E+00	1.37E-03	2.52E-03
CS-134	Ci	0.00E+00	0.00E+00	0.00E+00	1.92E-06	1.92E-06
CS-137	Ci	2.38E-05	1.55E-05	6.13E-06	1.98E-04	2.44E-04
FE-59	Ci	0.00E+00	1.84E-04	0.00E+00	0.00E+00	1.84E-04
MN-54	Ci	4.98E-04	1.98E-04	9.72E-05	3.34E-04	1.13E-03
NB-95	Ci	0.00E+00	1.10E-04	0.00E+00	8.21E-05	1.92E-04
NB-97	Ci	0.00E+00	2.16E-05	8.03E-06	1.24E-04	1.53E-04
RB-88	Ci	0.00E+00	0.00E+00	0.00E+00	3.93E-05	3.93E-05
RU-103	Ci	0.00E+00	1.24E-05	0.00E+00	0.00E+00	1.24E-05
SB-124	Ci	1.07E-04	6.90E-04	2.67E-04	1.04E-03	2.11E-03
SB-125	Ci	1.99E-03	3.90E-03	3.61E-03	2.86E-03	1.24E-02
SR-91	Ci	0.00E+00	0.00E+00	0.00E+00	2.90E-05	2.90E-05
SR-92	Ci	0.00E+00	4.47E-06	0.00E+00	1.40E-05	1.85E-05
Y-93	Ci	0.00E+00	0.00E+00	0.00E+00	8.81E-05	8.81E-05
ZN-65	Ci	8.14E-05	0.00E+00	0.00E+00	0.00E+00	8.14E-05
ZR-95	Ci	0.00E+00	6.14E-05	0.00E+00	1.75E-06	6.31E-05
Totals for Period...	Ci	1.07E-02	1.61E-02	1.66E-02	2.54E-02	6.88E-02
2. Tritium						
H-3	Ci	1.13E+02	1.08E+02	8.98E+01	1.69E+02	4.80E+02
Totals for Period...	Ci	1.13E+02	1.08E+02	8.98E+01	1.69E+02	4.80E+02
3. Dissolved and Entrained Gases						
XE-133M	Ci	0.00E+00	0.00E+00	0.00E+00	2.53E-05	2.53E-05
Totals for Period...	Ci	0.00E+00	0.00E+00	0.00E+00	2.53E-05	2.53E-05
4. Gross Alpha Radioactivity						
** No Nuclide Activities **		....	....	....	....	....

ATTACHMENT II

Supplemental Information

to the

Gaseous and Liquid Effluents Report

CATAWBA NUCLEAR STATION

2009 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. 8.00E+01 = TOTAL NUMBER OF BATCH RELEASES
2. 5.09E+03 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 8.40E+01 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 6.36E+01 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.50E+01 = MINIMUM TIME (MIN.) FOR A BATCH RELEASE.
6. 6.58E+04 = AVERAGE DILUTION WATER FLOW DURING RELEASES (GPM).

B. GASEOUS EFFLUENT
1. 4.80E+01 = TOTAL NUMBER OF BATCH RELEASES.
2. 1.02E+06 = TOTAL TIME (MIN.) FOR BATCH RELEASES.
3. 4.77E+04 = MAXIMUM TIME (MIN.) FOR A BATCH RELEASE.
4. 2.12E+04 = AVERAGE TIME (MIN.) FOR A BATCH RELEASE.
5. 1.60E+01 = 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 1/1/2009 TO 12/31/2009

Type of Waste Shipped	*Number of Shipments* *	*Number of Containers* *	*Waste Class* *	*Container Type* *	*Burial Volume* (ft^3)	(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	3	3	1 B 2 C	3 HIC	360.9	10.22	918.000
(C) Evaporator Concentrates	0	0	NA	NA	0.0	0.00	0.000
(D) Dewatered Mechanical Filters	1	1	1 C	1 HIC	120.3	3.41	56.500
(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)	3	4	4 A S	4 HIC	652.2	18.47	1.439
(C) Dry Active Waste (brokered)	NA	NA	NA	NA	15,178.3	429.85	0.999
(D) Irradiated Components	0	0	NA	NA	0.0	0.00	0.000
3. All Solid Waste	7 *	8 *	NA *	NA *	16,311.7	461.95	976.938

* Does not included brokered Dry Active Waste totals.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2009 TO 12/31/2009

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	0.6%
	Co-57	0.1%
	Co-58	0.8%
	Fe-59	2.2%
	Co-60	0.4%
	Zn-65	0.0%
	Nb-94	0.0%
	Nb-95	0.0%
	Zr-95	0.0%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-122	0.0%
	Sb-124	0.0%
	Sb-125	0.1%
	Te-125m	0.0%
	I-131	0.0%
	Ba-133	0.0%
	Cs-134	0.0%
	Cs-137	0.2%
	Np-237	0.0%
	Ba/La-140	0.0%
	Ce-141	0.0%
	Ce-144	0.0%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.1%
	Fe-55	7.4%
	Ni-59	0.5%
	Ni-63	87.6%
	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)	

* Average percent abundance for all shipments during period.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2009 TO 12/31/2009

Type of Waste Shipped	Radionuclide	% Abundance *
(D) Dewatered Mechanical Filters	H-3	0.0%
	Cr-51	6.3%
	Mn-54	2.2%
	Co-57	0.2%
	Co-58	51.9%
	Fe-59	0.2%
	Co-60	13.8%
	Zn-65	0.1%
	Nb-94	0.0%
	Nb-95	1.4%
	Zr-95	2.1%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-122	0.0%
	Sb-124	0.1%
	Sb-125	0.5%
	Te-125m	0.0%
	I-131	0.0%
	Ba-133	0.0%
	Cs-134	0.0%
	Cs-137	0.2%
	Np-237	0.0%
	Ba/La-140	0.0%
	Ce-141	0.0%
	Ce-144	0.1%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.3%
	Fe-55	15.2%
	Ni-59	0.0%
	Ni-63	5.0%
	Sr-89	0.0%
	Sr-90	0.0%
	Tc-99	0.0%
	I-129	0.0%
	Am-241	0.0%
	Pu-241	0.5%
	Cm-242	0.0%
	Cm-243	0.0%
(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.

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)	H-3	0.0%
	Cr-51	2.2%
	Mn-54	2.3%
	Co-57	0.2%
	Co-58	55.5%
	Fe-59	0.0%
	Co-60	9.7%
	Zn-65	0.2%
	Nb-94	0.0%
	Nb-95	0.7%
	Zr-95	0.4%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-122	0.0%
	Sb-124	0.0%
	Sb-125	0.4%
	Te-125m	0.0%
	I-131	0.0%
	Ba-133	0.0%
	Cs-134	0.0%
	Cs-137	1.7%
	Np-237	0.0%
	Ba/La-140	0.0%
	Ce-141	0.0%
	Ce-144	0.1%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.0%
	Fe-55	17.9%
	Ni-59	0.0%
	Ni-63	8.4%
	Sr-89	0.4%
	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.

CATAWBA NUCLEAR STATION - SOLID RADIOACTIVE WASTE

SUMMARY OF PRINCIPAL RADIONUCLIDE COMPOSITION

REPORT PERIOD 1/1/2009 TO 12/31/2009

Type of Waste Shipped	Radionuclide	% Abundance *
(C) Dry Active Waste (brokered)	H-3	0.0%
	Cr-51	1.0%
	Mn-54	2.5%
	Co-57	0.2%
	Co-58	42.6%
	Fe-59	0.0%
	Co-60	11.4%
	Zn-65	0.2%
	Nb-94	0.0%
	Nb-95	0.7%
	Zr-95	0.4%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-122	0.0%
	Sb-124	0.0%
	Sb-125	0.4%
	Te-125m	0.0%
	I-131	0.0%
	Ba-133	0.0%
	Cs-134	0.0%
	Cs-137	1.7%
	Np-237	0.0%
	Ba/La-140	0.0%
	Ce-141	0.0%
	Ce-144	0.3%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.0%
	Fe-55	26.5%
	Ni-59	0.0%
	Ni-63	11.9%
	Sr-89	0.2%
	Sr-90	0.1%
	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 1/1/2009 TO 12/31/2009

Type of Waste Shipped	Radionuclide	% Abundance *
3. All Solid Waste	H-3	0.0%
	Cr-51	0.4%
	Mn-54	0.7%
	Co-57	0.1%
	Co-58	3.9%
	Fe-59	2.0%
	Co-60	1.2%
	Zn-65	0.0%
	Nb-94	0.0%
	Nb-95	0.1%
	Zr-95	0.1%
	Ag-108m	0.0%
	Ag-110m	0.0%
	Sn-113	0.0%
	Sb-122	0.0%
	Sb-124	0.0%
	Sb-125	0.1%
	Te-125m	0.0%
	I-131	0.0%
	Ba-133	0.0%
	Cs-134	0.0%
	Cs-137	0.2%
	Np-237	0.0%
	Ba/La-140	0.0%
	Ce-141	0.0%
	Ce-144	0.0%
	Pu-238	0.0%
	Pu-239	0.0%
	C-14	0.1%
	Fe-55	7.9%
	Ni-59	0.5%
	Ni-63	82.7%
	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 Station

The SAS System

The FREQ Procedure

Table of STAB by CALM

STAB Frequency	CALM CALM	WIND	Total
1	0	529	529
2	0	399	399
3	0	538	538
4	3	3297	3300
5	2	2400	2402
6	3	833	836
7	21	542	563
Total	29	8538	8567

Frequency Missing = 194

		SECTOR															
		N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW
		No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
STAB	WSCLS																
A	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	1.00-1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.25-1.50	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
	1.50-2.00	0	0	0	0	0	0	0	0	1	0	4	6	2	2	1	0
	2.00-3.00	0	1	0	0	0	0	2	13	13	33	55	45	41	13	4	1
	3.00-4.00	11	10	7	2	0	1	3	4	5	28	46	14	4	4	4	5
	4.00-5.00	17	20	7	0	0	0	0	0	0	14	17	6	1	1	3	3
	5.00-6.00	6	11	3	0	0	0	0	0	0	1	8	0	0	3	1	1
	6.00-8.00	1	7	1	0	0	0	0	0	0	0	1	0	0	4	4	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.00-1.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.25-1.50	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
	1.50-2.00	0	0	1	0	0	2	3	7	7	9	9	7	10	3	0	0
	2.00-3.00	2	5	0	0	1	2	3	18	18	49	26	10	10	4	6	1

	3.00-4.00	21	3	1	0	0	0	3	5	7	17	11	4	1	6	3	6
	4.00-5.00	17	9	4	0	1	0	0	0	1	7	7	1	3	2	7	3
	5.00-6.00	1	8	3	0	0	0	0	0	0	3	2	0	0	2	3	1
	6.00-8.00	1	2	1	0	0	0	0	0	0	0	0	0	0	1	3	1
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C	0.46-0.75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0.75-1.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.00-1.25	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0
	1.25-1.50	0	0	1	0	1	1	0	2	2	2	1	4	1	0	0	0
	1.50-2.00	1	2	2	1	5	1	2	9	12	17	12	4	5	1	4	2
	2.00-3.00	16	1	2	0	1	2	4	18	21	46	18	7	7	4	10	14
	3.00-4.00	42	14	6	2	0	1	1	4	8	7	11	2	0	7	14	10
	4.00-5.00	22	36	11	1	1	0	0	0	4	4	3	0	0	4	7	4
	5.00-6.00	6	10	6	0	0	0	0	0	0	2	2	1	0	1	0	2
	6.00-8.00	2	5	0	0	0	0	0	0	0	0	1	0	0	2	2	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D	0.46-0.75	0	0	0	0	0	3	3	3	2	1	1	1	3	0	1	0
	0.75-1.00	3	4	0	2	0	3	3	4	4	4	11	10	7	7	1	0
	1.00-1.25	2	2	2	2	1	6	11	14	12	21	14	15	8	14	2	10
	1.25-1.50	6	6	6	3	4	10	18	32	28	34	34	21	29	16	15	14

	1.50-2.00	28	11	11	4	7	11	24	67	74	96	41	30	21	28	34	35
	2.00-3.00	163	71	26	12	8	8	40	67	111	118	64	15	20	30	39	112
	3.00-4.00	240	189	86	14	7	3	20	14	36	68	13	4	3	12	14	53
	4.00-5.00	130	113	77	10	0	1	1	2	9	10	10	5	1	7	10	25
	5.00-6.00	29	19	18	4	0	0	0	0	1	5	3	1	0	3	15	15
	6.00-8.00	30	24	5	0	0	0	0	0	0	1	0	2	0	1	6	0
	8.00-10.00	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E	0.46-0.75	2	0	0	1	0	0	1	0	1	4	8	4	4	5	1	2
	0.75-1.00	3	0	2	1	2	1	3	5	15	14	22	15	16	19	4	0
	1.00-1.25	3	1	1	0	2	0	5	18	38	49	48	20	18	22	12	6
	1.25-1.50	5	2	2	0	2	4	8	26	80	75	47	25	27	18	31	14
	1.50-2.00	19	7	7	2	2	4	12	45	133	78	32	27	38	46	53	46
	2.00-3.00	51	11	3	4	8	14	40	42	123	95	38	12	8	29	69	138
	3.00-4.00	63	17	10	5	6	6	16	13	30	26	17	10	2	2	15	45
	4.00-5.00	15	8	14	1	0	5	7	2	6	11	5	0	0	1	2	6
	5.00-6.00	1	0	4	2	0	0	1	0	5	3	1	1	0	0	0	0
	6.00-8.00	2	0	5	3	0	0	0	0	4	0	1	0	0	0	0	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
F	0.46-0.75	0	0	0	0	0	0	0	0	1	5	5	4	1	2	1	1
	0.75-1.00	2	0	0	0	0	1	0	4	10	12	14	7	7	10	9	3
	1.00-1.25	0	0	0	0	0	0	1	5	24	31	16	16	9	4	6	6

	1.25-1.50	2	0	0	0	0	1	1	3	41	39	16	15	18	12	20	15
	1.50-2.00	5	0	0	1	0	0	2	14	41	35	16	9	30	24	22	64
	2.00-3.00	30	3	0	0	0	3	6	7	6	3	1	1	10	23	16	46
	3.00-4.00	4	0	0	0	0	0	0	2	0	0	0	0	0	1	2	5
	4.00-5.00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6.00-8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	0.46-0.75	0	0	0	0	0	0	0	2	6	14	9	10	7	7	12	3
	0.75-1.00	0	1	0	0	0	0	0	1	16	13	12	10	12	8	7	6
	1.00-1.25	0	0	0	0	0	0	0	1	19	14	20	10	8	13	11	7
	1.25-1.50	4	0	0	0	0	0	0	4	28	26	12	9	7	5	7	16
	1.50-2.00	3	0	0	0	0	0	1	2	11	11	13	15	12	10	14	38
	2.00-3.00	9	0	0	0	0	0	0	0	0	1	1	2	8	0	0	14
	3.00-4.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4.00-5.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5.00-6.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6.00-8.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8.00-10.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	10.01-99.99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ATTACHMENT V

Unplanned Offsite Releases

There were no known unplanned releases of radioactivity (material, liquid, or airborne) from Catawba Nuclear Station in 2009.

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 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

1st Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 1 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	3.67E-01	1.50E+01	2.45E+00

Maximum Organ Dose Receptor Location: 0.5 Mile NE
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 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - Maximum Gamma Air Dose	8.75E-03	1.00E+01	8.75E-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

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q1 - 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	9.22E+01
XE-133	6.60E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

2nd Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 2 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	CHILD	LIVER	4.08E-01	1.50E+01	2.72E+00

Maximum Organ Dose Receptor Location: 0.5 Mile NE
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 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - Maximum Gamma Air Dose	6.92E-03	1.00E+01	6.92E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.87E+01

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q2 - Maximum Beta Air Dose	2.63E-03	2.00E+01	1.32E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.15E+01
XE-133	7.04E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

3rd Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 3 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	3.54E-01	1.50E+01	2.36E+00

Maximum Organ Dose Receptor Location: 0.5 Mile NE
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 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Gamma Air Dose	9.45E-03	1.00E+01	9.45E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.87E+01

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q3 - Maximum Beta Air Dose	3.59E-03	2.00E+01	1.79E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.17E+01
XE-133	6.89E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

4th Quarter 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Quarter 4 2009 ====

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	CHILD	LIVER	4.13E-01	1.50E+01	2.75E+00

Maximum Organ Dose Receptor Location: 0.5 Mile NE
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 2009 ====

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Maximum Gamma Air Dose	6.99E-03	1.00E+01	6.99E-02

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.81E+01

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Q4 - Maximum Beta Air Dose	2.72E-03	2.00E+01	1.36E-02

Maximum Beta Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	8.89E+01
XE-133	8.41E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
GASEOUS ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

ANNUAL 2009

=== IODINE, H3, AND PARTICULATE DOSE LIMIT ANALYSIS======= Annual 2009 ========

Period-Limit	Critical Group	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	1.54E+00	3.00E+01	5.14E+00

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

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
H-3	1.00E+02

=== NOBLE GAS DOSE LIMIT ANALYSIS======================= Annual 2009 ========

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Gamma Air Dose	3.21E-02	2.00E+01	1.61E-01

Maximum Gamma Air Dose Receptor Location: 0.5 Mile NNE

Major Isotopic Contributors (5% or greater to total)

Nuclide	Percentage
AR-41	9.86E+01

Period-Limit	Dose (mrad)	Limit (mrad)	% of Limit
Yr - Maximum Beta Air Dose	1.23E-02	4.00E+01	3.06E-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	7.18E+00

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

1st Quarter 2009

=== BATCH LIQUID RELEASES ============================== Quarter 1 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	1.13E-02	1.00E+01	1.13E-01
Q1 - Total Body Dose	CHILD		1.06E-02	3.00E+00	3.52E-01

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

Nuclide	Percentage
H-3	8.58E+01
CS-137	6.77E+00

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

Nuclide	Percentage
H-3	9.14E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===================== Quarter 1 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q1 - Maximum Organ Dose	CHILD	LIVER	2.57E-04	1.00E+01	2.57E-03
Q1 - Total Body Dose	CHILD		2.57E-04	3.00E+00	8.58E-03

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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

2nd Quarter 2009

=== BATCH LIQUID RELEASES ================================ Quarter 2 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	ADULT	GILLI	2.15E-02	1.00E+01	2.15E-01
Q2 - Total Body Dose	CHILD		1.04E-02	3.00E+00	3.45E-01

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

Nuclide	Percentage
NB-95	5.14E+01
H-3	3.77E+01
CO-60	5.06E+00

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

Nuclide	Percentage
H-3	9.43E+01

=== CONTINUOUS LIQUID RELEASES (WC) ===================== Quarter 2 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q2 - Maximum Organ Dose	-------	--------	0.00E+00	1.00E+01	0.00E+00
Q2 - Total Body Dose	-------	--------	0.00E+00	3.00E+00	0.00E+00

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

Nuclide	Percentage
-------	----------

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

Nuclide	Percentage
-------	----------

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

3rd Quarter 2009

=== BATCH LIQUID RELEASES ================================ Quarter 3 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	ADULT	GI-LLI	9.31E-03	1.00E+01	9.31E-02
Q3 - Total Body Dose	CHILD		8.55E-03	3.00E+00	2.85E-01

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

Nuclide	Percentage
H-3	6.99E+01
CO-60	1.73E+01
CO-58	1.19E+01

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

Nuclide	Percentage
H-3	9.16E+01
CO-60	6.13E+00

=== CONTINUOUS LIQUID RELEASES (WC) ====================== Quarter 3 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q3 - Maximum Organ Dose	CHILD	LIVER	2.61E-03	1.00E+01	2.61E-02
Q3 - Total Body Dose	CHILD		2.61E-03	3.00E+00	8.68E-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 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

4th Quarter 2009

=== BATCH LIQUID RELEASES ================================ Quarter 4 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	ADULT	GI-LLI	2.69E-02	1.00E+01	2.69E-01
Q4 - Total Body Dose	ADULT		1.90E-02	3.00E+00	6.35E-01

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

Nuclide	Percentage
H-3	4.85E+01
NB-95	3.16E+01
CO-60	1.21E+01
CO-58	5.89E+00

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

Nuclide	Percentage
H-3	6.86E+01
CS-137	2.51E+01

=== CONTINUOUS LIQUID RELEASES (WC) ====================== Quarter 4 2009 ======

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Q4 - Maximum Organ Dose	-------	--------	---------	1.00E+01	-----------
Q4 - Total Body Dose	-------		---------	3.00E+00	-----------

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

Nuclide	Percentage
-------	----------

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

Nuclide	Percentage
-------	----------

EFFLUENT AND WASTE DISPOSAL ANNUAL REPORT
PERIOD 1/1/09 TO 1/1/10
LIQUID ANNUAL DOSE SUMMARY REPORT

Catawba Nuclear Station Units 1 & 2

ANNUAL 2009

=== BATCH LIQUID RELEASES ================================ Annual 2009 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	ADULT	GILLI	6.78E-02	2.00E+01	3.39E-01
Yr - Total Body Dose	CHILD		4.72E-02	6.00E+00	7.87E-01

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

Nuclide	Percentage
H-3	5.24E+01
NB-95	2.82E+01
CO-60	1.10E+01
CO-58	6.06E+00

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

Nuclide	Percentage
H-3	9.04E+01
CO-60	5.15E+00

=== CONTINUOUS LIQUID RELEASES (WC) ====================== Annual 2009 =========

Period-Limit	Critical Age	Critical Organ	Dose (mrem)	Limit (mrem)	Max % of Limit
Yr - Maximum Organ Dose	CHILD	LIVER	2.93E-03	2.00E+01	1.47E-02
Yr - Total Body Dose	CHILD		2.93E-03	6.00E+00	4.89E-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
2009 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. 2009 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* = 1.615E+00 mrem

Maximum Location: 0.5 Mile, Northeast Sector
Critical Age: Child
Gas non-NG Contribution: 95%
Gas NG Contribution: 2%
Liquid Contribution: 3%

Maximum Organ (other than TB) Dose* = 1.596E+00 mrem

Maximum Location: 0.5 Mile, Northeast Sector
Critical Age: Child
Critical Organ: Liver
Gas Contribution: 97%
Liquid Contribution: 3%

II. 2009 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, ISFSI, 10CFR72.212 Evaluation" report. **The maximum dose rate to the nearest resident from the Catawba ISFSI is conservatively calculated to be 16.6 mrem/year.**

The attached excerpt from the "Catawba Nuclear Station, ISFSI, 10CFR72.212 Evaluation" report is provided to document the method used to calculate the Catawba ISFSI 16.6 mrem/year dose estimate.

* The effluent dose calculations consider radionuclides identified as part of the liquid and gaseous wastes sample and analysis program per SLC Table 16.11-1-1 and SLC Table 16.11-6-1.

The following three pages are taken from the "Catawba Nuclear Station, ISFSI, 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 24 loaded storage casks located at the ISFSI have been calculated. This represents the placement of a loaded canister at all available locations on the current ISFSI storage pad, completing the projected loading for Phase I.

The methodology and results of the dose calculations are discussed in detail in References 7.3-3 and 7.3-4. A summary of the methodology and results is presented below.

There are two calculations used to estimate the impact of the ISFSI direct radiation doses. The first calculation (Reference 7.3-3) determines a fuel assembly source term to be used in the subsequent shielding model. In order to bound fuel assemblies loaded into canisters in the past and projected to be loaded in the future, the same, bounding fuel assembly is modeled for all 24 spaces in each of the 24 casks. The source term was developed to bound all types of LEU fuel at Catawba (Westinghouse OFA, RFA, and Mk-BW). Axial flux profiles, fuel hardware activation, component activation, and the potential impacts from burnable poisons were modeled. Both gamma and neutron source spectrums were produced. In order to ensure that the gamma flux was conservative, the model includes the impact from activation of components, fuel hardware, and light elements. Thus, each spent fuel location models a bounding fuel assembly with a bounding activated component (thimble plug).

The source term was modeled using the SAS2H coupled shielding and depletion analysis module of the SCALE code suite. This module utilizes the ORIGEN-S point depletion code to compute the source spectra. An appropriate 44 group library was employed. Use of this code is a standard industry application for source term depletion and decay calculations. It is utilized in a manner consistent with its development.

The results from the source term calculation (Reference 7.3-3) are used as the source term spectra input to the shielding model (Reference 7.3-4). MCNP, a Monte-Carlo code for neutron and photon transport, was utilized for the shielding computations. This code is an industry standard and is typically applied to problems of this type. The fuel related source term was normalized to the 20 kW administrative decay heat limit and the component source term was normalized to an eight-year decay duration. The MCNP models were set up using the source terms developed for the four source regions in Reference 7.3-3: fuel (neutron and gamma), fuel hardware, upper plenum, and upper nozzle. These source regions include contributions from both the fuel assembly and the component, as physically appropriate.

The same mesh tally scheme was applied to each source case so the results for each source term could then be summed to produce the final result. A detailed cask model was developed (the work was performed by the cask vendor) and replicated in a 2 by 12 array mimicking the planned arrangement of the loaded canisters on the Catawba ISFSI pad. This represents a full pad of loaded canisters.

Detector locations were laid out on a grid in three dimensions and plots for both near and far field doses were obtained. However, because the coordinate axes align with the cask array orientation, the highest doses are seen along the axes. Thus, for a given distance the highest dose will be found along the x axis, as the long part of the array defines the y axis. The results are as expected for the near and far field doses. Conservatively, the coordinate system was eschewed in the evaluation of the results for 72.104 purposes in favor or the straight line distance to the limiting receptor location (nearest real individual). The nearest real individual is over 450 meters from the ISFSI, but a conservative evaluation distance of 405 meters is adopted. This distance from the ISFSI is within the site boundary. No real individual can live within the (site controlled) boundary, so this distance (location) bounds any real individual (living off-site). As shown in Table 6.7-5 of Reference 7.3-4, the annual dose to the nearest real individual from a full 2 by 12 array of loaded canisters with limiting 20 kW fuel sources and inserts decayed for eight years is 16.6 mrem/yr. The maximum dose at this distance is found, as expected, along the x axis. This is a conservative application of the shielding analysis results.

The shielding analysis contains many receptor locations, and the results from these cases could be used with a plot of the location of the nearest individual on the shielding model XY coordinates system. This would produce a more precise and lower result.

The computed direct shine dose from the ISFSI to the nearest individual will be added to the plant generated dose to show compliance with 72.104. General Office Radiation Protection has responsibility for this function.

(b) Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations.

(c) Operational limits must be established for radioactive materials in effluents and direct radiation levels associated with ISFSI or MRS operations to meet the limits given in paragraph (a) of this section.

The requirements are met through implementation of the CNS Radiation Protection Program (References 7.3-1 and 7.3-2).

ATTACHMENT VII

Revisions to the Updated Final Safety Analysis Report

Radiological Effluent Controls Section 16.11

There were revisions to the Catawba Nuclear Station Updated Final Safety Analysis Report, Section 16.11, Radiological Controls, in 2009:

Section 16.11-2, "Radioactive Liquid Effluent Monitoring Instrumentation" was changed on 8/21/09.

Section 16.11-4, "Liquid Radwaste Treatment System" was changed on 8/21/09.

Section 16.11-6, "Gaseous Effluents" was changed on 6/8/09.

Section 16.11-7, "Radioactive Gaseous Effluent Monitoring Instrumentation" was changed on 11/23/09.

Section 16.11-10, "Gaseous Radwaste Treatment System" was changed on 8/21/09.

Section 16.11-18, "Explosive Gas Mixture" was changed on 8/21/09.

Section 16.11-20, "Explosive Gas Monitoring Instrumentation" was changed on 8/21/09.

As per TS 5.5.5.b. *Licensee initiated changes to the Radiological Effluent Controls of the UFSAR*, Catawba is attaching the entire Section 16.11 of the UFSAR, and the List of Effective Sections page which will demonstrate when each section was revised.

LIST OF EFFECTIVE SECTIONS

SECTION	REVISION NUMBER	REVISION DATE
TABLE OF CONTENTS	12	06/08/09
16.1	1	08/27/08
16.2	2	08/21/09
16.3	1	08/21/09
16.5-1	1	10/24/06
16.5-2	Deleted	
16.5-3	1	02/20/04
16.5-4	0	10/09/02
16.5-5	1	01/28/10
16.5-6	1	08/21/09
16.5-7	0	10/09/02
16.5-8	2	12/22/08
16.5-9	0	10/24/06
16.5-10	Deleted	
16.6-1	0	10/09/02
16.6-2	Deleted	
16.6-3	1	08/21/09
16.6-4	1	08/21/09
16.6-5	1	08/21/09
16.7-1	1	08/21/09
16.7-2	3	11/23/09
16.7-3	1	08/21/09
16.7-4	2	08/21/09
16.7-5	2	08/21/09

SECTION	REVISION NUMBER	REVISION DATE
16.7-6	2	08/21/09
16.7-7	1	08/21/09
16.7-8	2	08/21/09
16.7-9	5	08/21/09
16.7-10	3	11/23/09
16.7-11	1	08/21/09
16.7-12	1	08/21/09
16.7-13	2	08/21/09
16.7-14	1	08/21/09
16.7-15	1	08/21/09
16.7-16	0	06/08/09
16.8-1	3	08/21/09
16.8-2	1	10/24/06
16.8-3	1	10/24/06
16.8-4	2	11/05/07
16.8-5	3	08/21/09
16.9-1	5	08/21/09
16.9-2	4	08/21/09
16.9-3	1	08/21/09
16.9-4	3	08/21/09
16.9-5	5	08/21/09
16.9-6	7	08/21/09
16.9-7	4	08/21/09
16.9-8	5	08/21/09

SECTION	REVISION NUMBER	REVISION DATE
16.9-9	3	08/21/09
16.9-10	5	08/21/09
16.9-11	3	08/21/09
16.9-12	2	08/21/09
16.9-13	3	08/21/09
16.9-14	1	09/25/06
16.9-15	2	08/21/09
16.9-16	2	08/21/09
16.9-17	0	10/09/02
16.9-18	0	10/09/02
16.9-19	2	08/21/09
16.9-20	0	10/09/02
16.9-21	0	10/09/02
16.9-22	1	08/21/09
16.9-23	3	08/21/09
16.9-24	2	10/24/06
16.9-25	2	08/21/09
16.10-1	1	08/21/09
16.10-2	1	10/24/06
16.10-3	1	08/21/09
16.11-1	0	10/09/02
16.11-2	2	08/21/09
16.11-3	0	10/09/02
16.11-4	1	08/21/09

SECTION	REVISION NUMBER	REVISION DATE
16.11-5	0	10/09/02
16.11-6	1	06/08/09
16.11-7	4	11/23/09
16.11-8	0	10/09/02
16.11-9	0	10/09/02
16.11-10	1	08/21/09
16.11-11	1	03/20/03
16.11-12	0	10/09/02
16.11-13	0	10/09/02
16.11-14	0	10/09/02
16.11-15	0	10/09/02
16.11-16	0	10/09/02
16.11-17	0	10/09/02
16.11-18	1	08/21/09
16.11-19	0	10/09/02
16.11-20	1	08/21/09
16.11-21	0	10/09/02
16.12-1	0	10/09/02
16.13-1	0	10/09/02
16.13-2	Deleted	
16.13-3	Deleted	
16.13-4	0	10/09/02

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-1 Liquid Effluents

COMMITMENT: The concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (see Figure 16.11-16-1 in SLC 16.11-16) shall be limited to:

a. For radionuclides other than dissolved or entrained noble gases, 10 times the effluent concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2, and

b. For dissolved or entrained noble gases, the concentration shall be limited to 2×10^{-4} microCurie/ml total activity.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS not within limits.	A.1 Restore the concentration to within limits.	Immediately

TESTING REQUIREMENTS

TEST		FREQUENCY
TR 16.11-1-1	-------------------------------NOTE------------------------------- The results of the radioactivity analyses shall be used in accordance with the methodology and parameters in the ODCM to assure that the concentrations at the point of release are maintained within the limits. -- Sample and analyze radioactive liquid wastes according to Table 16.11-1-1.	According to Table 16.11-1-1

Table 16.11-1-1

Radioactive Liquid Waste Sampling and Analysis Program (page 1 of 3)

LIQUID RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)(1) (µCi/ml)
1. Batch Waste Release Tanks(2) Any tank which discharges liquid wastes by either liquid effluent monitor, EMF-49 or EMF-57	Prior to each release Each Batch	Prior to each release Each Batch	Principal Gamma Emitters(3)	$5x10^{-7}$
			I-131	$1x10^{-6}$
	Prior to each release One Batch/31 days	31 days	Dissolved and Entrained Gases (Gamma Emitters)	$1x10^{-5}$
	Prior to each release Each Batch	31 days Composite(4)	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	Prior to each release Each Batch	92 days Composite(4)	Sr-89, Sr-90	$5x10^{-8}$
2. Continuous Releases(5) Conventional Waste Water Treatment Line	Continuous(6)	7 days Composite(6)	Principal Gamma Emitters(3)	$5x10^{-7}$
			I-131	$1x10^{-6}$
	31 days Grab Sample	31 days	Dissolved and Entrained Gases (Gamma Emitters)	$1x10^{-5}$
	Continuous(6)	31 days Composite(6)	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	Continuous(6)	92 days Composite(6)	Sr-89, Sr-90	$5x10^{-8}$

Table 16.11-1-1

Radioactive Liquid Waste Sampling and Analysis Program (page 2 of 3)

NOTES:

(1) The LLD is defined, for purposes of these commitments, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E \cdot V \cdot 2.22 \, x \, 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microCurie per unit mass or volume),

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

2.22 x 10^6 = the number of disintegrations per minute per microCurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}), and

Δt = the elapsed time between midpoint of sample collection and time of counting (sec).

Typical values of E, V, Y and Δt shall be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

(2) A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling.

(3) The principal gamma emitters for which the LLD specification applies include the following radionuclides:

Table 16.11-1-1

Radioactive Liquid Waste Sampling and Analysis Program (page 3 of 3)

Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, and Ce-141. The LLD for Ce-144 is 5×10^{-6} µCi/ml. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3 in the format outlined in Regulatory Guide 1.21, Appendix B, Revision 1, June 1974.

(4) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

(5) A continuous release is the discharge of liquid wastes of a non-discrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

(6) To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

BASES

The basic requirements for SLCs concerning effluents from nuclear power reactors are stated in 10 CFR 50.36a. These requirements indicate that compliance with effluent SLCs will keep average annual releases of radioactive material in effluents to small percentages of the limits specified in the old 10 CFR 20.106 (new 10 CFR 20.1302). These requirements further indicate that operational flexibility is allowed, compatible with considerations of health and safety, which may temporarily result in releases higher than such small percentages, but still within the limits specified in the old 10 CFR 20.106 which references Appendix B, Table II concentrations (MPCs). These referenced concentrations are specific values which relate to an annual dose of 500 mrem. It is further indicated in 10 CFR 50.36a that when using operational flexibility, best efforts shall be exerted to keep levels of radioactive materials in effluents as low as is reasonably achievable (ALARA) as set forth in 10 CFR 50, Appendix I.

As stated in the Introduction to Appendix B of the new 10 CFR 20, the liquid effluent concentration (EC) limits given in Appendix B, Table 2, Column 2, are based on an annual dose of 50 mrem. Since a release concentration corresponding to a limiting dose rate of 500 mrem/year has been acceptable as a SLC limit for liquid effluents, which applies at all times as an assurance that the limits of 10 CFR 50, Appendix I are not likely to be exceeded, it should not be necessary to reduce this limit by a factor of 10.

Operational history at Catawba has demonstrated that the use of the concentration values associated with the old 10 CFR 20.106 as SLC limits has resulted in calculated maximum individual doses to a MEMBER OF THE PUBLIC that are small percentages of the limits of 10 CFR 50, Appendix I. Therefore, the use of concentration values which correspond to an annual dose of 500 mrem (ten times the concentration values stated in the new 10 CFR 20, Appendix B, Table 2, Column 2) should not have a negative impact on the ability to continue to operate within the limits of 10 CFR 50, Appendix I and 40 CFR 190.

Having sufficient operational flexibility is especially important in establishing a basis for effluent monitor setpoint calculations. As discussed above, the concentrations stated in the new 10 CFR 20, Appendix B, Table 2, Column 2, relate to a dose of 50 mrem in a year. When applied on an instantaneous basis, this corresponds to a dose rate of 50 mrem/year. This low value is impractical upon which to base effluent monitor setpoint calculations for many liquid effluent release situations when monitor background, monitor sensitivity, and monitor performance must be taken into account.

Therefore, to accommodate operational flexibility needed for effluent releases, the limits associated with SLC 16.11-1 are based on ten times the concentrations stated in the new 10 CFR 20, Appendix B, Table 2, Column 2, to apply at all times. The multiplier of ten is proposed because the annual dose of 500 mrem, upon which the concentrations in the old 10 CFR 20, Appendix B, Table II, Column 2, are based, is a factor of 10 higher than annual dose of 50 mrem, upon which the concentrations in the new 10 CFR

BASES (continued)

20, Appendix B, Table 2, Column 2, are based. Compliance with the limits of the new 10 CFR 20.1301 will be demonstrated by operating within the limits of 10 CFR 50, Appendix I and 40 CFR 190. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

This commitment applies to the release of radioactive materials in liquid effluents from all units at the site.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination – Application to Radiochemistry," Annal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

REFERENCES

1. Catawba Offsite Dose Calculation Manual.

2. 10 CFR Part 20, Appendix B.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-2 Radioactive Liquid Effluent Monitoring Instrumentation

COMMITMENT

The Radioactive Liquid Effluent Monitoring Instrumentation channels shown in Table 16.11-2-1 shall be FUNCTIONAL with their Alarm/Trip Setpoints set to ensure that the limits of SLC 16.11-1 are not exceeded.

AND

The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

APPLICABILITY: At all times.

REMEDIAL ACTIONS

-----NOTE-----
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Radioactive Liquid Effluent Monitoring Instrumentation channel(s) Alarm/Trip Setpoint less conservative than required.	A.1 Suspend the release of radioactive liquid effluents monitored by the affected channel(s). OR A.2 Declare the channel(s) non-functional.	Immediately Immediately
B. One or more Radioactive Liquid Effluent Monitoring Instrumentation channel(s) non-functional.	B.1 Enter the applicable Conditions and Required Actions specified in Table 16.11-2-1 for the channel(s).	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One channel non-functional.	C.1.1 Analyze two independent samples per Testing Requirement 16.11-1-1.	Prior to initiating a release
	AND	
	C.1.2 Perform independent verification of the discharge line valving.	Prior to initiating a release
	AND	
	C.1.3.1 Perform independent verification of manual portion of the computer input for release rate calculations performed by computer.	Prior to initiating a release
	OR	
	C.1.3.2 Perform independent verification of entire calculations for release rate calculations performed manually.	Prior to initiating a release
	AND	
	C.1.4 Restore channel to FUNCTIONAL status.	14 days
	OR	
	C.2 Suspend release of radioactive effluents via this pathway.	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One flow rate measurement device channel non-functional.	D.1 --------------NOTE------------- Pump performance curves generated in place may be used to estimate flow. ----------------------------------- Estimate the flow rate of the release.	 Once per 4 hours during releases
	<u>AND</u>	
	D.2 Restore channel to FUNCTIONAL status.	30 days
E. One channel non-functional.	E.1 Perform an analysis of grab samples for radioactivity at a lower limit of detection of 10^{-7} microCurie/ml.	Once per 12 hours during releases when secondary specific activity is > 0.01 microCurie/gm DOSE EQUIVALENT I-131 <u>AND</u> Once per 24 hours during releases when secondary specific activity is ≤ 0.01 microCurie/gm DOSE EQUIVALENT I-131
	<u>AND</u>	
	E.2 Restore channel to FUNCTIONAL status.	30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. One channel non-functional.	F.1 Collect and analyze grab samples for principal gamma emitters (listed in Table 16.11-1-1, NOTE 3) at a lower limit of detection of no more than 5×10^{-7} microCurie/ml.	Once per 12 hours
	AND	
	F.2 Restore non-functional channel to FUNCTIONAL status.	30 days
G. Required Action and associated Completion Time of Condition C, D, E, or F not met.	G.1 Explain why the non-functionality was not corrected within the specified Completion Time.	In the next scheduled Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3

TESTING REQUIREMENTS

----------NOTE----------
Refer to Table 16.11-2-1 to determine which TRs apply for each Radioactive Liquid Effluent Monitoring Instrumentation channel.

TEST		FREQUENCY
TR 16.11-2-1	Perform CHANNEL CHECK.	24 hours
TR 16.11-2-2	----------NOTE---------- The CHANNEL CHECK shall consist of verifying indication of flow. ------------------------ Perform CHANNEL CHECK.	 24 hours during periods of release
TR 16.11-2-3	Perform SOURCE CHECK.	Prior to each release
TR 16.11-2-4	Perform SOURCE CHECK.	31 days
TR 16.11-2-5	Perform COT.	92 days
TR 16.11-2-6	----------NOTE---------- For Instrument 1, the COT shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation (for EMF-57, alarm annunciation is in the Monitor Tank Building control room and on the Monitor Tank Building control panel remote annunciator panel) occur if any of the following conditions exist: a. Instrument indicates measured levels above the Alarm/Trip Setpoint, or b. Circuit failure/instrument downscale failure (alarm only) ------------------------ Perform COT.	 9 months

(continued)

TESTING REQUIREMENTS (continued)

TEST		FREQUENCY
TR 16.11-2-7	-------------------------------NOTE------------------------------- For Instrument 1, the initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used. --	
	Perform CHANNEL CALIBRATION.	18 months

Table 16.11-2-1

Radioactive Liquid Effluent Monitoring Instrumentation

INSTRUMENT	REQUIRED CHANNELS	CONDITIONS	TESTING REQUIREMENTS
1. Radioactivity Monitors Providing Alarm and Automatic Termination of Release			
1.a Waste Liquid Discharge Monitor (EMF-49 – Low Range)	1 per station	A, C, G	TR 16.11-2-1 TR 16.11-2-3 TR 16.11-2-6 TR 16.11-2-7
1.b Turbine Building Sump Monitor (EMF-31)	1	A, E, G	TR 16.11-2-1 TR 16.11-2-4 TR 16.11-2-6 TR 16.11-2-7
1.c Monitor Tank Building Liquid Discharge Monitor (EMF-57 – Low Range)	1 per station	A, C, G	TR 16.11-2-1 TR 16.11-2-3 TR 16.11-2-6 TR 16.11-2-7
2. Continuous Composite Samplers and Sampler Flow Monitor			
2.a Conventional Waste Water Treatment Line (no alarm/trip function)	1 per station	E, G	TR 16.11-2-2 TR 16.11-2-7
3. Flow Rate Measurement Devices			
3.a Waste Liquid Effluent Line (no alarm/trip function)	1 per station	D, G	TR 16.11-2-2 TR 16.11-2-7
3.b Conventional Waste Water Treatment Line (no alarm/trip function)	1 per station	D, G	TR 16.11-2-2 TR 16.11-2-7
3.c Low Pressure Service Water Minimum Flow Interlock	1 per station	D, G	TR 16.11-2-2 TR 16.11-2-5 TR 16.11-2-7
3.d Monitor Tank Building Waste Liquid Effluent Line (no alarm/trip function)	1 per station	D, G	TR 16.11-2-2 TR 16.11-2-7
4. Radioactivity Monitors Providing Alarm			
4.a Service Water Monitor on Containment Spray Heat Exchanger (EMF-45 A & B – Low Range)	1 per heat exchanger	A, F, G	TR 16.11-2-1 TR 16.11-2-4 TR 16.11-2-6 TR 16.11-2-7

BASES

The Radioactive Liquid Effluent Monitoring Instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the Alarm/Trip will occur prior to exceeding the limits of 10 CFR Part 20. The FUNCTIONALITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 20.
3. 10 CFR Part 50, Appendix A.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-3 Dose

COMMITMENT

The dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each unit, to UNRESTRICTED AREAS (see Figure 16.11-16-1 in SLC 16.11-16) shall be limited:

a. During any calendar quarter to ≤ 1.5 mrem to the whole body and to ≤ 5 mrem to any organ, and

b. During any calendar year to ≤ 3 mrem to the whole body and to ≤ 10 mrem to any organ.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Calculated dose from release of radioactive materials in liquid effluents exceeding above limits.	A.1 --------------NOTE------------- If drinking water supply is taken from receiving water body within 3 miles downstream of plant discharge, the Special Report shall also include the results of radiological analyses of the drinking water source and the radiological impact on finished drinking water supplies with regard to 40 CFR 141, Safe Drinking Water Act. -----------------------------------	
	Prepare and submit a Special Report to the NRC which identifies the causes for exceeding the limits, corrective actions taken to reduce releases, and actions taken to ensure that subsequent releases are within limits.	30 days

TESTING REQUIREMENTS

	TEST	FREQUENCY
TR 16.11-3-1	Determine cumulative dose contributions from liquid effluents for current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM.	31 days

BASES

This SLC is provided to implement the requirements of Sections II.A, III.A and IV.A of Appendix I, 10 CFR Part 50. The COMMITMENT implements the guides set forth in Section II.A of Appendix I. The REMEDIAL ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable". Also, for fresh water sites with drinking water supplies that can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR Part 141. The dose calculation methodology and parameters in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

This SLC applies to the release of radioactive materials in liquid effluents from each unit at the site. When shared radwaste treatment systems are used by more than one unit on a site, the wastes from all units are mixed for shared treatment; by such mixing, the effluent releases cannot accurately be ascribed to a specific unit. An estimate should be made of the contributions from each unit based on input conditions, e.g., flow rates and radioactivity concentrations, or, if not practicable, the treated effluent releases may be allocated equally to each of the radioactive waste producing units sharing the radwaste treatment system. For determining conformance to COMMITMENTS, these allocations from shared radwaste treatment systems are to be added to the releases specifically attributed to each unit to obtain the total releases per unit.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 40 CFR Part 141.
3. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-4 Liquid Radwaste Treatment System

COMMITMENT The Liquid Radwaste Treatment System shall be FUNCTIONAL and appropriate portions of the system shall be used to reduce releases of radioactivity when the projected doses due to the liquid effluent, from each unit, to UNRESTRICTED AREAS (see Figure 16.11-16-1 in SLC 16.11-16) would exceed 0.06 mrem to the whole body or 0.2 mrem to any organ in a 31-day period.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Radioactive liquid waste being discharged without treatment and in excess of above limits. AND Any portion of Liquid Radwaste Treatment System not in operation.	A.1 Prepare and submit a Special Report to the NRC which identifies the reasons liquid radwaste was discharged without treatment, identification of non-functional equipment and reasons for non-functionality, corrective actions taken to restore the equipment to FUNCTIONAL status, and actions taken to prevent recurrence.	30 days

TESTING REQUIREMENTS

-----NOTE-----
The Liquid Radwaste Treatment System shall be demonstrated FUNCTIONAL by meeting SLC 16.11-1 and SLC 16.11-3.

TEST		FREQUENCY
TR 16.11-4-1	Project liquid release doses from each unit to UNRESTRICTED AREAS, in accordance with the methodology and parameters in the ODCM, when the Liquid Radwaste Treatment System is not being fully utilized.	31 days

BASES

The FUNCTIONALITY of the Liquid Radwaste Treatment System ensures that this system will be available for use whenever liquid effluents require treatment prior to release to the environment. The requirement that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable". This COMMITMENT implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

This SLC applies to the release of radioactive materials in liquid effluents from each unit at the site. When shared radwaste treatment systems are used by more than one unit on a site, the wastes from all units are mixed for shared treatment; by such mixing, the effluent releases cannot accurately be ascribed to a specific unit. An estimate should be made of the contributions from each unit based on input conditions, e.g., flow rates and radioactivity concentrations, or, if not practicable, the treated effluent releases may be allocated equally to each of the radioactive waste producing units sharing the radwaste treatment system. For determining conformance to COMMITMENTS, these allocations from shared radwaste treatment systems are to be added to the releases specifically attributed to each unit to obtain the total releases per unit.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 50, Appendix A.

REFERENCES (continued)

3. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-5 Chemical Treatment Ponds

COMMITMENT

The quantity of radioactive material contained in each Chemical Treatment Pond (CTP) shall be limited by the following expression:

$$\frac{264}{V} \cdot \sum_{j} \frac{A_j}{(C_j \; x \, 10)} < 1.0$$

excluding tritium and dissolved or entrained noble gases,

where:

A_j = CTP inventory limit for single radionuclide "j", in Curies;

C_j = 10 CFR 20, Appendix B, Table 2, Column 2, concentration for single radionuclide "j", microCuries/milliliter;

V = design volume of liquid and slurry in the CTP, in gallons; and

264 = conversion unit, microCuries/Curie per milliliter/gallon.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Quantity of radioactive material in any CTP exceeding above limit.	A.1 Suspend all additions of radioactive material to the CTP.	Immediately
	AND	
	A.2 Initiate corrective action to reduce the CTP contents to within limits.	Immediately

TESTING REQUIREMENTS

	TEST	FREQUENCY
TR 16.11-5-1	Verify that the quantity of radioactive material contained in each batch of resin/water slurry to be transferred to the CTPs is within limits by analyzing a representative sample of the batch to be transferred. Each batch to be transferred to the CTPs shall be limited by: $\sum_j \frac{c_j}{(C_j \times 10)} < 0.006$, where: c_j = radioactive resin/water slurry concentration for radionuclide "j" entering the UNRESTRICTED AREA CTPs, in microCuries/milliliter; and C_j = 10 CFR 20, Appendix B, Table 2, Column 2, concentration for single radionuclide "j", in microCuries/milliliter.	Prior to each transfer

BASES

The inventory limits of the CTPs are based on limiting the consequences of an uncontrolled release of the pond inventory. The expression in this SLC assumes the pond inventory is uniformly mixed, that the pond is located in an uncontrolled area as defined in 10 CFR Part 20, and that the concentration limit in Note 1 to Appendix B of 10 CFR Part 20 applies.

The batch limits of resin/water slurry transferred to the CTP assure that radioactive material transferred to the CTP are "as low as is reasonably achievable" in accordance with 10 CFR 50.36a. The expression in SLC 16.11-5 assures no batch will be transferred to the CTP unless the sum of the ratios of the activity of the radionuclides to their respective concentration limitation is less than the ratio of the 10 CFR Part 50, Appendix I, Section II.A, total body dose level to the instantaneous whole body dose rate limitation, or that:

$$\sum_j \frac{c_j}{(C_j \times 10)} < \frac{3 \text{ mrem/yr}}{500 \text{ mrem/yr}} = 0.006,$$

where:

BASES (continued)

c_j = radioactive resin/water slurry concentration for radionuclide "j" entering the UNRESTRICTED AREA CTP, in microCuries/milliliter; and,

C_j = 10 CFR Part 20, Appendix B, Table 2, Column 2, concentration for single radionuclide "j", in microCuries/milliliter.

The filter/demineralizers using powdered resin and the blowdown demineralizer are backwashed or sluiced to a holding tank. The tank will be agitated to obtain a representative sample of the resin inventory in the tank. A known weight of the wet, drained resin (moisture content approximately 55 to 60%, bulk density of about 58 pounds per cubic foot) will then be counted. The concentration of the resin slurry to be pumped to the CTPs will then be determined by the formula:

$$c_j = \frac{Q_j W_R}{V_T},$$

where:

Q_j = concentration of radioactive materials in wet, drained resin for radionuclide "j", excluding tritium, dissolved or entrained noble gases, and radionuclides with less than an 8-day half-life. The analysis shall include at least Ce-144, Cs-134, Cs-137, Co-58, and Co-60, in microCuries/gram. Estimates of the Sr-89 and Sr-90 batch concentration shall be included based on the most recent monthly composite analysis (within 3 months);

W_R = total weight of resin in the storage tank in grams (determined from chemistry logs procedures); and,

V_T = total volume of resin water mixture in storage tank to be transferred to the CTPs in milliliters.

The batch limits provide assurance that activity input to the CTP will be minimized, and a means of identifying radioactive material in the inventory limitation of this SLC.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.

2. 10 CFR Part 20, Appendix B.

3. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-6 Gaseous Effluents

COMMITMENT The dose rate due to radioactive materials released in gaseous effluents from the site to areas at and beyond the SITE BOUNDARY (see Figure 16.11-16-1 in SLC 16.11-16) shall be limited to the following:

a. For noble gases: $\leq$ 500 mrem/yr to the whole body and $\leq$ 3000 mrem/yr to the skin; and,

b. For Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate form with half-lives > 8 days: $\leq$ 1500 mrem/yr to any organ.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Dose rate not within limit.	A.1 Restore the release rate to within limits.	Immediately

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-6-1 Verify that the dose rate due to noble gases in gaseous effluents is within limits in accordance with the methodology and parameters in the ODCM.	In accordance with the methodology and parameters in the ODCM
TR 16.11-6-2 Verify that the dose rate due to Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives > 8 days in gaseous effluents is within limits in accordance with the methodology and parameters in the ODCM by obtaining representative samples and performing analyses according to Table 16.11-6-1.	According to Table 16.11-6-1

Table 16.11-6-1

Radioactive Gaseous Waste Sampling and Analysis Program (page 1 of 4)

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)(1) (μCi/ml)
1. Waste Gas Storage Tank	Prior to each release Each Tank Grab Sample	Prior to each release Each Tank	Principal Gamma Emitters(2)	1×10^{-4}
2. Containment Purge	Prior to each release Each PURGE(3) Grab Sample	Prior to each release Each PURGE(3)	Principal Gamma Emitters(2)	1×10^{-4}
		31 days	H-3 (oxide)	1×10^{-6}
3. Unit Vent	7 days(3)(4) Grab Sample	7 days(3)	Principal Gamma Emitters(2)	1×10^{-4}
			H-3 (oxide)	1×10^{-6}
4. Containment Air Release and Addition System	24 hours(3)(5) Grab Sample	24 hours(3)(5)	Principal Gamma Emitters(2)	1×10^{-4}
		31 days	H-3 (oxide)	1×10^{-6}
5. All Release Types as Listed in 3. Above	Continuous(6)	24 hours(7) Charcoal Sample	I-131	1×10^{-11}
			I-133	1×10^{-9}
	Continuous(6)	24 hours(7) Particulate Sample	Principal Gamma Emitters(2)	1×10^{-10}
	Continuous(6)	31 days Composite Particulate Sample	Gross Alpha(8)	1×10^{-11}
	Continuous(6)	92 days Composite Particulate Sample	Sr-89, Sr-90	1×10^{-11}

(continued)

Table 16.11-6-1

Radioactive Gaseous Waste Sampling and Analysis Program (page 2 of 4)

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD)(1) (μCi/ml)
6. Waste Monitor Tank Building Ventilation Exhaust	7 days Grab Sample	7 days	Principal Gamma Emitters(2)	$1x10^{-4}$
			H-3 (oxide)	$1x10^{-6}$
	Continuous(6)	7 days(9) Charcoal Sample	I-131	$1x10^{-12}$
			I-133	$1x10^{-10}$
	Continuous(6)	7 days(9) Particulate Sample	Principal Gamma Emitters(2)	$1x10^{-11}$
	Continuous(6)	31 days Composite Particulate Sample	Gross Alpha	$1x10^{-11}$
	Continuous(6)	92 days Composite Particulate Sample	Sr-89, Sr-90	$1x10^{-11}$

Table 16.11-6-1

Radioactive Gaseous Waste Sampling and Analysis Program (page 3 of 4)

NOTES:

(1) The LLD is defined, for purposes of these commitments, as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$\text{LLD} = \frac{4.66\, s_b}{E \cdot V \cdot 2.22\, x\, 10^6 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (microCurie per unit mass or volume);

S_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute);

E = the counting efficiency (counts per disintegration);

V = the sample size (units of mass or volume);

2.22×10^6 = the number of disintegrations per minute per microCurie;

Y = the fractional radiochemical yield, when applicable;

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}); and

Δt = the elapsed time between midpoint of sample collection and time of counting (sec).

Typical values of E, V, Y and Δt shall be used in the calculation.

It should be recognized that the LLD is defined as an <u>a priori</u> (before the fact) limit representing the capability of a measurement system and not as an <u>a posteriori</u> (after the fact) limit for a particular measurement.

Table 16.11-6-1

Radioactive Gaseous Waste Sampling and Analysis Program (page 4 of 4)

(2) The principal gamma emitters for which the LLD specification applies include the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 in noble gas releases based on grab samples and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, I-131, Cs-134, Cs-137, and Ce-141 in Iodine and particulate releases based on continuous samples. The LLD for Ce-144 is 5×10^{-9} μCi/ml and is based on continuous samples. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report, pursuant to Technical Specification 5.6.3 in the format outlined in Regulatory Guide 1.21, Appendix B, Revision 1, June 1974.

(3) Sampling and analysis shall also be performed following shutdown, startup, or a THERMAL POWER stabilization (power level constant at desired power level) after a THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1-hour period, for at least one of the three gaseous release types with this notation.

(4) Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.

(5) Required sampling and analysis frequency during effluent release via this pathway.

(6) The ratio of the sample flow volume to the sampled stream flow volume shall be known for the time period covered by each dose or dose rate calculation made in accordance with SLCs 16.11-6, 16.11-8, and 16.11-9.

(7) Samples shall be changed at least once per 24 hours and analyses shall be completed within 48 hours after changing, or after removal from sampler.

(8) The composite filter(s) will be analyzed for alpha activity by analyzing one filter per week to ensure that at least four filters are analyzed per collection period.

(9) Samples shall be changed at least once per 7 days and analyses shall be completed within 48 hours to meet LLDs after changing, or after removal from sampler. If the particulate and charcoal sample frequency is changed to a 24-hour frequency, the corresponding LLDs may be increased by a factor of 10 (e.g., LLD for I-131 from 1×10^{-12} to 1×10^{-11} μCi/ml).

BASES

The basic requirements for SLCs concerning effluents from nuclear power reactors are stated in 10 CFR 50.36a. These requirements indicate that compliance with effluent SLCs will keep average annual releases of radioactive material in effluents to small percentages of the limits specified in the old 10 CFR 20.106 (new 10 CFR 20.1301). These requirements further indicate that operational flexibility is allowed, compatible with considerations of health and safety, which may temporarily result in releases higher than such small percentages, but still within the limits specified in the old 10 CFR 20.106 which references Appendix B, Table II concentrations (MPCs). These referenced concentrations are specific values which relate to an annual dose of 500 mrems. It is further indicated in 10 CFR 50.36a that when using operational flexibility, best efforts shall be exerted to keep levels of radioactive materials in effluents as low as is reasonably achievable (ALARA) as set forth in 10 CFR 50, Appendix I.

As stated in the Introduction to Appendix B of the new 10 CFR 20, the gaseous effluent concentration (EC) limits given in Appendix B, Table 2, Column 1, are based on an annual dose of 50 mrems for isotopes for which inhalation or ingestion is limiting or 100 mrems for isotopes for which submersion (noble gases) is limiting. Since release concentrations corresponding to limiting dose rates less than or equal to 500 mrems/year to the whole body, 3000 mrems/year to the skin from noble gases, and 1500 mrems/year to any organ from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than 8 days at the site boundary has been acceptable as a SLC limit for gaseous effluents to assure that the limits of 10 CFR 50, Appendix I and 40 CFR 190 are not likely to be exceeded, it should not be necessary to restrict the operational flexibility by incorporating the dose rate associated with the EC value for isotopes based on inhalation/ingestion (50 mrems/year) or the dose rate associated with the EC value for isotopes based on submersion (100 mrems/year).

Having sufficient operational flexibility is especially important in establishing a basis for effluent monitor setpoint calculations. As discussed above, the concentrations stated in the new 10 CFR 20, Appendix B, Table 2, Column 1, relate to a dose of 50 or 100 mrems in a year. When applied on an instantaneous basis, this corresponds to a dose rate of 50 or 100 mrems/year.

These low values are impractical upon which to base effluent monitor setpoint calculations for many gaseous effluent release situations when monitor background, monitor sensitivity, and monitor performance must be taken into account.

Therefore, to accommodate operational flexibility needed for effluent releases, the limits associated with gaseous release rate SLCs will be maintained at the current instantaneous dose rate limit for noble gases of 500 mrems/year to the whole body and 3000 mrems/year to the skin; and for Iodine-131, for Iodine-133, for tritium, and for all radionuclides in particulate

BASES (continued)

form with half-lives greater than 8 days, an instantaneous dose rate limit of 1500 mrems/year to any organ.

Compliance with the limits of the new 10 CFR 20.1301 will be demonstrated by operating within the limits of 10 CFR 50, Appendix I and 40 CFR 190. Operational history at Catawba has demonstrated that the use of the dose rate values listed above (i.e., 500 mrems/year, 3000 mrems/year, and 1500 mrems/year) as SLC limits has resulted in calculated maximum individual doses to MEMBERS OF THE PUBLIC that are small percentages of the limits of 10 CFR 50, Appendix I and 40 CFR 190.

The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to a MEMBER OF THE PUBLIC at or beyond the SITE BOUNDARY to less than or equal to 500 mrem/year to the whole body and to less than or equal to 3000 mrem/year to the skin from noble gases, and to less than or equal to 1500 mrem/year to any organ from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days.

This commitment applies to the release of radioactive materials in gaseous effluents from all units at the site.

The required detection capabilities for radioactive material in gaseous waste samples are tabulated in terms of the lower limits of detection (LLDs). Based on NUREG-1301 and Regulatory Guide 1.21, the LLD value of 1×10^{-4} μCi/ml for grab samples is only applicable to noble gases grab samples and the LLD values for particulate and iodine radionuclides are applicable to continuous charcoal and particulate samples. The Table 16.11-6-1 Gaseous Release Type Number 6 (Waste Monitor Tank Building Ventilation Exhaust) LLDs are based on weekly samples per NUREG-1301. The Table 16.11-6-1 Gaseous Release Type Number 5 (All Release Types as Listed in 3. Above) LLDs, for the 24-hour charcoal and particulate samples, are based on daily (once per 24 hour) samples per NUREG-1301. There are two isotopes with associated LLDs that do not agree directly with NUREG-1301: Ce-144, LLD of 5×10^{-9} μCi/ml, which has historically been applied and achieved for analytical results, and I-133, LLD of 1×10^{-10} μCi/ml, which again has been historically listed, as 1×10^{-9} μCi/ml, for Radioactive Gaseous Waste Sampling but changed to be in agreement with I-131 for weekly (7-day) samples and is not specified in NUREG-1301. Detailed discussion of the LLD, and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination – Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J.K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 20, Appendix B.
3. 10 CFR Part 20.
4. 10 CFR Part 50.
5. 40 CFR Part 190.
6. NUREG-1301.
7. Regulatory Guide 1.21.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-7 Radioactive Gaseous Effluent Monitoring Instrumentation

COMMITMENT

The Radioactive Gaseous Effluent Monitoring Instrumentation channels shown in Table 16.11-7-1 shall be FUNCTIONAL with their Alarm/Trip Setpoints set to ensure that the limits of SLC 16.11-6 are not exceeded.

AND

The Alarm/Trip Setpoints of these channels shall be determined and adjusted in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).

APPLICABILITY: As shown in Table 16.11-7-1.

REMEDIAL ACTIONS

---NOTE---
Separate Condition entry is allowed for each Function.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more Radioactive Gaseous Effluent Monitoring Instrumentation channel(s) Alarm/Trip Setpoint less conservative than required.	A.1 Suspend the release of radioactive gaseous effluents monitored by the affected channel(s).	Immediately
	OR	
	A.2 Declare the channel(s) non-functional.	Immediately
B. One or more Radioactive Gaseous Effluent Monitoring Instrumentation channel(s) non-functional.	B.1 Enter the applicable Conditions and Required Actions specified in Table 16.11-7-1 for the channel(s).	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. One channel non-functional.	C.1 Verify that EMF-36 (Low Range) is FUNCTIONAL.	Prior to initiating a release
	OR	
	C.2.1 Analyze two independent samples of the tank's contents.	Prior to initiating a release
	AND	
	C.2.2 Perform independent verification of the discharge line valving.	Prior to initiating a release
	AND	
	C.2.3.1 Perform independent verification of manual portion of the computer input for release rate calculations performed by computer.	Prior to initiating a release
	OR	
	C.2.3.2 Perform independent verification of entire calculations for release rate calculations performed manually.	Prior to initiating a release
	AND	
	C.2.4 Restore channel to FUNCTIONAL status.	14 days
	OR	
	C.3 Suspend release of radioactive effluents via this pathway.	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. One or more flow rate measurement device channel(s) non-functional.	D.1 Estimate the flow rate of the release.	Once per 4 hours during releases
	AND	
	D.2 Restore channel to FUNCTIONAL status.	30 days
E. One or more Noble Gas Activity Monitor channel(s) non-functional.	E.1 Obtain grab samples from effluent pathway.	Once per 12 hours during releases
	AND	
	E.2 Perform an analysis of grab samples for radioactivity.	Within 24 hours of obtaining the sample
	AND	
	E.3 Restore channel to FUNCTIONAL status.	30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. Noble Gas Activity Monitor (EMF-39 – Low Range) providing automatic termination of release non-functional.	F.1 -------------NOTE-------------- In order to utilize Required Action F.1, the following conditions must be satisfied: 1. The affected unit is not in MODES 1, 2, 3, or 4. 2. EMF-36 is FUNCTIONAL and in service for the affected unit. 3. The Reactor Coolant System for the affected unit has been vented. 4. Either the reactor vessel head is in place (bolts are not required), or if it is not in place, either: (a) all irradiated fuel assemblies have been removed from containment, or (b) the lifting of heavy loads over the reactor vessel and the movement of irradiated fuel assemblies within containment have been suspended. -----------------------------------	
	Restore the non-functional channel to FUNCTIONAL status.	12 hours

(continued)

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
F. (continued)	OR	
	F.2.1 Provide a portable Continuous Air Monitor (CAM) on the operating deck of containment.	Immediately
	AND	
	F.2.2 -------------NOTE------------- In order to utilize Required Action F.2, the following conditions must be satisfied: 1. The affected unit is not in MODES 1, 2, 3, 4, 5, or 6. 2. EMF-36 is FUNCTIONAL and in service for the affected unit. 3. The reactor vessel head is in place (bolts are not required). ----------------------------------	
	Restore the non-functional channel to FUNCTIONAL status.	30 days
G. Required Action and associated Completion Time of Condition F not met. OR Required Action F.1 or F.2.1 and F.2.2 not utilized.	G.1 Suspend PURGING of radioactive effluents via this pathway.	Immediately

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
H. One or more sampler channel(s) non-functional.	H.1 Perform sampling with auxiliary sampling equipment as required by Table 16.11-6-1.	Continuously
	AND	
	H.2 Restore channel to FUNCTIONAL status.	30 days
I. One Condenser Evacuation System Noble Gas Activity Monitor (EMF-33) channel non-functional.	I.1 --------------NOTE------------- Applicable to effluent releases via the Condenser Steam Air Ejector (ZJ) System. ------------------------------------	
	Obtain grab samples from effluent pathway.	Once per 12 hours during releases
	AND	
	I.2 --------------NOTE------------- Applicable to effluent releases via the Condenser Steam Air Ejector (ZJ) System. ------------------------------------	
	Perform an analysis of grab samples for radioactivity.	Within 24 hours of obtaining the sample
	AND	
		(continued)

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
I. (continued)	I.3 --------------NOTE------------- Applicable to effluent releases via the Steam Generator Blowdown (BB) System atmospheric vent valve (BB-27) in the off-normal mode. ----------------------------------- Perform an analysis of grab samples for radioactivity at a lower limit of detection of 10^{-7} microCurie/ml.	Once per 12 hours during releases when secondary specific activity is > 0.01 microCurie/gm DOSE EQUIVALENT I-131 <u>AND</u> Once per 24 hours during releases when secondary specific activity is ≤ 0.01 microCurie/gm DOSE EQUIVALENT I-131
	<u>AND</u> I.4 Restore channel to FUNCTIONAL status.	30 days
J. Noble Gas Activity Monitor (EMF-39 – Low Range) providing automatic termination of release non-functional.	J.1 Verify that EMF-36 is FUNCTIONAL.	Prior to initiating a release
	<u>OR</u> J.2.1 Analyze two independent samples of the containment atmosphere. <u>AND</u>	Prior to initiating a release

(continued)

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
J. (continued)	J.2.2 Perform independent verification of the discharge line valving.	Prior to initiating a release
	AND	
	J.2.3.1 Perform independent verification of manual portion of the computer input for release rate calculations performed by computer.	Prior to initiating a release
	OR	
	J.2.3.2 Perform independent verification of entire calculations for release rate calculations performed manually.	Prior to initiating a release
	AND	
	J.2.4 --------------NOTE------------- If channel remains or is anticipated to remain non-functional for ≥ 90 days, re-evaluate the configuration of the affected unit in accordance with the applicable portions of 10 CFR 50.59 and 10 CFR 50.65(a)(4) prior to expiration of the 90-day period. -----------------------------------	
	Restore channel to FUNCTIONAL status.	30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
K. Required Action and associated Completion Time of Condition C, D, E, F, H, I, or J not met.	K.1 Explain why the non-functionality was not corrected within the specified Completion Time.	In the next scheduled Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3

TESTING REQUIREMENTS

-----NOTE-----
Refer to Table 16.11-7-1 to determine which TRs apply for each Radioactive Gaseous Effluent Monitoring Instrumentation channel.

TEST		FREQUENCY
TR 16.11-7-1	Perform CHANNEL CHECK.	Prior to each release
TR 16.11-7-2	-----NOTE----- For Instruments 1a, 4, and 5, a SOURCE CHECK for these channels shall be the qualitative assessment of channel response when the channel sensor is exposed to a light-emitting diode. ---------- Perform SOURCE CHECK.	Prior to each release
TR 16.11-7-3	Perform CHANNEL CHECK.	12 hours
TR 16.11-7-4	Perform CHANNEL CHECK.	24 hours
TR 16.11-7-5	Perform CHANNEL CHECK.	7 days

(continued)

TESTING REQUIREMENTS (continued)

	TEST	FREQUENCY
TR 16.11-7-6	---NOTE--- For Instruments 2 and 3a, a SOURCE CHECK for these channels shall be the qualitative assessment of channel response when the channel sensor is exposed to a light-emitting diode. ------ Perform SOURCE CHECK.	31 days
TR 16.11-7-7	---NOTE--- For Instruments 1a, 2, 3a, 5, and 6a, the COT shall also demonstrate, as applicable, that automatic isolation of this pathway and control room alarm annunciation (for EMF-58, alarm annunciation is in the Monitor Tank Building control room and on the Monitor Tank Building control panel remote annunciator panel) occur if any of the following conditions exist: a. Instrument indicates measured levels above the Alarm/Trip Setpoint, or b. Circuit failure/instrument downscale failure (alarm only) ------ Perform COT.	9 months
TR 16.11-7-8	---NOTE--- For Instrument 4, the COT shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occur if any of the following conditions exist: a. Instrument indicates measured levels above the Alarm/Trip Setpoint, or b. Circuit failure/instrument downscale failure (alarm only) ------ Perform COT.	18 months

(continued)

TESTING REQUIREMENTS (continued)

TEST		FREQUENCY
TR 16.11-7-9	-------------------------------NOTE------------------------------- For Instruments 1a, 2, 3a, 4, 5, and 6a, the initial CHANNEL CALIBRATION shall be performed using one or more of the reference standards certified by the National Bureau of Standards (NBS) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards shall permit calibrating the system over its intended range of energy and measurement range. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration shall be used. --	
	Perform CHANNEL CALIBRATION.	18 months

Table 16.11-7-1

Radioactive Gaseous Effluent Monitoring Instrumentation (page 1 of 2)

INSTRUMENT	REQUIRED CHANNELS	CONDITIONS	APPLICABLE MODES	TESTING REQUIREMENTS
1. Waste Gas Holdup System				
1.a Noble Gas Activity Monitor – Providing Alarm and Automatic Termination of Release (EMF-50 – Low Range)	1 per station	A, C, K	At all times except when the isolation valve is closed and locked	TR 16.11-7-1 TR 16.11-7-2 TR 16.11-7-7 TR 16.11-7-9
1.b Effluent System Flow Rate Measuring Device	1 per station	D, K	At all times except when the isolation valve is closed and locked	TR 16.11-7-1 TR 16.11-7-9
2. Condenser Evacuation System Noble Gas Activity Monitor (EMF-33) (BB-27 is only isolation function required) (Note 1)	1	A, I, K	When air ejectors are in operation (Apply Required Action I.3 when air ejectors are not in operation)	TR 16.11-7-3 TR 16.11-7-6 TR 16.11-7-7 TR 16.11-7-9
3. Vent System				
3.a Noble Gas Activity Monitor (EMF-36 – Low Range)	1	A, E, K	At all times	TR 16.11-7-4 TR 16.11-7-6 TR 16.11-7-7 TR 16.11-7-9
3.b Iodine Sampler Eberline RAP-1 (RDM-PU-VPVP)	1	A, H, K	At all times	TR 16.11-7-5
3.c Particulate Sampler Eberline RAP-1 (RDM-PU-VPVP)	1	A, H, K	At all times	TR 16.11-7-5
3.d Unit Vent Stack Flow Rate Meter (no alarm/trip function)	1	D, K	At all times	TR 16.11-7-4 TR 16.11-7-9
3.e Unit Vent Radiation Monitor Flow Meter	1	E, K	At all times	TR 16.11-7-4 TR 16.11-7-9
4. Containment Purge System Noble Gas Activity Monitor – Providing Alarm and Automatic Termination of Release (EMF-39 – Low Range)	1	A, F, G, K	At all times below MODE 4	TR 16.11-7-2 TR 16.11-7-3 TR 16.11-7-8 TR 16.11-7-9

(continued)

Table 16.11-7-1

Radioactive Gaseous Effluent Monitoring Instrumentation (page 2 of 2)

INSTRUMENT	REQUIRED CHANNELS	CONDITIONS	APPLICABLE MODES	TESTING REQUIREMENTS
5. Containment Air Release and Addition System Noble Gas Activity Monitor – Providing Alarm and Automatic Termination of Release (EMF-39 – Low Range)	1	A, J, K	1, 2, 3, 4, 5, 6	TR 16.11-7-2 TR 16.11-7-3 TR 16.11-7-7 TR 16.11-7-9
6. Monitor Tank Building HVAC				
6.a Noble Gas Activity Monitor – Providing Alarm (EMF-58 – Low Range)	1 per station	A, E, K	At all times	TR 16.11-7-4 TR 16.11-7-6 TR 16.11-7-7 TR 16.11-7-9
6.b Effluent Flow Rate Measuring Device	1 per station	D, K	At all times	TR 16.11-7-4 TR 16.11-7-9

Note 1: The setpoint is as required by the primary to secondary leak rate monitoring program.

BASES

The Radioactive Gaseous Effluent Monitoring Instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The Alarm/Trip Setpoints for these instruments shall be calculated and adjusted in accordance with the methodology and parameters in the ODCM to ensure that the Alarm/Trip will occur prior to exceeding the limits of 10 CFR Part 20. The FUNCTIONALITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50. The sensitivity of any noble gas activity monitor used to show compliance with the gaseous effluent release requirements of SLC 16.11-8 shall be such that concentrations as low as 1×10^{-6} μCi/cc are measurable.

Initiation of the Containment Purge Exhaust System (CPES) with EMF-39 non-functional is not permissible. The basis for Required Actions F.1 and F.2.1 and F.2.2 is to allow the continued operation of the CPES with EMF-39 initially FUNCTIONAL. Continued operation of the CPES is contingent upon the ability of the affected unit to meet the requirements as noted in Required Actions F.1 and F.2.1 and F.2.2.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 20.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-8 Dose - Noble Gases

COMMITMENT The air dose due to noble gases released in gaseous effluents, from each unit, to areas at and beyond the SITE BOUNDARY (see Figure 16.11-16-1 in SLC 16.11-16) shall be limited to the following:

a. During any calendar quarter: $\leq$ 5 mrad for gamma radiation and $\leq$ 10 mrad for beta radiation, and

b. During any calendar year: $\leq$ 10 mrad for gamma radiation and $\leq$ 20 mrad for beta radiation.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Calculated air dose from radioactive noble gases in gaseous effluents exceeding any of above limits.	A.1 Prepare and submit a Special Report to the NRC which identifies the causes for exceeding the limits, corrective actions taken to reduce releases, and actions taken to ensure that subsequent releases are within limits.	30 days

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-8-1 Determine cumulative dose contributions from noble gases in gaseous effluents for current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM.	31 days

BASES

This SLC is provided to implement the requirements of Sections II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. The COMMITMENT implements the guides set forth in Section II.B of Appendix I. The REMEDIAL ACTION statement provides the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable". The TESTING REQUIREMENTS implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The dose calculation methodology and parameters established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors," Revision 1, July 1977. The ODCM equations provided for determining the air doses at and beyond the SITE BOUNDARY are based upon the historical average atmospheric conditions.

This commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. When shared radwaste treatment systems are used by more than one unit on a site, the wastes from all units are mixed for shared treatment; by such mixing, the effluent releases cannot accurately be ascribed to a specific unit. An estimate should be made of the contributions from each unit based on input conditions, e.g., flow rates and radioactivity concentrations, or, if not practicable, the treated effluent releases may be allocated equally to each of the radioactives waste producing units sharing the radwaste treatment system. For determining conformance to COMMITMENTS, these allocations from shared radwaste treatment systems are to be added to the releases specifically attributed to each unit to obtain the total releases per unit.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-9 Dose - Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

COMMITMENT

The dose to a MEMBER OF THE PUBLIC from Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives > 8 days in gaseous effluents released, from each unit, to areas at and beyond the SITE BOUNDARY (see Figure 16.11-16-1 in SLC 16.11-16) shall be limited to the following:

a. During any calendar quarter: ≤ 7.5 mrem to any organ, and

b. During any calendar year: ≤ 15 mrem to any organ.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Calculated dose from the release of Iodine-131, Iodine-133, tritium, and radioactive material in particulate form with half-lives > 8 days in gaseous effluents exceeding any of above limits.	A.1 Prepare and submit a Special Report to the NRC which identifies the causes for exceeding the limits, corrective actions taken to reduce releases, and actions taken to ensure that subsequent releases are within limits.	30 days

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-9-1 Determine cumulative dose contributions from Iodine-131, Iodine-133, tritium, and radioactive material in particulate form with half-lives > 8 days in gaseous effluents for current calendar quarter and current calendar year in accordance with the methodology and parameters in the ODCM.	31 days

BASES

This SLC is provided to implement the requirements of Sections II.C, III.A and IV.A of Appendix I, 10 CFR Part 50, and are the guides set forth in Section II.C of Appendix I. The REMEDIAL ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents to UNRESTRICTED AREAS will be kept "as low as is reasonably achievable". The ODCM calculational methods specified in the TESTING REQUIREMENTS implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data, such that the actual exposure of a MEMBER OF THE PUBLIC through appropriate pathways is unlikely to be substantially underestimated. The ODCM calculational methodology and parameters for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors," Revision 1, July 1977. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate COMMITMENTS for Iodine-131, Iodine-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days are dependent upon the existing radionuclide pathways to man in the areas at and beyond the SITE BOUNDARY. The pathways that were examined in the development of the calculations were: (1) individual inhalation of airborne radionuclides, (2) deposition of radionuclides onto green leafy vegetation with subsequent consumption by man, (3) deposition onto grassy areas where milk animals and meat-producing animals graze with consumption of the milk and meat by man, and (4) deposition on the ground with subsequent exposure of man.

This commitment applies to the release of radioactive materials in gaseous effluents from each unit at the site. When shared radwaste treatment systems are used by more than one unit on a site, the wastes from all units are mixed for shared treatment; by such mixing, the effluent releases cannot accurately be ascribed to a specific unit. An estimate should be made of the contributions from each unit based on input conditions, e.g., flow rates and radioactivity concentrations, or, if not practicable, the treated effluent releases may be allocated equally to each of the radioactive waste producing units sharing the radwaste treatment system. For determining conformance to COMMITMENTS, these allocations from shared radwaste treatment systems are to be added to the releases specifically attributed to each unit to obtain the total releases per unit.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.

2. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-10 Gaseous Radwaste Treatment System

COMMITMENT

The VENTILATION EXHAUST TREATMENT SYSTEM and the WASTE GAS HOLDUP SYSTEM shall be FUNCTIONAL and appropriate portions of these systems shall be used to reduce releases of radioactivity when the projected doses in 31 days due to gaseous effluent releases, from each unit, to areas at and beyond the SITE BOUNDARY (see Figure 16.11-16-1 in SLC 16.11-16) would exceed either:

a. 0.2 mrad to air from gamma radiation, or

b. 0.4 mrad to air from beta radiation, or

c. 0.3 mrem to any organ of a MEMBER OF THE PUBLIC.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Radioactive gaseous waste being discharged without treatment and in excess of above limits.	A.1 Prepare and submit a Special Report to the NRC which identifies non-functional equipment and reasons for non-functionality, actions taken to restore the equipment to FUNCTIONAL status, and actions taken to prevent recurrence.	30 days

TESTING REQUIREMENTS

-----NOTE-----
The installed VENTILATION EXHAUST TREATMENT SYSTEM and WASTE GAS HOLDUP SYSTEM shall be demonstrated FUNCTIONAL by meeting SLC 16.11-6, SLC 16.11-8, and SLC 16.11-9.

TEST		FREQUENCY
TR 16.11-10-1	Project gaseous release doses from each unit to areas at and beyond the SITE BOUNDARY, in accordance with the methodology and parameters in the ODCM, when Gaseous Radwaste Treatment Systems are not being fully utilized.	31 days

BASES

The FUNCTIONALITY of the WASTE GAS HOLDUP SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM ensures that the systems will be available for use whenever gaseous effluents require treatment prior to release to the environment. The requirement that the appropriate portions of these systems be used, when specified, provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable". This COMMITMENT implements the requirements of 10 CFR 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

This SLC applies to the release of radioactive materials in gaseous effluents from each unit at the site. When shared radwaste treatment systems are used by more than one unit on a site, the wastes from all units are mixed for shared treatment; by such mixing, the effluent releases cannot accurately be ascribed to a specific unit. An estimate should be made of the contributions from each unit based on input conditions, e.g., flow rates and radioactivity concentrations, or, if not practicable, the treated effluent releases may be allocated equally to each of the radioactive waste producing units sharing the radwaste treatment system. For determining conformance to COMMITMENTS, these allocations from shared radwaste treatment systems are to be added to the releases specifically attributed to each unit to obtain the total releases per unit.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-11 Solid Radioactive Wastes

COMMITMENT

Radioactive wastes shall be processed and packaged to ensure compliance with the applicable requirements of 10 CFR Part 20, 10 CFR Part 61, 10 CFR Part 71, and state regulations governing the transportation and disposal of radioactive wastes.

The Solid Radwaste System or an approved alternative process shall be used in accordance with the PROCESS CONTROL PROGRAM for the solidification of liquid or wet radioactive wastes or the dewatering of wet radioactive wastes to be shipped for direct disposal at a 10 CFR Part 61 licensed disposal site. Wastes shipped for offsite processing in accordance with the processor's specifications and transportation requirements are not required to be solidified or dewatered to meet disposal requirements.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Applicable regulatory requirements for solidified or dewatered wastes not satisfied.	A.1 Suspend shipment of inadequately processed waste.	Immediately
	AND	
	A.2 Take action to correct the PROCESS CONTROL PROGRAM, procedures, or solid waste equipment as necessary to prevent recurrence.	Prior to next shipment for disposal of solidified or dewatered wastes

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. Solidification test as described in the PROCESS CONTROL PROGRAM fails to verify solidification.	B.1 Suspend solidification of the batch under test and follow PROCESS CONTROL PROGRAM guidance for test failures.	Immediately
	<u>AND</u>	
	B.2 --------------NOTE------------- Once a subsequent test verifies solidification, solidification of the batch may be resumed as directed by the PROCESS CONTROL PROGRAM. ----------------------------------- Modify the PROCESS CONTROL PROGRAM as required to assure solidification of subsequent batches of waste.	Prior to next solidification for shipment of waste for disposal at a 10 CFR Part 61 disposal site
C. Solidification or dewatering for disposal not performed in accordance with the PROCESS CONTROL PROGRAM.	C.1 Reprocess the waste in accordance with PROCESS CONTROL PROGRAM requirements.	Prior to shipment for disposal of the inadequately processed waste that requires solidification or dewatering
	<u>OR</u>	
	C.2 Follow PROCESS CONTROL PROGRAM or procedure guidance for alternative free-standing liquid verification to ensure the waste in each container meets disposal requirements and take appropriate administrative action to prevent recurrence.	Prior to shipment for disposal of the inadequately processed waste that requires solidification or dewatering

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Solid waste equipment incapable of supporting COMMITMENT.	D.1 Restore the equipment to a status capable of supporting COMMITMENT.	In a time frame supporting COMMITMENT
	<u>OR</u>	
	D.2 Provide for alternative capability to process wastes as necessary to satisfy all applicable transportation and disposal requirements.	In a time frame supporting COMMITMENT

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-11-1 Verify, using the PROCESS CONTROL PROGRAM, the solidification of at least one representative test specimen from at least every tenth batch of each type of radioactive waste to be solidified for disposal at a 10 CFR Part 61 disposal site.	Every tenth batch of each type of radioactive waste to be solidified

BASES

This SLC implements the requirements of 10 CFR Part 50.36a and General Design Criterion 60 of Appendix A to 10 CFR Part 50 and requirements to use a PROCESS CONTROL PROGRAM to meet applicable 10 CFR Part 61 waste form criteria for solidified and dewatered radioactive wastes.

- The PROCESS CONTROL PROGRAM describes administrative and operational controls used for the solidification of liquid or wet solid radioactive wastes in order to meet applicable 10 CFR Part 61 waste form requirements.
- The PROCESS CONTROL PROGRAM describes the administrative and operational controls used for the dewatering of wet radioactive wastes to meet 10 CFR Part 61 free-standing water requirements.
- The process parameters used in establishing the PROCESS CONTROL PROGRAM shall be based on demonstrated processing of actual or simulated liquid or wet solid wastes and must adequately verify that the final product of solidification or dewatering meets all applicable federal, state, and disposal site requirements.

REFERENCES

1. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. 10 CFR Part 50, Appendix A.

3. 10 CFR Part 20, "Standards for Protection Against Radiation."

4. 10 CFR Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste."

5. 10 CFR Part 71, "Packaging and Transportation of Radioactive Materials."

6. PROCESS CONTROL PROGRAM Manual.

7. Generic Letter 84-12, "Compliance with 10 CFR Part 61 and Implementation of the Radiological Effluent Technical Specifications (RETS) and Attendant Process Control Program (PCP)."

8. Generic Letter 89-01, "Implementation of Programmatic Controls for Radiological Effluent Technical Specifications in the Administrative Controls Section of the Technical Specifications and the Relocation of Procedural Details of RETS to the Offsite Dose Calculation Manual or to the Process Control Program."

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-12 Total Dose

COMMITMENT: The annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to ≤ 25 mrem to the whole body or any organ, except the thyroid, which shall be limited to ≤ 75 mrem.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Calculated doses from releases exceeding twice the specified limits of SLC 16.11-3, SLC 16.11-8, or SLC 16.11-9.	A.1 Verify, by calculation, that the cumulative dose from direct radiation contributions and outside storage tanks and radioactivity releases are within the total dose limit.	Immediately
	AND	
	A.2 --------------NOTE------------- Only required to be performed if the total dose limit is exceeded. -----------------------------------	
	Prepare and submit a Special Report to the NRC which identifies corrective actions to be taken to reduce subsequent releases to prevent recurrence and schedule for achieving conformance with specified limits.	30 days

TESTING REQUIREMENTS

---NOTE---
Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with SLC 16.11-3, SLC 16.11-8, and SLC 16.11-9, and in accordance with the methodology and parameters specified in the ODCM.

TEST	FREQUENCY
TR 16.11-12-1 Determine cumulative dose contributions from direct radiation from the units and from radwaste storage tanks in accordance with the methodology and parameters specified in the ODCM.	When calculated doses from effluent releases exceed twice the limits of SLC 16.11-3, SLC 16.11-8, or SLC 16.11-9

BASES

This SLC is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The SLC requires the preparation and submittal of a Special Report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrem to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem. For sites containing up to four reactors, it is highly unlikely that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units and from outside storage tanks are kept small.

This Special Report, as defined in 10 CFR 20.2203(a)(4), shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered.

BASES (continued)

If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.2203(a)(4), is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 and a variance is granted until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in SLC 16.11-1 and SLC 16.11-6.

An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 20.
3. 40 CFR Part 190.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-13 Monitoring Program

COMMITMENT The Radiological Environmental Monitoring Program shall be conducted as specified in Table 16.11-13-1.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Radiological Environmental Monitoring Program not being conducted as specified in Table 16.11-13-1.	A.1 Identify the reasons for not conducting the program as required and the plans for preventing a recurrence in the Annual Radiological Environmental Operating Report.	In the next scheduled Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2
B. Radioactivity level resulting from plant effluents of environmental sampling medium at a specified location in excess of reporting limits of Table 16.11-13-2 when averaged over any calendar quarter.	B.1 Prepare and submit a Special Report that identifies the cause(s) for exceeding the limits and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of SLC 16.11-3, SLC 16.11-8, and SLC 16.11-9.	30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
C. Milk or fresh leafy vegetation samples unavailable from one or more sample location(s) required by Table 16.11-13-1.	C.1 --------------NOTE------------- Specific location(s) from which samples were unavailable may be deleted from the program. ----------------------------------	
	Revise the Radiological Environmental Monitoring Program to identify location(s) for obtaining replacement samples.	30 days
	AND	
	C.2 Identify the cause of the unavailability of samples and identify and justify new location(s) for obtaining replacement samples in the Annual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).	In the next scheduled Annual Radioactive Effluent Release Report pursuant to Technical Specification 5.5.1

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-13-1 -------------------------------NOTE------------------------------ The maximum values for the lower limits of detection shall be as specified in Table 16.11-13-3. ---	
Collect and analyze radiological environmental monitoring samples pursuant to Table 16.11-13-1 from the specific locations given in the table and figure(s) in the ODCM.	In accordance with Table 16.11-13-1

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 1 of 7)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS[1]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
1. Direct Radiation[2]	Forty routine monitoring stations either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows: An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY; An outer ring of stations, one in each meteorological sector in the 6- to 8-km range from the site; and The balance of the stations to be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control stations.	Quarterly	Gamma dose quarterly

(continued)

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 2 of 7)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS[1]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
2. Airborne Radioiodine and Particulates	Samples from five locations. Three samples from close to the three SITE BOUNDARY locations, in different sectors, of the highest calculated annual average ground-level D/Q; One sample from the vicinity of a community having the highest calculated annual average ground-level D/Q; and One sample from a control location, as for example 15 to 30 km distant and in the least prevalent wind direction.	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Radioiodine Canister: I-131 analysis weekly. Particulate Sampler: Gross beta radioactivity analysis following filter change; [3] and gamma isotopic analysis [4] of composite (by location) quarterly.

(continued)

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 3 of 7)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS[(1)]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
3. Waterborne			
a. Surface[(5)]	One sample upstream. One sample downstream.	Composite sample over 1-month period [(6)].	Gamma isotopic analysis [(4)] monthly. Composite for tritium analysis quarterly.
b. Ground	Samples from one or two sources only if likely to be affected[(7)].	Quarterly	Gamma isotopic [(4)] and tritium analysis quarterly.
c. Drinking	One sample of each of one to three of the nearest water supplies that could be affected by its discharge. One sample from a control location.	Composite sample over 2-week period [(6)] when I-131 analysis is performed; monthly composite otherwise.	I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than 1 mrem per year [(8)]. Composite for gross beta and gamma isotopic analyses [(4)] monthly. Composite for tritium analysis quarterly.
d. Sediment from Shoreline	One sample from downstream area with existing or potential recreational value.	Semiannually	Gamma isotopic analysis [(4)] semiannually.

(continued)

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 4 of 7)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS(1)	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
4. Ingestion			
a. Milk	Samples from milking animals in three locations within 5-km distance having the highest dose potential. If there are none, then one sample from milking animals in each of three areas between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per year(8). One sample from milking animals at a control location 15 to 30 km distant and in the least prevalent wind direction.	Semimonthly when animals are on pasture; monthly at other times.	Gamma isotopic(4) and I-131 analysis semi-monthly when animals are on pasture; monthly at other times.
b. Fish and Invertebrates	One sample each of a predatory species, a bottom feeder and a forage species in vicinity of plant discharge area. One sample each of a predatory species, a bottom feeder and a forage species in areas not influenced by plant discharge.	Sample in season, or semiannually if they are not seasonal.	Gamma isotopic analysis(4) on edible portions.

(continued)

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 5 of 7)

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF REPRESENTATIVE SAMPLES AND SAMPLE LOCATIONS[1]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSIS
4. Ingestion (Continued)			
c. Food Products	One sample of each principal class of food products from any area that is irrigated by water in which liquid plant wastes have been discharged.	At time of harvest[9].	Gamma isotopic analyses[4] on edible portion.
	Samples of three different kinds of broad leaf vegetation grown nearest each of two different offsite locations of highest predicted annual average ground level D/Q if milk sampling is not performed.	Monthly, when available.	Gamma isotopic[4] and I-131 analysis.
	One sample of each of the similar broad leaf vegetation grown 15 to 30 km distant in the least prevalent wind direction if milk sampling is not performed.	Monthly, when available.	Gamma isotopic[4] and I-131 analysis.

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 6 of 7)

NOTES:

(1) Specific parameters of distance and direction sector from the centerline of the station, and additional description where pertinent, shall be provided for each and every sample location in Table 16.11-13-1 in a table and figure(s) in the ODCM. Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, and malfunction of automatic sampling equipment. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program. In lieu of any Licensee Event Report required by 10 CFR 50.73 and pursuant to Technical Specification 5.6.3, identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples in the next Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

(2) One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation. (The 40 stations is not an absolute number. The number of direct radiation monitoring stations may be reduced according to geographical limitations; e.g., at an ocean site, some sectors will be over water so that the number of dosimeters may be reduced accordingly. The frequency of analysis or readout for TLD systems will depend upon the characteristics of the specific system used and should be selected to obtain optimum dose information within minimal fading.)

(3) Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

Table 16.11-13-1

Radiological Environmental Monitoring Program (page 7 of 7)

(4) Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

(5) The "upstream sample" shall be taken at a distance beyond significant influence of the discharge. The "downstream" sample shall be taken in an area beyond but near the mixing zone. "Upstream" samples in an estuary must be taken far enough upstream to be beyond the plant influence. Salt water shall be sampled only when the receiving water is utilized for recreational activities.

(6) A composite sample is one in which the rate at which the liquid sampled is uniform and in which the method of sampling employed results in a specimen that is representative of the time-averaged concentration at the location being sampled. In this program composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

(7) Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

(8) The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.

(9) If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuberous and root food products.

Table 16.11-13-2

Reporting Levels for Radioactivity Concentrations in Environmental Samples

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)
H-3	20,000[(1)]				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

(1) For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

Table 16.11-13-3

Lower Limit of Detection (LLD)[3] (page 1 of 3)

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)	SEDIMENT (pCi/kg, dry)
Gross Beta	4	0.01				
H-3	2000[5]					
Mn-54	15		130			
Fe-59	30		260			
Co-58, 60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1[4]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140	15			15		

Table 16.11-13-3

Lower Limit of Detection (LLD)[3] (page 2 of 3)

NOTES:

(1) This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.

(2) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13.

(3) The LLD is defined, for purposes of these commitments, as the smallest concentrations of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66\, s_b}{E \cdot V \cdot 2.22 \cdot Y \cdot \exp(-\lambda \Delta t)}$$

Where:

LLD = the "a priori" lower limit of detection (picoCuries per unit mass or volume);

s_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute);

E = the counting efficiency (counts per disintegration);

V = the sample size (units of mass or volume);

2.22 = the number of disintegrations per minute per picoCurie;

Y = the fractional radiochemical yield, when applicable;

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}); and

Δt = the elapsed time between environmental collection, or end of the sample collection period, and time of counting (sec).

Typical values of E, V, Y and Δt shall be used in the calculation.

Table 16.11-13-3

Lower Limit of Detection (LLD)[3] (page 3 of 3)

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.

(4) LLD for drinking water samples. If no drinking water pathway exists, the LLD of gamma isotopic analysis may be used.

(5) If no drinking water pathway exists, a value of 3000 pCi/l may be used.

BASES

The Radiological Environmental Monitoring Program required by this SLC provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the plant operation. This Monitoring Program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the Radiological Effluent Monitoring Program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this Monitoring Program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. The initially specified Monitoring Program will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 16.11-13-3 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

With the level of radioactivity in an environmental sampling medium at a specified location exceeding the reporting levels of Table 16.11-13-2 when averaged over any calendar quarter, in lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days a Special Report that defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of SLC 16.11-3, SLC 16.11-8, and SLC 16.11-9. When more than one of the radionuclides in Table 16.11-13-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 16.11-13-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose to a MEMBER OF THE PUBLIC from all radionuclides is equal to or greater than the calendar year limits of SLC 16.11-3, SLC 16.11-8, and SLC 16.11-9. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report required by Technical Specification 5.6.2. The methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC shall be indicated in the 30-day Special Report.

BASES (continued)

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination – Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J.K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

REFERENCES

1. Catawba Offsite Dose Calculation Manual.
2. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-14 Land Use Census

COMMITMENT

-----NOTE-----

Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Requirements for broad leaf vegetation sampling in Table 16.11-13-1 (Item 4c) shall be followed, including analysis of control samples.

A Land Use Census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence, and the nearest garden of > 50 m^2 (500 ft^2) producing broad leaf vegetation.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION		REQUIRED ACTION		COMPLETION TIME
A.	Location(s) identified which yield a calculated dose or dose commitment greater than values currently calculated in SLC 16.11-9.	A.1	Identify the new location(s) in the Annual Radioactive Effluent Release Report.	In the next scheduled Annual Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3
B.	Location(s) identified which yield a calculated dose or dose commitment (via same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with SLC 16.11-13.	B.1 AND	Add the new location(s) to the Radiological Environmental Monitoring Program.	30 days (continued)

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
B. (continued)	B.2 Identify the new location(s), revised figure(s) and table(s) for the ODCM, and information supporting the change in sampling location(s) in the Annual Radioactive Effluent Release Report.	In the next scheduled Annual Radioactive Effluent Release Report pursuant to Technical Specification 5.5.1

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-14-1 --------------------------------NOTE-------------------------------- The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2. -- Conduct a Land Use Census during the growing season using the information which will provide the best results such as a door-to-door survey, aerial survey, or consultation with local agricultural authorities.	12 months

BASES

This SLC is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the Radiological Environmental Monitoring Program given in the ODCM are made if required by the results of this census. The best information from the door-to-door survey, from aerial survey, or from consulting with local agricultural authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 50 m^2 provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantify (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m^2.

BASES (continued)

With a Land Use Census identifying a location(s) which yield a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with SLC 16.11-13, add the new location(s) within 30 days to the Radiological Environmental Monitoring Program given in the ODCM. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment, via the same exposure pathway, may be deleted from this monitoring program after October 31 of the year in which this Land Use Census was conducted.

REFERENCES

1. Catawba Offsite Dose Calculation Manual.

2. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-15 Interlaboratory Comparison Program

COMMITMENT Analyses shall be performed on all radioactive materials, supplied as part of an Interlaboratory Comparison Program, that correspond to samples required by SLC 16.11-13.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Analyses not being performed as required.	A.1 Report corrective actions taken to prevent recurrence in the Annual Radiological Environmental Operating Report.	In the next scheduled Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-15-1 Report a summary of the results of the Interlaboratory Comparison Program in the Annual Radiological Environmental Operating Report.	In the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2

BASES The requirement for participation in an Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

BASES (continued)

The Interlaboratory Comparison Program shall be described in the Annual Radiological Environmental Operating Report.

REFERENCES 1. 10 CFR Part 50, Appendix I.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-16 Annual Radiological Environmental Operating Report and Radioactive Effluent Release Report

COMMITMENT

Annual Radiological Environmental Operating Report

Routine Annual Radiological Environmental Operating Reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 15 of each year.

The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, with operational controls as appropriate, and with previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The reports shall also include the results of the Land Use Census.

The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the table and figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the Radiological Environmental Monitoring Program; at least two legible maps (one map shall cover stations near the SITE BOUNDARY, and a second map shall include the more distant stations) covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor; the results of licensee participation in the Interlaboratory Comparison Program, required by SLC 16.11-15; discussion of all deviations from the sampling schedule of Table 16.11-13-1; and discussion of all analyses in which the LLD required by Table 16.11-13-3 was not achievable.

A single submittal may be made for the station.

(continued)

COMMITMENT (continued)

Radioactive Effluent Release Report

The Radioactive Effluent Release Report covering the operation of the unit during the previous calendar year shall be submitted before May 1 of each year. The Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit.

The Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability. (In lieu of submission with the Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.) This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to a MEMBER OF THE PUBLIC due to their activities inside the SITE BOUNDARY during the report period. All assumptions used in making these assessments, i.e., specific activity, exposure time and location, shall be included in these reports. A five-year average of representative onsite meteorological data shall be used in the gaseous effluent dose pathway calculations. Dispersion factors (X/Qs) and deposition factors (D/Qs) shall be generated using the computer code XOQDOQ (NUREG/CR-2919) which implements NRC Regulatory Guide 1.111. The meteorological conditions concurrent with the time of release shall be reviewed annually to determine if the five-year average values should be revised. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the ODCM.

The Radioactive Effluent Release Report shall also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operation." Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Rev. 1, October 1977.

(continued)

COMMITMENT (continued)

The Radioactive Effluent Release Reports shall include the following information for each type of solid waste shipped offsite during the report period:

a. Total container volume, in cubic meters,

b. Total Curie quantity (determined by measurement or estimate),

c. Principal radionuclides (determined by measurement or estimate),

d. Type of waste (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms),

e. Number of shipments, and

f. Solidification agent or absorbent (e.g., cement or other approved agents (media)).

The Radioactive Effluent Release Reports shall include a list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period.

The Radioactive Effluent Release Reports shall include any changes made during the reporting period to the PROCESS CONTROL PROGRAM (PCP) and to the ODCM, as well as a listing of new locations for dose calculations and/or environmental monitoring identified by the Land Use Census pursuant to SLC 16.11-14.

A single submittal may be made for the station. The submittal should combine those sections that are common to both units.

APPLICABILITY: At all times.

REMEDIAL ACTIONS None

TESTING REQUIREMENTS None

BASES None

REFERENCES None

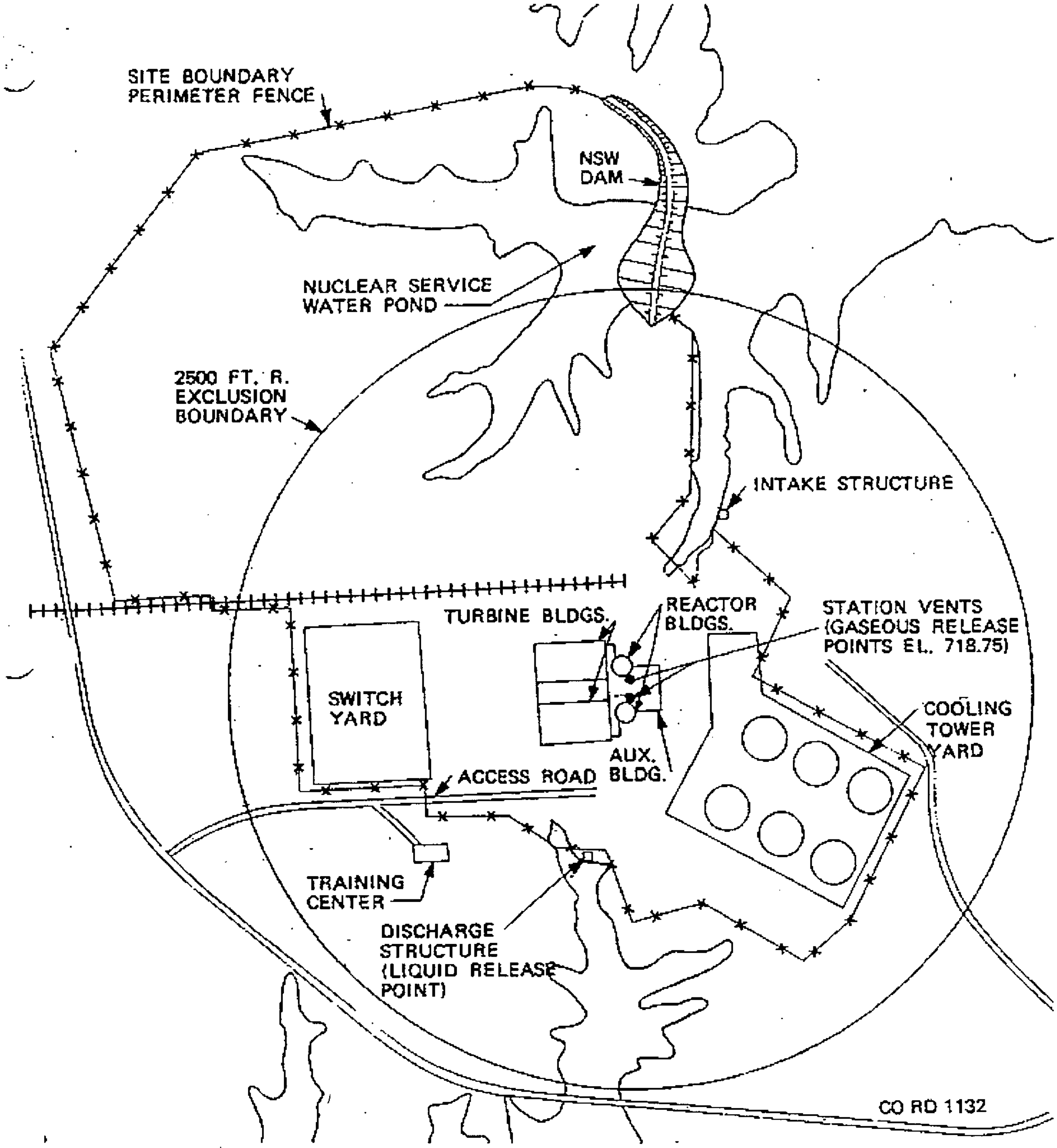

Figure 16.11-16-1

UNRESTRICTED AREA and SITE BOUNDARY for Radioactive Effluents

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-17 Liquid Holdup Tanks

COMMITMENT: The quantity of radioactive material contained in each temporary unprotected outdoor tank shall be limited to ≤ 10 Curies, excluding tritium and dissolved or entrained noble gases.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Quantity of radioactive material in tank(s) exceeding limit.	A.1 Suspend all additions of radioactive material to the tank(s).	Immediately
	AND	
	A.2 Reduce tank(s) contents to within limit.	48 hours
	AND	
	A.3 Describe the events leading to this condition in the Radioactive Effluent Release Report.	In the next scheduled Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-17-1 Verify that the quantity of radioactive material contained in each tank is within limits by analyzing a representative sample of the tank(s) contents when radioactive materials are being added to the tank(s).	7 days

BASES

The tanks included in this SLC are all those outdoor radwaste tanks that are not surrounded by liners, dikes, or walls capable of holding the tank contents and that do not have tank overflows and surrounding area drains connected to the liquid radwaste treatment system.

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply and the nearest surface water supply in an UNRESTRICTED AREA.

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

2. Technical Specification 5.5.12, Explosive Gas and Storage Tank Radioactivity Monitoring Program.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-18 Explosive Gas Mixture

COMMITMENT: The concentration of oxygen in the WASTE GAS HOLDUP SYSTEM shall be limited to ≤ 2% by volume whenever the hydrogen concentration is > 4% by volume.

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Concentration of oxygen in the WASTE GAS HOLDUP SYSTEM > 2% but ≤ 4% by volume and hydrogen concentration > 4% by volume.	A.1 Reduce oxygen concentration to within limits.	48 hours
B. Concentration of oxygen in the WASTE GAS HOLDUP SYSTEM > 4% by volume and hydrogen concentration > 4% by volume.	B.1 Suspend all additions of waste gases to the system.	Immediately
	<u>AND</u>	
	B.2 Reduce the concentration of oxygen to ≤ 4% by volume.	Immediately
	<u>AND</u>	
	B.3 Reduce oxygen concentration to within limits.	48 hours

TESTING REQUIREMENTS

TEST		FREQUENCY
TR 16.11-18-1	Verify that the concentrations of hydrogen and oxygen in the WASTE GAS HOLDUP SYSTEM are within limits by continuously monitoring the waste gases in the WASTE GAS HOLDUP SYSTEM with the hydrogen and oxygen monitors required FUNCTIONAL by SLC 16.11-20.	During WASTE GAS HOLDUP SYSTEM operation

BASES

This SLC is provided to ensure that the concentration of potentially explosive gas mixtures contained in the WASTE GAS HOLDUP SYSTEM is maintained below the flammability limits of hydrogen and oxygen. Automatic control features are included in the system to prevent the hydrogen and oxygen concentrations from reaching these flammability limits. These automatic control features include isolation of the source of hydrogen and/or oxygen, automatic diversion to recombiners, or injection of dilutants to reduce the concentration below the flammability limits. Maintaining the concentration of hydrogen and oxygen below their flammability limits provides assurance that the releases of radioactive materials will be controlled in conformance with the requirements of General Design Criterion 60 of Appendix A to 10 CFR Part 50.

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

2. Technical Specification 5.5.12, Explosive Gas and Storage Tank Radioactivity Monitoring Program.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-19 Gas Storage Tanks

COMMITMENT: The quantity of radioactivity contained in each gas storage tank shall be limited to ≤ 97,000 Curies of noble gases (considered as Xe-133 equivalent).

APPLICABILITY: At all times.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. Quantity of radioactive material in tank(s) exceeding limit.	A.1 Suspend all additions of radioactive material to the tank(s).	Immediately
	AND	
	A.2 Reduce tank(s) contents to within limit.	48 hours
	AND	
	A.3 Describe the events leading to this condition in the Radioactive Effluent Release Report.	In the next scheduled Radioactive Effluent Release Report pursuant to Technical Specification 5.6.3

TESTING REQUIREMENTS

TEST	FREQUENCY
TR 16.11-19-1 Verify that the quantity of radioactive material contained in each tank is within limits when radioactive materials are being added to the tank(s).	24 hours

BASES

The tanks included in this SLC are those tanks for which the quantity of radioactivity contained is not limited directly or indirectly by another SLC. Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tank's contents, the resulting whole body exposure to a MEMBER OF THE PUBLIC at the nearest SITE BOUNDARY will not exceed 0.5 rem. This is consistent with Standard Review Plan 11.3, Branch Technical Position ETSB 11-5, "Postulated Radioactive Releases Due to a Waste Gas System Leak or Failure," in NUREG-0800, July 1981.

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

2. Technical Specification 5.5.12, Explosive Gas and Storage Tank Radioactivity Monitoring Program.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-20 Explosive Gas Monitoring Instrumentation

COMMITMENT The Explosive Gas Monitoring Instrumentation channels shown in Table 16.11-20-1 shall be FUNCTIONAL with their Alarm/Trip Setpoints set to ensure that the limits of SLC 16.11-18 are not exceeded.

APPLICABILITY: During WASTE GAS HOLDUP SYSTEM operation.

REMEDIAL ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required Explosive Gas Monitoring Instrumentation channel(s) Alarm/Trip Setpoint less conservative than required.	A.1 Declare the channel(s) non-functional.	Immediately
B. One required hydrogen monitor channel non-functional.	B.1 Suspend oxygen supply to the recombiner.	Immediately
	<u>AND</u>	
	B.2 Restore channel to FUNCTIONAL status.	30 days
C. One required oxygen monitor channel non-functional.	C.1 Obtain and analyze grab samples.	24 hours
	<u>AND</u>	
	C.2 Restore channel to FUNCTIONAL status.	30 days

(continued)

REMEDIAL ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
D. Two required oxygen monitor channels non-functional.	D.1 Obtain and analyze grab samples. AND D.2 Restore channels to FUNCTIONAL status.	Once per 4 hours during degassing operations AND Once per 24 hours during other operations 30 days
E. Required Action and associated Completion Time of Condition B, C, or D not met.	E.1 Prepare and submit a Special Report to the NRC to explain why the non-functionality was not corrected within the time specified.	30 days

TESTING REQUIREMENTS

--NOTE--
Refer to Table 16.11-20-1 to determine which TRs apply for each Explosive Gas Monitoring Instrumentation channel.

TEST	FREQUENCY
TR 16.11-20-1 Perform CHANNEL CHECK.	24 hours
TR 16.11-20-2 Perform COT.	31 days

(continued)

TESTING REQUIREMENTS (continued)

TEST	FREQUENCY
TR 16.11-20-3 -------------------------------NOTE------------------------------- The CHANNEL CALIBRATION shall include the use of standard gas samples in accordance with the manufacturer's recommendations. In addition, a standard gas sample of nominal four volume percent hydrogen (for the hydrogen monitors) and four volume percent oxygen (for the oxygen monitors), with the balance nitrogen, shall be used in the calibration to check linearity of the analyzer. --- Perform CHANNEL CALIBRATION.	92 days

Table 16.11-20-1

Explosive Gas Monitoring Instrumentation

INSTRUMENT		REQUIRED CHANNELS	TESTING REQUIREMENTS
WASTE GAS HOLDUP SYSTEM Explosive Gas Monitoring Instrumentation			
1.	Hydrogen Monitors	1/inservice train per station	TR 16.11-20-1 TR 16.11-20-2 TR 16.11-20-3
2.	Oxygen Monitors	2/inservice train per station	TR 16.11-20-1 TR 16.11-20-2 TR 16.11-20-3

BASES

The Explosive Gas Monitoring Instrumentation is provided for monitoring and controlling the concentrations of potentially explosive gas mixtures in the WASTE GAS HOLDUP SYSTEM.

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

16.11 RADIOLOGICAL EFFLUENTS CONTROLS

16.11-21 Major Changes to Liquid, Gaseous, and Solid Radwaste Treatment Systems

COMMITMENT

Licensee-initiated major changes to the Radwaste Treatment Systems (liquid, gaseous, and solid):

1. Shall be reported to the NRC in the Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the Station Manager. Licensees may choose to submit the information called for in this SLC as part of the periodic Updated Final Safety Analysis Report update. The discussion of each change shall contain:

   a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59;

   b. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information;

   c. A detailed description of the equipment, components, and processes involved and the interfaces with other plant systems;

   d. An evaluation of the change, which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto;

   e. An evaluation of the change, which shows the expected maximum exposures to a MEMBER OF THE PUBLIC in the UNRESTRICTED AREA and to the general population that differ from those previously estimated in the license application and amendments thereto;

   f. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made;

   g. An estimate of the exposure to plant operating personnel as a result of the change; and

(continued)

COMMITMENT (continued)

h. Documentation of the fact that the change was reviewed and found acceptable by the Station Manager or the Chemistry Manager.

2. Shall become effective upon review and acceptance by a qualified individual/organization.

APPLICABILITY: At all times.

REMEDIAL ACTIONS None

TESTING REQUIREMENTS None

BASES None

REFERENCES

1. Letter from NRC to Gary R. Peterson, Duke, Issuance of Improved Technical Specifications Amendments for Catawba, September 30, 1998.

ATTACHMENT VIII

Revisions to the Radioactive Waste Process Control Program Manual

The following letter dated April 6, 2010 from David L. Vaught, Senior Engineer, Nuclear Chemistry, summarizes how the Process Control Program (PCP) manual has been revised. The updated version of the manual contains all the changes implemented during 2009 and is designated as the "2009 Update" on the enclosed Compact Disc.

April 6, 2010

RD Hart
Regulatory Compliance Manager
Catawba Regulatory Compliance

ATTENTION: MJ Sawicki

SUBJECT: Catawba Nuclear Station
2009 Annual Radioactive Effluent Release Report
Process Control Program Changes
File: GS-764.25, CN-215.06

Enclosed are CD copies of the PDF file of the Radioactive Waste Process Control Program Manual to be included in the NRC distribution of the Annual Radioactive Effluent Release Report for Catawba Nuclear Station for the period of January 1, 2009 through December 31, 2009. This version of the Manual contains all the changes implemented during 2009 and is designated as the "2009 Report Year".

The PCP Manual is revised using the review and approval process in APPENDIX F of the Manual, "Administration of the PCP and Support Documents" prior to publication on the NEDL Portal.

The attachment summarizes the scope of the changes during 2009.

The PDF files on the CDs were reviewed and verified against the control copies of the PCP Manual published on the NEDL Portal. Because of the NRC electronic record screening process, the PDF file for the NRC was revised to remove all graphics. The graphics were non technical images that did not meet the resolution requirements, e.g., the Duke Logo, NGD image and site pictures, etc.

Three CD copies containing graphics are for internal distribution and DHEC and 4 CDs without graphics are for the NRC as follows:
NRC File: NRC_2009-2010_PCP_Manual.pdf

1. NRC Document Control Desk
2. Catawba NRC Project Manager
3. Catawba Senior Resident Inspector
4. NRC Regional Administrator

Duke File: 2009-2010_Duke_Energy_PCP_Manual.pdf

5. ELL - CD
6. Master File - CD
7. DHEC primary contact Russell Keown - CD

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

Dewey P Rochester
Technical Manager II
Nuclear Chemistry

David L Vaught

by: David L Vaught
Senior Engineer
Nuclear Chemistry - Radwaste

ATTACHMENT

ATTACHMENT
Duke Energy Radioactive Waste Process Control Program Manual
Summary of 2009 Changes

A brief summary of the 2009 changes to the Duke Energy Radioactive Waste PCP Manual is found below. These are described in more detail in APPENDIX H "Revision Summary - Licensee Initiated Changes"

REVISED SECTIONS
- Appendix A "ONS PCP" Rev 14 (6/19/09)
- Appendix B "MNS PCP" Rev 18 (Issued 1/30/08) Minor Change (4/23/09)
- Appendix F "Administration of the PCP Manual and Associated Documents" Rev 2 (2/26/09)
- Appendix E "PCP Manual Review and Approval Requirements" Rev 1 (2/18/09)

DESCRIPTION OF CHANGES BY SECTION

APPENDIX A: "ONS PCP" REV 13 to Rev 14
Added two documents to APPENDIX A: "ONS PCP", one that is used in support of the process control program and one that documents the dewatering process used on filters and the filter HICs:
BASIS: G-08-01066: 2008 ONS Radiological Effluent Controls Audit 08-21(INOS)(REC)(ONS)

APPENDIX B: "MNS PCP" Rev 18 MINOR CHANGE
An editorial change was made to Appendix B of the McGuire PCP.
BASIS: M-08-07570 Documents the Recommendations for Performance Improvement identified during the 2008 MNS Radiological Effluent Controls Audit 08-22(INOS)(REC)(MNS).

APPENDIX E: "PCP Manual Review and Approval Requirements" Rev 0 to Rev 1
A table for "minor change" approvals was added that lists technical review requirements and reduces the number of management approvals required for minor changes as defined in Appendix F Section 5.1 "PCP Manual Revision and Review".

APPENDIX F: "Administration of the PCP and Support Documents" Rev 2
1. Added a minor change process to the administration guidance for the PCP Manual to more appropriately utilize management involvement..
2. Removed references to Record Retention Rule # 004928.
3. Revised Appendix F section 5.4 "Administration of Nuclear Generation Procedures for Implementing PCP Activities" to include the listing of PCP support documents that are not technical procedures that can effect station configuration but may be listed in the site PCP sections, Appendices A, B & C at the site's discretion.
4. Edited the publication processes in the Appendix F Enclosures to clarify and update to better utilize PIP and electronic administrative processes available.
5. Some editorial word changes for clarity and readability.

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 2009.

Results from sampling during 2009 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.- 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 2009 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	<	<	3
C101R	U-1 SFP	918	762 - 1090	4
C101DR	U-1 SFP	380	345 - 426	4
C102	E of U1 SFP O/S protected area	474	361 - 483	4
C103	E of U1 SFP @ Cooling Towers	651	557 - 699	4
C104	U-1 RMWST	683	587 - 789	4
C105	Engr. Bldg.	682	313 - 1040	4
C105R	Engr. Bldg.	683	397 - 886	4
C106	W Parking Lot	<	<	4
C106R	W Parking Lot	187	<- 201	4
C107	MET Tower Hill	613	492 -817	4
C200R	U-2 SFP	1041	890 - 1260	4
C200DR	U-2 SFP	558	406 - 674	4
C201R	U-2 SFP	1885	1420 - 2320	4
C201DR	U-2 SFP	545	399 - 696	4
C202	S of RMC Tent	801	561 - 981	4
C203	E of RMC tent @ Cooling Towers	685	515 - 832	4
C204	S of RMC Tent	253	< - 270	4
C205	Adm. Parking	178	< - 178	4
C205R	Adm Parking	265	< - 413	4

C206	W Parking Lot	177	< - 177	4
C207R	Mon. Tank B	741	689- 795	4
C207	Mon. Tank B	430	< - 445	4
C208	N of MTB	259	< - 294	4
C209	MTUville S of light pole 23A	335	< - 480	4
C210	N of U2 Mech Equip Bldg	245	215 - 277	3
C211	W of RL intake O/S protected area	889	538 - 1400	4
C212	Behind Aquatic Center	<	<	4
C213	Mon. Tank B	42293	27400 - 47500	4
C213R	Mon. Tank B	<	<	4
C214	N of U2 TB	1117	896 - 1270	4
C215	N of U2 TB	543	425 - 730	4
C217	N of U2 TB	741	554 - 980	4
C218	N of U2 TB	3688	738 - 6910	4
C220	N of U2 TB	10670	9980 - 11300	4
C221	N of U2 TB	304	< - 340	4
WCMW-2	WC Ponds	4643	4390 - 4840	4
WCMW-3	WC Ponds	753	556 - 1070	4
WCMW-4	WC Ponds	651	483 - 766	4
WCMW-5	WC Ponds	612	206 - 1630	4
LMW 2A	Landfill	<	<	2
LMW 3A	Landfill	<	<	2
LMW 4	Landfill	<	<	2
LMW 5S	Landfill	<	<	2
LMW 5D	Landfill	<	<	2

* Well dry, no sample available.

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.

ATTACHMENT X

Inoperable Equipment

EMF-39 and 36 non-functional for 21 hours during which 3 Gaseous Waste Releases were made

EMF-39 is the Containment (Gas) Airborne Monitor; it provides alarm and automatic termination of releases. When a unit is in Mode 1, as Unit 2 was in on February 8th and 9th, the EMF is required to meet Select Licensee Commitment (SLC) 16.11-7, Condition J. This condition further specifies that EMF 36 (Unit Vent (Gas) Airborne Monitor) be verified as functional prior to initiating a release with EMF-39 non-functional.

On February 8, 2010 at approximately 10:00 am, the 2EMF-38 sample filter paper was changed out. Then on February 9, it was identified that 2EMF-39 counts had decreased from approximately 400 counts per minute (cpm) to 150 cpm following the 2EMF-38 filter paper change the previous day. The EMF flow rate was then observed locally at the monitor and the EMF sample chamber T- handle was tightened to eliminate any potential sample chamber in-leakage from the auxiliary building. The EMF at approximately 0755 was discovered to have a flow rate of 4.31 square cubic feet per minute (SCFM). The T-handle on the sample holder was tightened about another ½ turn and the flow rate decreased to 3.71 SCFM. The 2EMF-39 returned to functional as the count rate returned to 400 cpm. The EMF's sample was diluted with auxiliary building air from 10:00 am on February 8th through 08:15 am on February 9th, meaning 2EMF39 was non-functional for a period of approximately 22.25 hours. This issue was entered into the station's corrective action program as PIP C-10-00779.

During periods when 2EMF39 is non-functional, reliance is upon 2EMF-36 for performing radioactive releases. PIP C-10-00781 was generated identifying that 2EMF-36 suffered from the same in-leakage condition as 2EMF-39 rendering it non-functional from approximately 1100 on 2-8-1010 to 1650 on 2-9-2010. A review of station logs indicated that Gaseous Waste Release (GWR) 2010-014 was performed on 02/08/2010 and 02/09/2010 at the following times when both 2EMF39 and 2EMF36 were non-functional:

Start	11:45	End	13:46	2/8/2010
Start	20:19	End	22:18	2/8/2010
Start	04:42	End	07:25	2/9/2010

The RP procedure for replacing the filter sample holder after filter change out states: "Rotate handle on front end of shield CW (clockwise) until noticeable resistance is felt". There is also a caution associated with the step stating "CAUTION: Over tightening handle will cause excess wear to "O" rings and possibly damage the detector". This subjective direction had led to the under-tightening of the handles which rendered both EMFs non-functional.

Interim actions are for Radiation Protection (RP) personnel to "smoke-test" the monitor following filter paper replacements in order to identify in-leakage. Long-term actions are to install vacuum gages on these monitors which will provide indication of properly seated o-rings. These items have been entered into the corrective action program (PIP).

0EMF50 - Waste Gas Discharge Monitor

The Waste Gas Discharge monitor is a dual range monitor that monitors the gaseous beta activity released to the environment from Waste Gas (WG) System Decay Tank C. The waste gas decay tanks contain radioactive noble gases that, after laboratory analysis, may be released through the Unit 1 unit vent on a controlled basis.

On 28 April 2009 three high-radiation trips occurred on 0EMF50 at the start of Gaseous Waste Release (GWR) 2009-030. Problem Investigation Process (PIP) C-09-02848 was initiated in response to these trips. The monitor was entered into TSAIL (C0-09-00981). The apparent cause of the higher than expected response is the presence of Carbon-14 (C14) in the Waste Gas stream.

Since 0EMF50 operates using a beta-scintillation detector, it is sensitive to both gamma and beta emitting isotopes. The Count Room is not equipped for the detection of beta-emitting isotopes (see discussion of the Radioactive Gaseous Waste Sampling and Analysis Program, below). Thus the Count Room correlates the response of the radiation monitor using only the gamma isotopes and does not account for the presence of C14 a pure beta-emitting isotope.

The Radioactive Gaseous Waste Sampling and Analysis Program (reference SLC Table 16.11-6-1) identifies that for the Waste Gas Storage Tank, the principal gamma emitters is the type of activity analyzed. The principal gamma emitters are defined as the following radionuclides: Kr-87; Kr-88; Xe-133; Xe-133m; Xe-135 and Xe-138. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Radioactive Effluent Release Report.

Since C14 does not require reporting the approach will be to raise the lower discriminator setting of the Waste Gas Discharge Monitor (0EMF50) to eliminate the contribution of C14 to the overall count rate. Performing this will alter the response of the monitor to the concentration of gamma isotopes. Therefore a primary calibration must be performed in order to correlate the response of the monitor to gamma isotopes at the higher discriminator setting.

Engineering is presently pursuing the performance of a primary calibration with the vendor (open corrective action in PIP C-09-02848). Once the new calibration report is received, the applicable procedures, design documents, and UFSAR changes can be made. These changes will include a new correlation factor (cpm/(uCi/ml)) that will not be impacted by the presence of C14.

TSAIL entry C0-09-00981 was exited on 12/29/2009 even though the effects of C14 had not been addressed. The position taken was that the monitor was responding in a conservative manner (count rate was higher than what was being estimated).

Subsequently three high-radiation trips of 0EMF50 occurred on GWR 2010-006. The monitor will remain in TSAIL until such time as the primary calibration has been completed and the respective plant documentation has been updated with the results.

0EMF57 - Waste Monitor Tank Building Liquid Discharge Monitor

The Waste Monitor Tank Building (WMTB) Liquid Discharge monitor is equipped with a dual range gamma liquid detector assembly. This assembly monitors the Liquid Waste (WL) system discharge from the WMTB to the Low-Pressure Service Water discharge. Levels exceeding the high radiation setpoint will terminate the WL release by closing the discharge isolation valve, and will activate high radiation annunciators in the WMTB and the Auxiliary Building.

On 14 September 2009 0EMF57 was entered into TSAIL (C0-09-02130) in order to perform routine maintenance (WO 01882197; Perform ACOT on 0EMF0057). This work was bundled with a channel calibration (WO 01884540). The As-Found response of the detector to the calibration sources was low. Degraded components were identified and replaced. The monitor was returned to service on 08 October 2009.

On 04 December 2009 Radiation Protection (RP) personnel identified that 0EMF57 over responded during Liquid Waste Release (LWR) 2009-078. Work Request 00995396 and Problem Investigation Process (PIP) C-09-07441 were initiated. TSAIL entry C0-09-02763 was made in response to the Work Request.

The Work Request identified foreign material in the system (high count rates during release are caused by solids in the liquid waste system). Calibration performed on the monitor determined that it was responding appropriately to the calibration sources. PIP C-09-07441 drove out the investigation of the solids being present in the radiation monitor, but not being accounted for in the Chemistry sample.

This investigation determined that Sodium Hydroxide (NaOH) had been added to a Waste Monitor Tank in the past. This resulted in material precipitation out of solution. When the tank was recirculated and sampled, the precipitate did not appear in the sample because the size of the material was larger than the restrictions in the sample line. The material collected in the chamber of the radiation monitor resulting in a higher than expected response during the release.

The TSAIL entry was cleared on 06 January 2010 once it was determined that the radiation monitor (0EMF57) was responding appropriately.

Unit 1 Unit Vent Continuous Sampler Out of Service for Approximately 10 Hours

The Unit Vent Continuous Sampler draws a sample from the Unit Vent in conjunction with the Unit Vent Radiation Monitors. The Sampler is required to be functional at all times per Selected Licensee Commitment (SLC) Table 16.11-7-1.

On November 27, 2009 at approximately 10:54 am, the Unit Vent Continuous Sample pump was discovered not operating due to a loss of power. This pump provides sampling capability as required by SLC Table 16.11-7-1 for particulate and iodine releases via the Unit Vent.

The loss of power was due to the receptacle providing power to this pump being part of an electrical tag-out that had taken place around 0350 the morning of November 27. The pump was last verified operating when sampling was performed at 0103 on November 27.

Pump was plugged into an operational outlet and continuous sampling was resumed. The maximum time that the pump was not operating is 9 hours 51 minutes.