D.M. JAMIL
Vice President

Duke Power
Catawba Nuclear Station
4800 Concord Road / CN01VP
York, SC 29745-9635

803 831 4251
803 831 3221 fax

September 8, 2005

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

Subject: Duke Energy Corporation
Catawba Nuclear Station, Units 1 and 2
Docket Numbers 50-413 and 50-414
Proposed Technical Specifications and Bases Amendment
Technical Specification and Bases 3.6.10
Annulus Ventilation System (AVS)
Technical Specification and Bases 3.6.16
Reactor Building
Technical Specification Bases 3.7.10
Control Room Area Ventilation System (CRAVS)
Technical Specification Bases 3.7.12
Auxiliary Building Filtered Ventilation Exhaust System (ABFVES)
Technical Specification Bases 3.7.13
Fuel Handling Ventilation Exhaust System (FHVES)
Technical Specification and Bases 3.9.3
Containment Penetrations
Technical Specification 5.5.11
Ventilation Filter Testing Program (VFTP)
TAC Numbers MB7014 and MB7015

References: Letters from Duke Energy Corporation to NRC, dated November 25, 2002, November 13, 2003, December 16, 2003, September 22, 2004, April 6, 2005, June 14, 2005, July 8, 2005, and August 17, 2005

The reference letters comprise Duke Energy Corporation's collective submittal to date concerning the subject license amendment request. On August 15, 2005 and September 6, 2005, the NRC provided Catawba Requests for Additional Information (RAIs) via electronic mail. The purpose of this letter is to reply to these RAIs. The format of the reply is to restate each RAI question, followed by our response. The RAI reply is contained in Attachment 1 to this letter.

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Also, on September 1, 2005, a conference call was held among various representatives of Duke Energy Corporation and the NRC. In that conference call, Duke Energy Corporation indicated that we would withdraw that portion of the original license amendment request that modified the TS 5.5.11 specified flowrate through the Auxiliary Building Filtered Ventilation Exhaust System (ABFVES) during ABFVES testing. Attachment 2 to this letter contains the revised TS markup pages to reflect the withdrawal of this portion of the license amendment request.

Pursuant to 10 CFR 50.91, a copy of this letter is being sent to the appropriate State of South Carolina official.

Inquiries on this matter should be directed to L.J. Rudy at (803) 831-3084.

Very truly yours,

D.M. Jamil

LJR/s

Attachments

D.M. Jamil affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

D.M. Jamil, Vice President

Subscribed and sworn to me: 9/8/05
Date

Connie M Breazeale
Notary Public

My commission expires: 12/19/12
Date

SEAL

xc (with attachments):

W.D. Travers
U.S. Nuclear Regulatory Commission
Regional Administrator, Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
Atlanta, GA 30303

E.F. Guthrie
Senior Resident Inspector (CNS)
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

S.E. Peters (addressee only)
NRC Project Manager (CNS)
U.S. Nuclear Regulatory Commission
Mail Stop O-8 G9
Washington, D.C. 20555-0001

H.J. Porter, Assistant Director
Division of Radioactive Waste Management
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull St.
Columbia, SC 29201

ATTACHMENT 1

REPLY TO NRC REQUEST FOR ADDITIONAL INFORMATION

Catawba Technical Specification License Amendment Request (MB7014/5)

1.) For each accident and release location, please provide tables of the c/Q values used in the dose assessments for the technical specification license amendment request (LAR) dated November 25, 2002. Sample tables are provided below. It is staff's understanding that the following applies for the dose assessments performed for this LAR.

i) Only three accidents need to be considered: a) loss of coolant accident, b) rod ejection accident, and c) locked rotor accident.

ii) Only three release locations are most limiting: a) unit vent stack, b) refueling water storage tank, and c) AFW TDP exhaust vent. You have determined that c/Q values for releases from the equipment hatch and containment purge ventilation supply vent are bounded by releases from the unit vent stack and c/Q values for releases from the steam generator power operated relief valves (PORVs) and main steam safety valves (MSSVs) are bounded by releases from the AFW TDP exhaust vent. c/Q values for releases from the fuel building, outboard steam generator doghouse, and yard near the outboard steam generator doghouse were not used because releases do not occur from these locations for the LOCA, REA, or LRA.

iii) The 0-10 hour c/Q values for the LOCA assume a release to the more contaminated intake. The 10-720 hour c/Q values for the LOCA and 0-720 hour c/Q values for the REA and LRA assume that both intakes are operating with the more contaminated intake drawing in 60 percent of the flow.

Unit Vent Stack Release Pathway			
Accidents	Time Interval (hrs)	c/Q Values (sec/m^3)	No. of Open Intakes
Loss of Coolant Accident Loss of Coolant Accident (containment bypass leakage)	0 - 2		One
	2 - 8		one
	8 - 10		one
	10 - 24		both
	24 - 96		both
	96 - 720		both

Unit Vent Stack Release Pathway			
Accidents	Time Interval (hrs)	c/Q Values (sec/m^3)	No. of Open Intakes
Rod Ejection Accident (source term release to containment and containment bypass leakage)	0 - 2		both
	2 - 8		both
	8 - 10		both
	10 - 24		both
	24 - 96		both
	96 - 720		both

Refueling Water Storage Tank Release Pathway			
Accidents	Time Interval (hrs)	c/Q Values (sec/m^3)	No. of Open Intakes
Loss of Coolant Accident (ESF backleakage to the RWST)	0 - 2		one
	2 - 8		one

	8 - 10		one
	10 - 24		both
	24 - 96		both
	96 - 720		both

Refueling Water Storage Tank Release Pathway			
Accidents	**Time Interval (hrs)**	**c/Q Values (sec/m^3)**	**No. of Open Intakes**
Rod Ejection Accident (source term release to containment and engineered safety features - ESF - intersystems leakage to RWST)	0 - 2		both
	2 - 8		both
	8 - 10		both
	10 - 24		both
	24 - 96		both
	96 - 720		both

S/G PORVs, MSSVs and AFW TDP Exhaust Vent Release Pathway			
Accidents	**Time Interval (hrs)**	**c/Q Values (sec/m^3)**	**No. of Open Intakes**
Rod Ejection Accident **Locked Rotor Accident**	0 - 2		both
	2 - 8		both
	8 - 10		both
	10 - 24		both
	24 - 96		both
	96 - 720		both

Duke Energy Corporation Response:

Values for the control room χ/Qs used in the analyses of radiological consequences of the design basis loss of coolant accident (LOCA), locked rotor accident (LRA), and

rod ejection accident (REA) are provided in Table Q1-1 below. This table is presented at the end of the responses to this question. Tables of control room χ/Q values for transport of releases from the unit vent stack and the refueling water storage tank (RWST) vent to either one or both Control Room Area Ventilation System (CRAVS) outside air intakes for 0-10 hours and to both CRAVS outside air intakes for 10-720 hours were provided in Enclosure 11 to Appendix A (Pages A69 and A70) of Attachment 3 of the LAR dated November 25, 2002 (Ref. 1). These control room χ/Q values have been rearranged to fit the format of the sample tables provided by the staff and are shown in Table Q1-1. The control room χ/Q values for releases from the AFW TDP vents and the vents for the steam generator power operated relief valves (PORVs) and main steam safety valves (MSSVs) are presented in Table Q1-1.

A specific response to each of statements (i), (ii), and (iii) is provided immediately after the presentation of that statement. The understanding is that in making each of statements (i), (ii), and (iii), the Staff requests confirmation of the validity of that statement.

i) Only three accidents need to be considered: a) loss of coolant accident, b) rod ejection accident, and c) locked rotor accident.

This statement is correct. Control room χ/Q values have been presented for current or future use in AST analyses of radiological consequences of all design basis accidents at Catawba Nuclear Station. However, AST analyses of radiological consequences of only the design basis LOCA, REA, and LRA were presented in the original LAR and the associated supplemental submittals (Ref. 1, 4, 7).

ii) Only three release locations are most limiting: a) unit vent stack, b) refueling water storage tank, and c) AFW TDP exhaust vent. You have determined that c/Q values for releases from the equipment hatch and containment purge ventilation supply vent are bounded by releases from the unit vent stack and c/Q values for releases from the steam generator power operated relief valves (PORVs) and main steam safety valves (MSSVs) are bounded by releases from the AFW TDP exhaust vent. c/Q values for releases from the fuel building, outboard steam generator doghouse, and yard near the outboard steam generator doghouse were not used because releases

do not occur from these locations for the LOCA, REA, or LRA.

This statement is correct; some clarification pertaining to the unit vent stack is added based on the original submittal (Ref. 1 Pages A-20 - A22).

- **The unit vent stack is the only release point for containment leakage to the annulus (i.e., containment leakage that is not bypass leakage).**

- **The unit vent stack is selected as the release point for all containment bypass leakage. Other release points considered were the equipment hatch (closed but assumed to leak) and the containment purge ventilation supply vent (backleakage past closed containment isolation valves). The unit vent stack was selected since its control room χ/Q values were limiting compared to those for the other two.**

- **The unit vent stack is the only release point for leakage from engineered safety features (ESF) systems in the Auxiliary Building during the recirculation phase of a design basis accident.**

iii) The 0-10 hour c/Q values for the LOCA assume a release to the more contaminated intake. The 10-720 hour c/Q values for the LOCA and 0-720 hour c/Q values for the REA and LRA assume that both intakes are operating with the more contaminated intake drawing in 60 percent of the flow.

This statement requires correction concerning the design basis LOCA as follows:

Radiation doses were calculated for four design basis LOCA scenarios. Three of these design basis LOCA scenarios included the following single failures.

- **A minimum safeguards failure.**

- **Failure of a pressure transmitter for one Annulus Ventilation System (AVS) train.**

- **Failure of cooling water flow to a heat exchanger of the Residual Heat Removal System (RHRS) or the Containment Spray System (CSS).**

In these three scenarios it was assumed that both CRAVS outside air intakes were open for the duration of the accident (0-720 hr). This has been justified previously (Ref. 1 Page A-21, Ref. 3). The last design basis LOCA scenario included an initially closed CRAVS outside air intake. For this scenario, it was assumed that only the "more contaminated" intake was open for 0-10 hours, then both intakes were open for the remaining duration of the accident (10-720 hr). Administrative controls governing the closure of a CRAVS outside air intake direct the operators to declare a CRAVS filter train inoperable when an intake is closed.

The statement made by the above pertaining to the design basis LRA and REA is correct. It is assumed in the dose analyses for these design basis accidents and for the first three above mentioned design basis LOCA scenarios that both CRAVS outside air intakes are open for 0-720 hours. In all cases in which both intakes are assumed to be open, it is assumed that the airflow imbalance in the intakes is 60/40. The intake with the higher airflow rate is assumed to be exposed to the more contaminated air. Additional discussion concerning the control room χ/Q values used in the AST analysis of the design basis LRA and REA may be found in the letter to the NRC dated April 6, 2005 (Ref. 7).

The control room χ/Q values used in the calculation of radiation doses for the design basis LOCA, LRA, and REA are provided below in Table Q1-1.

Table Q1-1
Control Room χ/Q Values Associated with the Design Basis LOCA, LRA, and REA at Catawba Nuclear Station

CNS DBA Scenarios and Release Pathways	Time Interval (Hours)	χ/Q Value (sec/m^3)	No. of open intakes
Unit Vent Stack Release Initially to One CRAVS Outside Air Intake			
CNS DB LOCA with an initially closed CRAVS outside air intake. Release pathways include containment leakage to the annulus, containment bypass leakage, and ESF leakage in the Auxiliary Building.	0 - 2	1.74×10^{-3}	One
	2 - 8	1.47×10^{-3}	One
	8 - 10	6.90×10^{-4}	One
	10 - 24	3.68×10^{-4}	Both
	24 - 96	2.67×10^{-4}	Both
	96 - 720	1.87×10^{-4}	Both
RWST Vent Release Initially to One CRAVS Outside Air Intake			
CNS DB LOCA with an initially closed CRAVS outside air intake. The release pathway consists of ESF backleakage to the RWST and releases from the RWST vent.	0 - 2	1.92×10^{-3}	One
	2 - 8	1.48×10^{-3}	One
	8 - 10	7.40×10^{-4}	One
	10 - 24	4.10×10^{-4}	Both
	24 - 96	2.86×10^{-4}	Both
	96 - 720	1.87×10^{-4}	Both
Unit Vent Stack Release to Both CRAVS Intakes			
CNS DB LOCA with either a minimum safeguards failure, an AVS pressure transmitter failure, or a RHRS or CSS Heat Exchanger failure and all CNS DB REA scenarios. Release pathways include containment leakage to the annulus, containment bypass leakage, and ESF leakage in the Auxiliary Building.	0 - 2	1.04×10^{-3}	Both
	2 - 8	8.82×10^{-4}	Both
	8 - 10	4.14×10^{-4}	Both
	10 - 24	3.68×10^{-4}	Both
	24 - 96	2.67×10^{-4}	Both
	96 - 720	1.87×10^{-4}	Both
RWST Vent Release to Both CRAVS Intakes			
CNS DB LOCA with either a minimum safeguards failure, an AVS pressure transmitter failure, or a RHRS or CSS Heat Exchanger failure and all CNS DB REA scenarios. The release pathway consists of ESF backleakage to the RWST and releases from the RWST	0 - 2	1.26×10^{-3}	Both
	2 - 8	9.78×10^{-4}	Both
	8 - 10	4.86×10^{-4}	Both
	10 - 24	4.10×10^{-4}	Both
	24 - 96	2.86×10^{-4}	Both
	96 - 720	1.87×10^{-4}	Both

vent.			
Releases from Steam Generator PORVs, MSSVs, and AFW TDP Vent to Both Intakes			
All CNS DB LRA and REA scenarios. The release pathways consist of steam generator boiloff.	0 - 2	2.27×10^{-3}	Both
	2 - 8	1.74×10^{-3}	Both
	8 - 10	1.02×10^{-3}	Both
	10 - 24	8.70×10^{-4}	Both
	24 - 96	7.14×10^{-4}	Both
	96 - 720	5.74×10^{-4}	Both

Notes on Table Q1-1

As noted above, the control room χ/Q values for releases from the unit vent stack and the RWST vent were taken from the submittal of November 25, 2002 (Ref. 1) and arranged to fit the format specified by the Staff. A few transcription errors were identified in reviewing the information in that submittal and are corrected in this table. The corrections are as follows:

1) **For releases from the unit vent stack over the time span 10-24 hours, the control room χ/Q value has been corrected from 3.74×10^{-4} to 3.68×10^{-4}.**

2) **For releases from the RWST vent and transport to both CRAVS outside air intakes over the time span 8-10 hours, the control room χ/Q value has been corrected from 5.30×10^{-4} to 4.86×10^{-4}.**

3) **For releases from the RWST vent over the time spans 24-96 hours and 96-720 hours, the control room χ/Q values have been corrected from 2.68×10^{-4} and 1.88×10^{-4} to 2.86×10^{-4} and 1.87×10^{-4}.**

All values shown in Table Q1-1 were used in the analyses of radiological consequences of the design basis LOCA, LRA, and REA that have been submitted to the Staff (Ref. 1, 4, 7).

2.) Item 24 on page A-40 of Appendix A, Attachment 3, to the November 25, 2002 submittal states the following about the assumed closure of one of the intakes for the first 10 hours of a LOCA: "The commitment is retain[ed] to account for closure of a CRAVS intake under administrative controls for maintenance activity." Please provide an estimate of the amount of time per year an intake would be closed for maintenance activity.

Duke Energy Corporation Response:

Each control room outside air intake is closed approximately two days maximum per year. The closure occurs due to actuator preventive maintenance, actuator refurbishment

(which occurs every few years), chlorine detector preventive maintenance, and control room differential pressure testing (which isolates one intake then the other).

3.) Please confirm that it is not likely that the recorded frequency of winds from the east northeast, east, and east southeast between 1994-1999 was impacted by factors such as vegetation, plant structures, tower structure, instrument location on the tower, or local topography near the meteorological measurement tower.

Duke Energy Corporation Response:

The meteorological instruments at Catawba Nuclear Station are currently located on a 60m tower atop a hill approximately 800-900 ft SW of the Unit 1 containment building. This tower became operational at 1900 hours on June 11, 1996. Prior to that, the meteorological instruments were located on the 40m microwave tower atop the same hill. Both towers have a ground grade elevation of 630 ft msl. The plant structures near the reactor units have a ground grade elevation of approximately 594 ft msl in the North to NE sectors from the meteorological tower(s).

The data from both towers has been summarized in joint frequency distributions and shows similar frequencies historically from either tower (Table Q3-1). In addition, the frequencies from the ENE, East, and ESE directions trends downward at each level, both upper (60m or 40m) and lower levels (10m) on the tower, although the upper level of either tower (60m and 40m) would extend above any structures, or local terrain, in the directions of concern. This indicates that the meteorological tower(s) are and have been representative of the regional winds and have not been impacted by any plant structures, tower structure, instrument location, or local topography.

All terrain in the ENE, East, and ESE directions decreases in elevation, moving away from the tower(s). Grass is the only vegetation on the hill in these directions. The next highest terrain, closest to the meteorological tower(s), is the cooling tower yard, generally at a ground grade around 620 ft msl. There are no trees or other obstructions between the meteorological tower(s) and the cooling towers. Beyond the cooling towers, there are local, isolated hills

scattered about, with hilltop elevations ranging from 639 to 643 ft in the East and ESE directions, and hills with top elevations between 645 and 662 ft in the ENE direction. So again, terrain and vegetation have not impacted the meteorological tower(s).

The only plant structures in the ENE, East, and ESE directions are the cooling towers. There are six cooling towers in the yard, each of height 92 ft (28 m) tall, and diameter of 272 ft. Distance between the meteorological tower(s) and the closest cooling tower is between 1013 and 1113 ft. Thus, the location of the meteorological tower(s), with respect to the cooling towers, meets the "10L" tower siting criteria of being a distance away that is 10 times the lesser of the height or projected width of an obstruction (Ref. 12). The "10L" distance would be 920 ft (e.g., 10 x 92 ft). In addition, the region of influence of an object is considered to be "5L" (e.g., 5 x 92 ft = 460 ft) for air modeling purposes. And the cavity length of each cooling tower would be "3L" (e.g., 3 x 92 ft = 276 ft). Thus, the cooling towers are far enough away from the meteorological tower(s) so that they have not and do not impact the meteorological measurements.

In conclusion, there are/were no structures, terrain, or vegetation in the ENE, East, or ESE sectors affecting the meteorological measurement of wind direction at Catawba Nuclear Station. The measurements agree locally through time and generally across the region, with a lower frequency of winds in these sectors (i.e., ENE, East, ESE).

Table Q3-1 Wind Direction Frequency

	Period	ENE	East	ESE
10m level on both towers	1994-1999	673 hours 1.3%	490 hours 1.0%	555 hours 1.1%
10m level (current tower)	1997-2000	413 hours 1.2%	253 hours 0.7%	325 hours 1.0%
10m level on both towers	1996	94 hours 1.1%	110 hours 1.3%	108 hours 1.3%
10m level (microwave tower)	1991-1995	738 hours 1.7%	429 hours 1.0%	523 hours 1.2%
60m level (current tower)	1997-2000	788 hours 2.4%	434 hours 1.3%	711 hours 2.1%
40m level (microwave tower)	1991-1995	1144 hours 2.7%	575 hours 1.3%	862 hours 2.0%

4.) Please provide the inputs and quantitative justification that the PORV and MSSV c/Q values are bounded by the AFW TDP exhaust vent release pathway c/Q values. Page 16 of Attachment 1 to the November 13, 2003 submittal provides a qualitative description that states that the PORVs and MSSVs are at an elevation approximately 15 meters above the control room air intakes. Page 17 states that the 95 percentile wind speed at the Catawba site is approximately 12 miles per hour. Is this estimate for the height of the PORVs and MSSVs? What other inputs were used, including the minimum flow velocity from the PORVs and MSSVs at any time of release?

Duke Energy Corporation Response:

On November 13, 2003, Duke Energy Corporation provided to the Staff limiting values for the control room χ/Qs to be used in analyses of all design basis accidents at Catawba Nuclear Station with the method of AST. The control room χ/Q values presented to the NRC Staff on November 13, 2003 correspond to transport of fission products from a release point to a CRAVS outside air intake (Ref. 3).

Among those control room χ/Q values provided were those from the releases from the steam generator doghouses. In particular, the steam generator doghouse release point for which control room χ/Q values were presented was the Auxiliary Feedwater (AFW) turbine driven pump (TDP) exhaust vent, located on the inboard steam generator doghouse. In the submittal of November 13, 2003, Duke Energy Corporation reported that the control room χ/Q values for the AFW TDP exhaust vent would be higher than those for releases from the steam generator power operated relief valves (PORVs) and main steam safety valves (MSSVs). Some of the MSSV and steam generator PORV vents are located on the outboard steam generator doghouses and are closer to the CRAVS outside air intakes than the AFW TDP exhaust vents. It was reported that the high vertical velocity and temperature of the steam releases "...precludes any significant contamination of the nearer CRAVS outside air intake with releases from the SG PORVs and MSSVs of the outboard [SG] doghouse." In addition, it was noted that the control room χ/Q values for releases from the steam generator PORVs and MSSVs could be divided by 5 given that the vents were vertical and uncapped

and that the velocity of the release exceeded the 95th percentile high wind speed by at least a factor of 5 (comp. Ref. 11). It was stated that "the resulting value[s are] calculated to be less than the control room χ/Q [values] for the vent of the turbine driven AFW pump." (Ref. 3)

Control room χ/Q values were calculated for releases from the Unit 2 outboard steam generator doghouse MSSV vent closest to the Unit 2 CRAVS outside air intake. Simulation of transport and dispersion along this path yielded the highest control room χ/Q values for releases from the steam generator PORVs and MSSVs. A comparison of these values to the control room χ/Q values for releases from the AFW TDP exhaust vent are shown below:

Table Q4-1
Limiting Values for Control Room χ/Qs for Releases from Steam Relief Valves

Limiting Main Steam Safety Valve Vent vs. Auxiliary Feedwater Turbine Driven Pump Exhaust Vent

Time Span (hours)	Control Room χ/Q Value (s/m^3)		
	Limiting MSSV Release Point		AFW TDP Exhaust Vent
	Full Value	Full Value / 5	
0 - 2	1.19E-02	2.38E-03	3.78E-03
2 - 8	6.75E-03	1.35E-03	2.90E-03
8 - 10	3.74E-03	7.48E-04	1.70E-03
10 - 24	3.02E-03	6.04E-04	1.45E-03
24 - 96	2.06E-03	4.13E-04	1.19E-03
96 - 720	1.21E-03	2.42E-04	9.57E-04

This comparison shows that for each time span of interest, the control room χ/Q value associated with the releases from the AFW TDP vent exceeds one-fifth of the control room χ/Q value associated with the limiting MSSV release location.

The site specific input for the calculation of control room χ/Q values for releases from the AFW TDP exhaust vent have been reported to the NRC (Ref. 3). The site specific data for the ARCON96 calculation of the control room χ/Q values for releases from the MSSVs are presented below:

Table Q4-2
Site Specific Data Associated with Control Room χ/Q Values for Releases from the MSSVs (Note 1)

Input Parameter	Value (Note 2) Limiting Unit 1 MSSV to Unit 1 CRAVS intake	Value (Note 2) Limiting Unit 2 MSSV to Unit 2 CRAVS intake
Number of meteorological data files	3	3
Height of upper wind speed instrument (meters)	Note 3	Note 3
Height of lower wind speed instrument (meters)	10	10
Units of wind speed data	Mph	Mph
Type of release	Ground	Ground
Release height (meters)	16.8	16.8
Building cross section area (square meters)	1571	1571
Effluent release velocity (meter/sec)	0	0
Vent flow rate (meters^3/sec)	0	0
Vent radius (meters)	0	0
Direction from intake to source (degrees)	119	65
Horizontal distance between source and intake (meters)	12.3	12.3
Intake height (meters)	1.4	1.4
Terrain level difference (meters)	0	0
Minimum wind speed (meters/sec)	0.5	0.5
Surface roughness length (meters)	0.1	0.1
Sector averaging constant	4.0	4.0
Wind direction width (degrees)	90	90

Notes on Table Q4-2

1) No ARCON96 calculations for releases from the steam generator PORVs were completed. Each steam line is equipped with five MSSVs and one steam generator PORV. The MSSV and steam generator PORV vents for each steam line form a column (i.e., are collinear). The vents for the MSSVs are closer to the CRAVS outside air intake while the vent for the steam generator PORV is farthest from the CRAVS outside air intake. For this reason, control room χ/Q values for releases from the MSSVs only were calculated.

2) The values presented in Table Q4-2 are associated with releases from the MSSV vent on the outboard steam generator doghouse closest to the associated CRAVS outside air intake. Each CRAVS outside air intake is located at the corner between the outboard steam generator doghouse and reactor building facing the turbine building (Ref. 3).

3) The meteorological data used in the calculations of control room χ/Q values for releases from the MSSVs and AFW TDP exhaust vent were taken in the years 1994-1998. At first, the data were collected with instruments placed on a 40 meter microwave tower located on top of a hill located 800-900 feet southwest of the Unit 1 reactor building. At 7 PM June 11, 1996, a 60 meter tower equipped with meteorological instrumentation was placed into service. From that time onward, meteorological data have been collected at that location. For each of the MSSV and AFW TDP exhaust vents modeled, two separate ARCON96 calculations were completed: one with meteorological data taken with instruments on the 40 meter tower and the second with meteorological data taken with instruments on the 60 meter tower. For each time span, the higher of the control room χ/Q values calculated was taken as the control room χ/Q value for that time span. (Cf. the response to Question 3. Cf. also Ref. 3.)

As noted in Table Q4-2, ground releases with vertical velocity set to 0 meters/sec were taken for all time spans in the ARCON96 calculations of control room χ/Q values for MSSV vent releases.

All steam generator PORV and MSSV vents are oriented vertically and uncapped (Ref. 3). The 95th percentile high wind speed at Catawba, measured 10 meters up the tower, has been measured to be 12 mph (Ref. 3). Choked (sonic flow) conditions at the seats of the steam generator PORVs and MSSVs are calculated to exist for steam pressures down to 32.4 psia. The corresponding saturation temperature is approximately 255 ^{o}F. Therefore, MSSV and steam generator PORV vent release velocities will remain above 60 mph, or five times the 95th high wind speed. Therefore, it is acceptable to divide the control room χ/Q values for releases from the steam generator PORVs and MSSVs by 5.

For the reasons noted above, the control room χ/Q values for releases from the AFW TDP exhaust vents are taken as the

control room χ/Q values for releases from the steam generator doghouses at Catawba Nuclear Station.

5.) To clarify our position on the bypass issue, the Staff needs to understand the method of degradation of the filters (e.g., is the degradation caused by poisoning or voiding). What is the history of the penetration and bypass testing at Catawba Unit 2? When the carbon filters fail the tests and you repack the filters, do you pass or fail the subsequent tests? If this information is on the docket already, please point us to the appropriate page of the submittal. If it is not, please provide the results of the testing/repacking.

Duke Energy Corporation Response:

The inability to consistently meet the 0.05% Unit 2 carbon filter in-place penetration and system bypass leakage criteria is a tracer gas desorption issue and not a bypass leakage issue (poisoning issue and not voiding issue). The in-place penetration and system bypass test failures are due to the tracer gas (refrigerant R-11) competing with water vapor and contaminants for adsorption sites on the carbon filter media. New carbon is known to adsorb R-11 quite effectively and release R-11 very slowly, while used/wet carbon tends to adsorb R-11 poorly and release its adsorbed refrigerant quite rapidly (desorption). This effect is due to adsorbed organic material and water blocking the carbon's adsorption sites. Please see Pages 4 and 7 in the Attachment of the September 22, 2004 Response to NRC Request for Additional Information (Ref. 6) for a description of this problem during the in-place carbon filter penetration and system bypass tests. References 4 and 5 as discussed in the September 22, 2004 response were informally submitted to the NRC with this response.

The six year historical Unit 1 and Unit 2 in-place penetration and system bypass test results are contained on Pages 5 through 7 of the September 22, 2004 response. For the carbon filter in-place penetration and system bypass test results greater than 0.05%, the ASTM D3803-1989 laboratory methyl iodide penetration test results clearly show that the filter efficiency is not degraded.

Additional Auxiliary Building Filtered Ventilation Exhaust System (ABFVES) carbon filter in-place testing history was provided via electronic mail in March 2005 and is attached below. Note that one ABFVES-2B and all ABFVES-1A and ABFVES-1B carbon filter media replacements were performed as scheduled predictive maintenance and were not preceded by in-place penetration and system bypass leakage test failures.

Catawba's test methodology indicates whether or not the results are due to R-11 desorption (also commonly referred to as breakthrough) or mechanical bypass leakage (e.g., voids, etc.). The test results clearly show that the test failures are due to desorption of R-11. This conclusion has been validated by industry experts at both NCS Corporation and NUCON International. Since Catawba does not have test results that indicate mechanical bypass leakage (including voids) is present, Catawba typically does not repack the carbon beds after a failed test.

After the February 2, 2005 ABFVES-2B test failure, the carbon bed and bypass damper were inspected to determine if any mechanical bypass leakage paths existed. No mechanical bypass leakage paths were identified. 110 pounds of new carbon filter media was packed into the bed and the top access plate gaskets were replaced. The subsequent carbon filter in-place tests failed with similar results.

Historically, after Catawba has replaced the carbon filter media, subsequent tests have passed the 0.05% acceptance criterion.

In summary, the carbon filter in-place test results show that the failures are due to R-11 desorption and not from any mechanical bypass leakage paths (e.g., voids, etc.). The methyl iodide laboratory penetration tests validate that the carbon filter media is not degraded.

System/Filtration Unit	Date	Carbon Leakage (%)	Comments
ABFVES-2A	10/27/99	0.0000	carbon replaced
	9/11/01	0.0960	
	9/15/01	0.0000	carbon replaced
	6/11/03	0.3314	
	6/14/03	0.0313	carbon replaced
	4/8/04	0.0324	
	2/16/05	0.1384	
	2/18/05	0.0000	carbon replaced

ABFVES-2B	2/9/98	0.0000	
	8/23/99	0.3700	
	8/25/99	0.3200	
	8/28/99	0.0000	carbon replaced
	3/7/01	0.0000	
	7/24/02	0.0000	carbon replaced
	3/22/04	0.0000	
	2/2/05	0.1003	
	2/4/05	0.1401	
	2/5/05	0.1183	emergency TS change
	3/2/05	0.1078	for 0.2% approved
ABFVES-1A	2/26/98	0.1790	
	12/2/98	0.0000	carbon replaced
	10/28/99	0.0000	
	1/17/01	0.0000	carbon replaced
	7/3/01	0.0000	
	5/7/03	0.2153	
	1/14/04	0.1252	
	3/9/05	0.1298	
ABFVES-1B	12/9/98	0.0000	carbon replaced
	5/25/00	0.0000	
	1/31/01	0.0000	carbon replaced
	7/20/01	0.0000	
	5/21/03	0.2260	
	2/1/04	0.2833	
	2/23/05	0.3632	

REFERENCES

1) G.R. Peterson (Duke Energy Corporation) to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP)," November 25, 2002.

2) Robert E. Martin (USNRC) to D.M. Jamil (Duke Energy Corporation), "Catawba Nuclear Station, Units 1 and 2

Re: Request for Additional Information (TAC Nos. MB7014 and MB7015)," September 11, 2003.

3) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," November 13, 2003.

4) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," December 16, 2003.

5) S.E. Peters (USNRC) to D.M. Jamil, "Catawba Nuclear Station, Units 1 and 2 Re: Request for Additional Information (TAC Nos. MB7014 and MB7015)," May 25, 2004.

6) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16

Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," September 22, 2004.

7) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," April 6, 2005.

8) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," June 14, 2005.

9) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical

Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," July 8, 2005.

10) D.M. Jamil to U.S. Nuclear Regulatory Commission, "Duke Energy Corporation Catawba Nuclear Station, Units 1 and 2 (Docket Nos. 50-413 and 50-414, Proposed Technical Specifications and Bases Amendment, Technical Specification and Bases 3.6.10 Annulus Ventilation System (AVS), Technical Specification and Bases 3.6.16 Reactor Building, Technical Specification Bases 3.7.10 Control Room Area Ventilation System (CRAVS), Technical Specification Bases 3.7.12 Auxiliary Building Filtered Ventilation Exhaust System (ABFVES), Technical Specification Bases 3.7.13 Fuel Handling Ventilation Exhaust System (FHVES), Technical Specification and Bases 3.9.3 Containment Penetrations, Technical Specification 5.5.11 Ventilation Filter Testing Program (VFTP), TAC Numbers MB7014 and MB7015," August 17, 2005.

11) USNRC, Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants, Regulatory Guide (R.G.) 1.194, June 2003.

12) American Nuclear Society, "Determining Meteorological Information at Nuclear Facilities," ANSI/ANS-3.11, February 16, 2000.

ATTACHMENT 2

REVISED TS MARKUP PAGES

5.5 Programs and Manuals

5.5.11 Ventilation Filter Testing Program (VFTP) (continued)

ESF Ventilation System	Penetration / and System Bypass	Flowrate
Annulus Ventilation (Unit 1)	< 1%	9000 cfm
Annulus Ventilation (Unit 2)	< 0.05%	9000 cfm
Control Room Area Ventilation	< 0.05%	6000 cfm
Aux. Bldg. Filtered Exhaust (Unit 1)	< 1%	30,000 cfm
Aux. Bldg. Filtered Exhaust (Unit 2)	< 0.05%	30,000 cfm
Containment Purge (non-ESF) (2 fans)	< 1%	25,000 cfm
Fuel Bldg. Ventilation (Unit 1)	< 1%	16,565 cfm
Fuel Bldg. Ventilation (Unit 2)	< 0.05%	16,565 cfm

b. Demonstrate for each of the ESF systems that an inplace test of the charcoal (carbon) adsorber shows the following penetration and system bypass when tested in accordance with Regulatory Guide 1.52, Revision 2, and ANSI N510-1980 at the flowrate specified below ± 10%.

ESF Ventilation System	Penetration / and System Bypass	Flowrate
Annulus Ventilation (Unit 1)	< 1%	9000 cfm
Annulus Ventilation (Unit 2)	< 0.05%	9000 cfm
Control Room Area Ventilation	< 0.05%	6000 cfm
Aux. Bldg. Filtered Exhaust (Unit 1)	< 1%	30,000 cfm
Aux. Bldg. Filtered Exhaust (Unit 2)*	< 0.05%	30,000 cfm
Containment Purge (non-ESF) (2 fans)	< 1%	25,000 cfm
Fuel Bldg. Ventilation (Unit 1)	< 1%	16,565 cfm
Fuel Bldg. Ventilation (Unit 2)	< 0.05%	16,565 cfm

c. Demonstrate for each of the ESF systems that a laboratory test of a sample of the charcoal (carbon) adsorber, when obtained as described in Regulatory Guide 1.52, Revision 2, shows the methyl iodide penetration less than the value specified below when tested in accordance with ASTM D3803-1989 at a temperature of ≤ 30°C and greater than or equal to the relative humidity specified below.

ESF Ventilation System	Penetration	RH
Annulus Ventilation	< 4%	95%
Control Room Area Ventilation	< 0.95%	95%
Aux. Bldg. Filtered Exhaust (Note 1)	< 4%	95%
Containment Purge (non-ESF)	< 6%	95%
Fuel Bldg. Ventilation	< 4%	95%

INSERT 4

*The Penetration/bypass acceptance criteria for the charcoal adsorber for the 2B ABFVES train is changed to 0.20%. This will remain in effect until the next Unit 2 refueling outage in the spring of 2006.

(continued)

INSERT 4 for TS 5.5.11c

Note 1: The Auxiliary Building Filtered Exhaust System carbon adsorber samples shall be tested at a face velocity of 48 ft/min instead of the 40 ft/min specified in ASTM D3803-1989. 48 ft/min is the nominal limiting velocity the carbon adsorber may be exposed to under post accident conditions as a result of certain postulated failures. The results from this test shall then be corrected to a 2.27 inch bed in accordance with the guidance provided in ASTM D3803-1989 prior to comparing them to the Technical Specification criteria. 2.27 inches is the actual bed depth for the filter unit.

5.5 Programs and Manuals

5.5.11 Ventilation Filter Testing Program (VFTP) (continued)

Carbon

d. Demonstrate for each of the ESF systems that the pressure drop across the combined HEPA filters, the prefilters, and the charcoal adsorbers is less than the value specified below when tested in accordance with Regulatory Guide 1.52, Revision 2, and ANSI N510-1980 at the flowrate specified below ± 10%.

ESF Ventilation System	Delta P	Flowrate
Annulus Ventilation	8.0 in wg	9000 cfm
Control Room Area Ventilation	8.0 in wg	6000 cfm
Aux. Bldg. Filtered Exhaust	8.0 in wg	30,000 cfm
Containment Purge (non-ESF) (2 fans)	8.0 in wg	25,000 cfm
Fuel Bldg. Ventilation	8,0 in wg	16,565 cfm

e. Demonstrate that the heaters for each of the ESF systems dissipate the value specified below when tested in accordance with ANSI N510-1980.

ESF Ventilation System	Wattage @ 600 vac
Annulus Ventilation	45 ± 6.7 kW
Control Room Area Ventilation	25 ± 2.5 kW
Aux. Bldg. Filtered Exhaust	40 ± 4.0 kW
Containment Purge (non-ESF)	120 ± 12.0 kW
Fuel Bldg. Ventilation	80 + 8/-17.3 kW

The provisions of SR 3.0.2 and SR 3.0.3 are applicable to the VFTP test frequencies.

5.5.12 Explosive Gas and Storage Tank Radioactivity Monitoring Program

This program provides controls for potentially explosive gas mixtures contained in the Waste Gas Holdup System, the quantity of radioactivity contained in gas storage tanks or fed into the offgas treatment system, and the quantity of radioactivity contained in unprotected outdoor liquid storage tanks. The gaseous radioactivity quantities shall be determined following the methodology in Branch Technical Position (BTP) ETSB 11-5, "Postulated Radioactive Release due to Waste Gas System Leak or Failure". The liquid radwaste quantities shall be determined in accordance with Standard Review Plan, Section 15.7.3, "Postulated Radioactive Release due to Tank Failures".

(continued)