



Kelvin Henderson
Vice-President
Catawba Nuclear Station

Duke Energy
CNO1VP | 4800 Concord Road
York, SC 29745

o: 803.701.4251
f: 803.701.3221
kelvin.henderson@duke-energy.com

CNS-16-035

June 20, 2016

10 CFR 50.90

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

Subject: Duke Energy Carolinas, LLC (Duke Energy)
Catawba Nuclear Station (CNS), Units 1 and 2
Docket Numbers 50-413 and 50-414
License Amendment Request (LAR) to Revise Technical Specifications
(TS) Section 5.5.2, "Containment Leakage Rate Testing Program" for
Permanent Extension of Type A and Type C Leak Rate Test Frequencies
Response to NRC Requests for Additional Information (RAIs)
CAC Nos. MF7265 and MF7266

- References:
1. Letter from Duke Energy to the NRC dated January 18, 2016 (ADAMS Accession No. ML16026A048).
 2. Letter from the NRC to Duke Energy dated April 28, 2016 (ADAMS Accession No. ML16111B247).

The Reference 1 letter requested an amendment to the CNS Unit 1 Renewed Facility Operating License (NPF-35) and the CNS Unit 2 Renewed Facility Operating License (NPF-52) to allow the following: 1) Increase in the existing Type A Integrated Leakage Rate Test (ILRT) program test interval from 10 years to 15 years, 2) Adopt an extension of the containment isolation valve leakage testing (Type C) frequency from the 60 months currently permitted by 10 CFR 50, Appendix J, Option B, to a 75-month frequency for Type C leakage rate testing of selected components, 3) Adopt the use of ANSI/ANS 56.8-2002, "Containment System Leakage Testing Requirements", 4) Adopt a more conservative grace interval of 9 months for Type A, Type B, and Type C leakage tests, and 5) Propose administrative changes to TS 5.5.2.

The Reference 2 letter transmitted RAIs associated with the Reference 1 amendment request.

ADD
NRR

June 20, 2016

The purpose of this letter is to respond to the Reference 2 RAIs. The enclosure to this letter provides the associated RAI responses. The format of the enclosure is to restate each RAI question, followed by its respective response. As indicated in the Reference 1 letter, Duke Energy requests approval of the proposed LAR by August 31, 2016, to be implemented within 120 days of the issuance of the license amendment.

There are no regulatory commitments being made in conjunction with this RAI response.

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

Inquiries on this matter should be directed to L.J. Rudy at (803) 701-3084.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 20, 2016.

Very truly yours,

 FOR

Kelvin Henderson
Vice President, Catawba Nuclear Station

LJR/s

Enclosure

U.S. Nuclear Regulatory Commission
Page 3
June 20, 2016

xc (with enclosure):

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

G.A. Hutto III
Senior Resident Inspector (Catawba)
U.S. Nuclear Regulatory Commission
Catawba Nuclear Station

M.D. Orenak (addressee only)
NRC Project Manager (Catawba)
U.S. Nuclear Regulatory Commission
One White Flint North, Mail Stop 8 G9A
11555 Rockville Pike
Rockville, MD 20852-2738

S.E. Jenkins
Manager
Radioactive & Infectious Waste Management
Division of Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull St.
Columbia, SC 29201

Enclosure

Responses to NRC Requests for Additional Information (RAIs)

REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST
CONTAINMENT LEAKAGE RATE TESTING PROGRAM
CATAWBA NUCLEAR STATION, UNITS 1 AND 2
DOCKET NOS. 50-413 AND 50-414

By letter dated January 18, 2016,¹ Duke Energy Carolinas, Inc., (Duke, the licensee) submitted a license amendment requested (LAR) for the Catawba Nuclear Station, Units 1 and 2 (Catawba). The LAR proposes to revise Catawba Technical Specification Section 5.5.2, "Containment Leakage Rate Testing Program", for Permanent Extension of Type A and Type C Integrated Leakage Rate Test (ILRT) Frequencies. Specifically, the LAR proposes to increase the existing Type A ILRT program test interval from 10 years to 15 years and to increase the existing Type C containment isolation valve leakage testing frequency from 60 months to 75 months. Responses to the request for additional information (RAI) questions listed below are needed to support the U.S. Nuclear Regulatory Commission (NRC) staff's continued technical review of the proposed LAR.

RAI-01: The following question refers to Section 3.7, "Evaluation of Risk Impact," of the enclosure to the licensee's LAR.

Limitation/Condition 2 in Table 3.7.1-1 on page 61 of the enclosure to the licensee's LAR, states that the increase in population dose for Catawba is 0.026 person-rem/y;² and that in Conditional Containment Failure Probability (CCFP) is 0.502%. Table 6-1 and Section 7.0 in Attachment 5, "Evaluation of Risk Significance of Permanent ILRT Extension," 54003-CALC-02, of the licensee's LAR, give corresponding values of (1) for the extension to 1 in 15 years vs. the base case of 3 in 10 years, 0.109 person-rem/yr (1.47%) and 0.888%, respectively; and (2) for the extension to 1 in 15 years vs. the extension to 1 in 10 years, 0.0453 person-rem/y (0.61%) and 0.370%, respectively. On pages 65-66 of the enclosure to licensee's LAR, the reported results are as follows: (1) large early release frequency (LERF) increase = 1.13E-7/y (Electrical Power Research Institute (EPRI) guidance) or 1.14E-7/y (including effect of steel liners) for a change in test interval from 3 in 10 years to 1 in 15 years; (2) baseline LERF = 1.12E-6/y; (3) increase in total integrated plant risk = 0.026 person-rem/y;³ and (4) increase in CCFP = 0.502% for a change in test interval from 3 in 10 years to 1 in 15 years. All these differ from the results reported in Table 6-1 and Section 7.0 in Attachment 5, 54003-CALC-02, each of which is higher there, as follows: (1) LERF increase = 4.68E-7/y from 3 in 10 years to 1 in 15 years; (2) baseline LERF = 1.67E-6/y; (3) increase in total integrated plant risk = 0.109 person-rem/yr (1.47%) from 3 in 10 years to 1 in 15 years; and (4) increase in CCFP = 0.888% from 3 in 10 years to 1 in 15 years.

¹ Agencywide Documents Access and Management System (ADAMS) Accession Number ML16026A048.

² This value is also reported on Page 69 in Section 4.3.

³ This value is also reported on Page 69 in Section 4.3.

- a. Which values are correct and are the conclusions regarding the acceptability of the ILRT extension affected?

Duke Energy Response:

The values reported in Table 6-1 and Section 7.0 in Attachment 5, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, of the LAR are the correct values. Attachment 5 underwent a final comment resolution and revision shortly before the LAR was finalized and Duke Energy failed to ensure that the values reported elsewhere in the LAR were consistent with the final revised values. The conclusions regarding the acceptability of the ILRT extension are not affected by this oversight.

RAI-02: The following questions refer to Attachment 5 to the licensee's LAR. The pages noted at the beginning of each question refer to a page in Attachment 5 to the licensee's LAR.

- a. Page 9. What is the basis for assuming no impact on the reliability of containment isolation valves to close when demanded by an isolation signal given the test interval is increased? If there is an impact, but the assumption is that it is negligible, provide justification, preferably quantitative.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- b. Page 16. Accident sequences involving large and small isolation failures, including "failure-to-seal" events for the latter, are cited as not being affected by the ILRT frequency change. Do any of these failures potentially result from components whose failure probability is test-interval dependent? If not, confirm. If so, justify the statement that there is no effect. Page 19. This assumption is repeated for Class 6 Sequences, citing dominance due to misalignment of containment isolation valves following test/maintenance.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- c. Pages 28-29. A seismic core damage frequency (CDF) of 1.65E-5/y from the Catawba Individual Plant Examination of External Events (IPEEE) is cited. More recent updates per letter dated September 2, 2010, "Safety/Risk Assessment Results for Generic Issue 199,"⁴ estimate a seismic CDF using the 2008 United States Geological Survey (USGS) Seismic Hazard Curves for Catawba of 3.7E-5/y (Table D-1, weakest link model). The Catawba analysis used a seismic CDF of 1.15E-5/y to estimate the Class 3b frequency. If the Generic Issue (GI)-199 results were used instead, the results would be as shown below.

Class	Multiplier	Failure Rate	Seismic CDF	LERF/CDF Ratio	Frequency
3b	1.00E+00	2.29E-03	3.70E-05	3.17E-02	8.22E-08
3b-10	3.33E+00	2.29E-03	3.70E-05	3.17E-02	2.74E-07
3b-15	5.00E+00	2.29E-03	3.70E-05	3.17E-02	4.11E-07

These exceed the frequencies calculated using the IPEEE by 5.67E-8/y, 1.89E-7/y and 2.83E-7/y for the three intervals, respectively. These result in the following changes to Tables 5-17 and 5-18.

Hazard	LERF			
	3 per 10	1 per 10	1 per 15	Increase
External	1.71E-07	5.70E-07	8.54E-07	6.83E-07
Internal	1.17E-07	3.90E-07	5.85E-07	4.68E-07
Combined	2.88E-07	9.60E-07	1.44E-06	1.15E-06

Hazard	LERF			
	3 per 10	1 per 10	1 per 15	Increase
External	1.73E-07	5.75E-07	8.61E-07	6.88E-07
Internal	1.17E-07	3.90E-07	5.85E-07	4.68E-07
Combined	2.90E-07	9.65E-07	1.45E-06	1.16E-06

The combined results now slightly exceed the allowed total change in LERF of 1E-6/y for "small" changes. The total LERFs for the two units using the GI-199 results are now as follows:

$$U1 = 1.67E-6/y + (3.7E-5/y \times 0.0317) + 3.41E-6/y + 6.48E-7/y + 1.15E-6/y = 8.05E-6/y$$

$$U2 = 1.67E-6/y + (3.7E-5/y \times 0.0317) + 3.48E-6/y + 6.48E-7/y + 1.16E-6/y = 8.13E-6/y$$

These remain below 1E-5/y. Page 29 of Attachment 5 to the licensee's LAR states, in part, that:

Although the total change in LERF is somewhat close to the Regulatory Guide 1.174 limit [when calculated using the Seismic CDF from the IPEEE] when external event risk is included, several conservative assumptions were made in this ILRT analysis, as discussed in Sections 4.0, 5.1.3, 5.2.1, and 5.2.4;

⁴ ADAMS Accession NO. ML100270582.

therefore the total change in LERF is considered conservative for this application.

Given the delta-LERF now slightly exceeds the RG-1.174 threshold for “small” changes, address the role of the cited conservatisms in justifying the acceptability of the LERF increases. Alternatively, provide a reassessment of the seismic risk based on the more recent USGS Seismic Hazard Curves in lieu of that used in the GI-199 reference, such that the RG-1.174 threshold is not exceeded.

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

RAI-03: The following questions refer to Attachment 1 in Attachment 5 to the licensee’s LAR. The pages noted at the beginning of each question refer to a page in Attachment 5 to the licensee’s LAR.

- a. Page 42. A fact and observation (F&O) for IE-A8 remains Open, but is determined not to impact the ILRT extension because it is “unlikely” that plant personnel interviews would uncover any new initiating events. In performing the “extensive search” for initiating events referenced in the disposition, was simulator experience or other types of experience that might be obtained only through personnel interviews considered?

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- b. Page 47. Although not cited as an F&O at the time of the 2002 Peer Review, an action required for IE-C14 remains Open due to the need to incorporate updated industry guidance on removing credit for motor operated valves (MOVs) that could impact the LERF. With External Events included, the total LERF is ~ 7E-06/y for each unit (~ 8E-06/y when the GI-199 seismic CDFs are incorporated, as per RAI 02.c). Provide a basis, preferably quantitative, to justify that the expected increase in CDF/LERF with credit for the MOVs removed is small enough that the risk metrics would remain in Region II.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- c. Pages 52, 57-60. F&Os for AS-A8, SC-A1 and SC-A2 are Dispositioned, but it appears that confirmation that the results from using a 2000F criterion for core damage vs. 2500°F via the Modular Accident Analysis Program (MAAP) have not been evaluated, at least not via MAAP itself. Other justification for not revising the criterion for Catawba (i.e., similarity to McGuire) is cited, but it is not clear that this MAAP confirmation has been performed for the McGuire Nuclear Station, Units 1 and 2, either. Explain if the MAAP confirmation has been done; if not, justify why basing Catawba success criteria on MAAP runs using 2500°F vs. 2000°F for core damage remain valid.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- d. Pages 54-55, 136-137. F&Os for AS-B1 and QU-B6 remain Open and cited the need to correct the probabilistic risk assessment (PRA) to correctly account for the dependency of the turbine-driven pump (TDP) on the steam generator tube rupture (SGTR) initiator, scheduled for incorporation into the Rev. 3 PRA. Confirm that this correction has been incorporated. If not, provide a sensitivity analysis of the effect on LERF and metrics for the ILRT extension that incorporates this correction.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- e. Pages 56 and 62-63. F&Os for AS-B5 and SC-A4 are Dispositioned. One item of concern was failure to model the degraded condition of the supply to the TDP given an SGTR. The

disposition cites an update to reflect the correct success criteria due to SGTR loss of the auxiliary feedwater (AFW) pump. Confirm that this update corrected the deficiency related to the degraded supply to the TDP given an SGTR.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- f. Pages 89-90. An F&O for SY-B14 remains Open, although concerns related to high-energy line breaks are considered resolved. However, Revision 2 of Regulatory Guide (RG)-1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities,"⁵ adds the following example to the supporting requirement (SR): "(h) harsh environments induced by containment venting, failure of the containment venting ducts, or failure of the containment boundary that may occur prior to the onset of core damage." Confirm that consideration of this additional example does not affect the conclusion that the ILRT extension is not impacted.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- g. Pages 101-102, 104-105. F&Os for HR-F2 and HR-G4 remain Open, citing the need to incorporate updated information related to operator actions into the PRA model. While citing no significant changes to the success criteria as the basis for negligible impact on the ILRT extension, it is not clear whether there are potentially other aspects of the PRA besides success criteria that might be affected by the needed incorporation of the operator actions. Explain further the conclusion of negligible impact despite the need to still incorporate these operator actions into the PRA model.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as

⁵ ADAMS Accession No. ML090410014.

selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- h. Pages 109-113. F&Os for DA-A1 and DA-A4 are Dispositioned regarding the use of outdated generic data based on “minor changes to random failure rate[s] of the components [are] not significant in the risk evaluations.” However, it is unclear whether more recent generic data sources were reviewed such that the assertion that any changes would be “minor” is justified. Pages 114-116. An F&O for DA-C1 remains Open but appears to address the concern in the previous two F&Os in that it cites use of NUREG/CR-6928, “Industry-Average Performance for Components and Initiating Events at U.S. Commercial Nuclear Power Plants,”⁶ (through 2010) as the primary data source for generic parameter estimates. If this explanation is applicable to the previous two Dispositioned F&Os, confirm. If not, explain what reviews were performed, even if the generic data were not updated, to confirm that any changes would be “minor.”

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- i. Pages 116-118. An F&O for DA-C2 remains Open, citing collection of plant-specific failure data from Maintenance Rule documents through 2005. This suggests that the current failure data used in the PRA are at least 10 years old. The basis for “negligible impact” on the ILRT extension is that “minor changes” to random failure rates are not significant. Provide a basis for concluding that the plant-specific data used in the PRA, current only through 2005, remain representative of the past 10 years of operation at Catawba such that the conclusion that any changes to failure data remain “minor” is justified. Note: Related to this F&O are three for DA-C11, C12 and C13 on Pages 122-123. While remaining Open due to the need for documentation, please justify all references to the 2005 limit date for collection of plant-specific failure data such that the similar conclusion of “negligible impact.”

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand

⁶ ADAMS Accession No. ML070650650.

margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- j. Page 128. Although not cited as an F&O at the time of the 2002 Peer Review, an action, cited as “documentation,” required for DA-D5 remains Open. However, it is unclear that this is only a documentation issue, as it discusses the use of a “modified” multiple Greek letter (MGL) method for common-cause failure (CCF) analysis. It is unclear how far from the standard MGL method this “modification” diverges or whether it is adequately representative. Non-mandatory Appendix 1-A of ASME/ANS RA-Sa-2009, “Addenda to ASME/ANS RA-S-2008: Standard for Level 1/LERF PRA for Nuclear Power Plant Applications,” ASME 2009, discusses PRA Maintenance and Upgrade and cites “new treatment of common cause failure” as a potential type of PRA Upgrade. Explain whether or not this “modified” MGL method constitutes a PRA Upgrade and why. If it constitutes an Upgrade, provide a sensitivity evaluation of its effect until a Focused-Scope Peer Review can be completed.

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- k. Pages 128-129. Although not cited as an F&O at the time of the 2002 Peer Review, an action cited for DA-D6 remains Open. Although it is assumed that any effect on CCF rates would be minor, thereby negligibly impacting the ILRT extension, this needs to be confirmed by comparing the component boundaries used in the CCF generic estimates with those assumed for the PRA. Confirm that the component boundaries assumed for the PRA assure that the generic CCF estimates are adequate.

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- l. Pages 138-139. An F&O for QU-D4 remains Open citing the need to compare the Catawba PRA results with those from similar plants. Provide assurance that, at least for those results which are relevant to the ILRT extension, the Catawba results are consistent with similar plants or, where not, the difference can be adequately explained.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- m. Pages 149-157. Although considered Dispositioned, numerous F&Os for IFPP-A2 through IFEV-B1 justify an insignificant impact on the ILRT extension due to "internal flooding represent[ing] such a small portion of the internal events risk." However, Tables 5-1 and 5-2 in the enclosure to the licensee's LAR indicate that internal flooding contributes $(3.92E-5)/(5.27E-5) = 0.74$ to total internal CDF and $(5.58E-7)/(1.67E-6) = 0.33$ to total internal LERF, i.e., it is the dominant contributor in each case. If, as cited, internal flooding resolutions do not significantly impact the ILRT extension, provide appropriate justifications for all these F&Os being Dispositioned.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- n. Pages 160-161. An F&O for FSS-A2 is Dispositioned, but it is unclear whether the clarification from Revision 2 of RG-1.200 was addressed. This clarification adds "including spurious operation" to the requirement to specify failure modes for equipment and cables in the target sets. Confirm that this additional failure mode was addressed.

Duke Energy Response:

Refer to attached calculation, "Evaluation of Risk Significance of Permanent ILRT Extension", 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

- o. Pages 162-163. An F&O for HRA-D2 (referencing HR-H2) is Dispositioned based on the operator action in question not being a "recovery action" in the context of National Fire Protection Association (NFPA) Standard 805. The NFPA-805 definition of a "recovery action" is not relevant when dispositioning "recovery actions" in the context of PRA/human

reliability analysis (HRA). If this action constitutes a “recovery” in the context of PRA/HRA, typically post-processed after cut-set generation, then the requirements of HR-H2 apply. Given this action has been credited, indicate (1) if it is proceduralized and trained on, as required for crediting under HR-H2; (2) if not, provide the basis for crediting it; or (3) why, despite its meeting neither (1) nor (2), it does not pose more than a negligible impact on the ILRT extension.

Duke Energy Response:

Refer to attached calculation, “Evaluation of Risk Significance of Permanent ILRT Extension”, 54003-CALC-02, Revision 3. The entire calculation was submitted as Revision 2 in the Reference 1 LAR. This entire calculation is being resubmitted, as selected information used to support the responses to questions RAI-02 and RAI-03 has changed. The changed information is designated by revision bars in the right hand margin of the affected pages. The actual responses to questions RAI-02 and RAI-03 are contained in Attachment 2 of Revision 3 of this calculation.

RAI-04: The following questions refer to Section 3.4 of the Enclosure to the licensee’s LAR.

- a. Section 3.4.1 of the licensee’s LAR discusses the observations made in IN 2010–12, “Containment Liner Corrosion,”⁷ and Technical Letter Report on “Containment Liner Corrosion Operating Experience Summary,”⁸ Revision 1. Specifically, the licensee discusses actions performed at Catawba in responses to these documents, including an examination of coating failures on the exterior faces of the steel containment vessel (SCV) of both units in 1990. All identified failed coatings were cleaned and reapplied. Specifically, the licensee stated that concrete interface was repaired and removed and moisture barrier caulking was replaced.

Please confirm, based on recent inspection findings of the SCV, that the previously identified problems have not recurred, or if they have, they are under active monitoring and the degradation/corrosion is under control by measures adopted.

Duke Energy Response:

Currently, the Unit 1 and Unit 2 steel containment vessel (SCV) material condition is acceptable. No previously identified degradation/corrosion of the Unit 1 and Unit 2 SCV has reoccurred. Catawba will continue to inspect the Unit 1 and Unit 2 SCV commensurate with the Catawba Containment Inspection Program. Any relevant conditions found during future inspections will be evaluated through the Corrective Action Process.

Unit 1:

The existing coatings and moisture barriers located at the exterior faces of the Unit 1 SCV were removed and base metal cleaned and inspected via Work Request #001719 (Spring 1990). Additionally under Work Request #001719, new coatings were reapplied,

⁷ ADAMS Accession No. ML100640449.

⁸ ADAMS Accession No. ML112070867.

the concrete interface was repaired, and the removed moisture barrier caulking was replaced.

During the most recent Unit 1 Containment General Visual Examination (December 2015, 1EOC22), the conditions were determined acceptable by the qualified inspector at the referenced locations.

Unit 2:

The existing coatings and moisture barriers located at the exterior faces of the Unit 2 SCV were removed and base metal cleaned and inspected via Work Request #002557 (Summer 1990). Additionally under Work Request #002557, new coatings were reapplied, the concrete interface was repaired, and the removed moisture barrier caulking was replaced.

The complete Unit 2 Containment General Visual Examination was performed using two separate examination dates (October 2013 - 2EOC19 and May 16, 2014). Under the aforementioned examinations, the conditions were determined acceptable by the qualified inspector at the referenced locations.

- b. Section 3.4.2 of the licensee's LAR discusses the inspection of containment leak chase channel systems at Catawba. In its LAR, the licensee proposes to inspect these leak chase channels by performing a VT-3 visual examination in accordance with procedure "Visual Examination (VT-1 and VT-3) of Metal and Concrete Containment," stating, in part, that these examinations may be scheduled and performed as follows:

100% of the containment interior concrete floors shall be examined during each inspection interval. Approximately 1/3 of the floor surface areas shall be examined during each inspection period to determine the condition of all leak chase channel bronze caps and test channel drain plugs installed in the floor within the examination area.

Please provide additional information to justify why inspection of 100% of the leak chase test channels each interval is acceptable to comply with the containment inservice inspection requirements of 10 CFR 50.55a(g)(4) as opposed to the 100% visual inspection each period as discussed in Information Notice (IN) 2014-07, "Degradation of Leak-Chase Channel Systems for Floor Welds of Metal Containment Shell and Concrete Containment Metallic Liner."⁹ Include a summary of the results of any inspections completed to date.

Duke Energy Response:

Catawba will revise its inspection program to require 100% examination of these items every inspection period in accordance with 10 CFR 50.55a(g)(4), as clarified by Information Notice 2014-07.

⁹ ADAMS Accession No. ML14070A114.

Unit 1:

Catawba recently performed a VT-3 examination on approximately one-third of the Unit 1 leak chase test channels during 1EOC22 (December 2015) under Work Order #2208010-01. All visible leak chase test channel covers were found intact and acceptable in accordance with the acceptance criteria of inspection procedure, NDE-67. The remaining Unit 1 leak chase test channels will be inspected in 1EOC23 (last outage of the first inspection period - April 2017).

Unit 2:

Currently, Catawba has not performed a VT-3 examination of the Unit 2 leak chase test channels. Inspection of 100% of the Unit 2 leak chase test channels will be scheduled for the first inspection period. The first inspection period of the third containment ISI interval contains two outages (2EOC21 - September 2016 and 2EOC22 - March 2018).

- c. Section 3.4.4 of the licensee's LAR discusses Problem Identification Reports from the results of recent containment inspections at Catawba. Based on the description provided, there are several instances where the same or similar problems were identified in two consecutive inspections, once in 2010 for 2EOC18 and another in 2013 for 2EOC20. For example,
- i. CNS evaluation in Indication Number 2-SCVI-0006.2010.1 and Indication Number 2-SCVI-0006.2013.1.
 - ii. CNS evaluation in Indication Number 2-SCVI-0007.2010.1 and Indication Number 2-SCVI-0007.2013.1.
 - iii. CNS evaluation in Indication Number 2-SCVI-0008.2010.1 and Indication Number 2-SCVI-0008.2013.1.
 - iv. CNS evaluation in Indication Number 2-SCVI-0009.2010.1 and Indication Number 2-SCVI-0009.2013.1.

It is not clear from the description whether the problem(s) identified during the first inspection in 2010 were or were not completely rectified at the time of closing Work Order #00986330-01 or if the problem(s) recurred later. Please provide a discussion of whether or not the problem(s) were the original ones or recurred subsequent to the closure of the work order. The information should include the bases for concluding the work was complete under Work Order #00986330-01 in 2010 for 2EOC18. Additionally, please indicate when Work Order #02036636 was opened as the LAR states that this work order was still open during 2013 inspection for 2EOC20.

Duke Energy Response:

Catawba Unit 2 Outage Clarification Dates:

- 2EOC17 was in Fall 2010. (Containment General Visual Exam performed)**
- 2EOC18 was in Spring 2012. (No Containment General Visual Exam performed)**
- 2EOC19 was in Fall 2013. (Containment General Visual Exam performed)**
- 2EOC20 was in Spring 2015. (No Containment General Visual Exam performed)**

The severity of the items (i-iv) noted above are non-relevant conditions relative to the containment structural integrity inspection results. The examination records from 2010

and 2013 for items (i-iv) document the conditions which were determined acceptable by the qualified inspector at the referenced locations.

The bases for concluding the non-relevant repair work was completed under Work Order #00986330-01 was based on the detailed instructions which included items (i-iv) and other non-relevant conditions. However, in reviewing the work order completion comments, items (i-iv) were not specifically documented as being completed.

During the 2EOC19 (2013) Containment General Visual Examination, the same non-relevant conditions (items i-iv) were again noted by the qualified inspector. Work Order #02036636 was written to address the non-relevant conditions identified which were again determined acceptable. The accessible vertical moisture barriers in the vertical wall joints of items (i-iv) were removed and new coatings were reapplied to the SCV under Work Order #02036636 during 2EOC19 (October 2013) and 2EOC20 (March 2015). All field work associated with Work Order #02036636 was completed by March 3, 2015.

The areas identified in items (i-iv) will continue to be monitored during future Containment General Visual Examinations commensurate with the Catawba Containment Inspection Program. The next Unit 2 Containment General Visual Examination is scheduled for 2EOC21 (September 2016).