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November 5, 2002

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Subject: Comments on the U.S.N.R.C Safety Evaluation with Open Items
Related to the License Renewal of McGuire Nuclear Station, Units 1 & 2 and
Catawba Nuclear Station, Units 1 & 2

Docket Nos. 50-369, 50-370, 50-413 and 50-414

By letter dated June 13, 2001, Duke Energy Corporation (Duke) submitted an Application to Renew the Facility Operating Licenses of McGuire Nuclear Station and Catawba Nuclear Station (Application). The Application contains the technical information required by 10 CFR Part 54 and the Supplement to the Final Safety Analysis Report (FSAR) for each station as required by §54.21(d). In a letter dated August 14, 2002, the NRC staff provided Duke a copy of the "Safety Evaluation Report with Open Items Related to the License Renewal of McGuire Nuclear Station, Units 1 and 2, Catawba Nuclear Station, Units 1 and 2." This staff letter requested that Duke review the enclosed safety evaluation report (SER), verify its accuracy, provide comments, and respond to the open and confirmatory items by October 27, 2002. (By letter dated August 29, 2002, the staff stated that this date is not a business day and revised the response due date to October 28, 2002.)

In a letter dated October 2, 2002, Duke provided an interim response that was intended to expedite the staff's completion of its review and to support the staff in its presentation to the Advisory Committee on Reactor Safeguards that occurred on October 8, 2002. By letter dated October 28, 2002, Duke provided its responses to the remaining SER open items and provided revised UFSAR Supplements for each station. Comments on the SER were provided informally to the license renewal project manager.

The staff, in its letter dated October 19, 2002, provided requests for additional information on two topics and requested that Duke review an excerpt from the SER for the Waste Gas System Inspection. Attachment 1 provides responses to the two requests for additional information. One of these responses commits to revise the summary description of the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program* contained in each station's UFSAR Supplement. This committed change will be included in Revision 2 of each station's UFSAR Supplement which will be provided at a later date following completion of the staff review.

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Duke comments on the excerpt from the SER for the Waste Gas System Inspection were provided to the license renewal project manager along with its comments on the entire SER.

If there are any questions, please contact Bob Gill at (704) 382-3339.

Very truly yours,



M. S. Tuckman

Attachments:

Affidavit

M. S. Tuckman, being duly sworn, states that he is Executive Vice President, Nuclear Generation Department, Duke Energy Corporation; that he is authorized on the part of said Corporation to sign and file with the U. S. Nuclear Regulatory Commission the attached response to the Safety Evaluation with Open Items Related to the License Renewal of McGuire Nuclear Station, Units 1 & 2 and Catawba Nuclear Station, Units 1 & 2 , Docket Nos. 50-369, 50-370, 50-413 and 50-414, and that all the statements and matters set forth herein are true and correct to the best of his knowledge and belief. To the extent that these statements are not based on his personal knowledge, they are based on information provided by Duke employees and/or consultants. Such information has been reviewed in accordance with Duke Energy Corporation practice and is believed to be reliable.

M. S. Tuckman

M. S. Tuckman, Executive Vice President
Duke Energy Corporation

Subscribed and sworn to before me this 5TH day of November 2002.

Mary P. Nehus

Notary Public

My Commission Expires:

JAN 22, 2006



xc: (w/ Attachment)

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Attachment 1

Response to McGuire Units 1 & 2 and Catawba Units 1 & 2 Safety Evaluation Report with Open Items

Request for Additional Information
NRC letter dated October 19, 2002

Inaccessible Non-EQ Medium-Voltage Cable Aging Management Program

Title 10 of the *Code of Federal Regulations* (10 CFR) Part 54.21(a)(3) requires that, for each structure and component within the scope of license renewal and subject to an aging management review, the applicant demonstrate that the effects of aging will be adequately managed so that the intended function(s) will be maintained consistent with current licensing basis (CLB) for the period of extended operation. The staff has reviewed the Inaccessible Non-EQ Medium-Voltage Cable Aging Management Program in the McGuire and Catawba license renewal application (LRA) as well as the proposed revision to the aging manage program (AMP). The AMP states, in part, that medium voltage cables within the scope of the Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program are tested to provide indication of the condition of the conductor insulation. The specific type of test to be performed will be determined before each test during the period of extended operation.

The staff is unable to determine if the test to be performed will be an appropriate test that has been proven to accurately assess the cable condition with regard to water treeing. The staff requests that the applicant modify this AMP to indicate that the test to be performed will be a proven test for detecting deterioration of insulation system due to wetting. The staff requests this modification to the AMP so that it can make a reasonable assurance finding that the test will be capable of detecting insulation degradation and that the effects of aging on inaccessible non-EQ medium voltage cables will be adequately managed so that the intended function will be maintained in accordance with the requirement of 10 CFR 54.21(a)(3). The staff believes that the requested modification still provides the applicant with maximum flexibility to choose an appropriate test method that accurately assesses the cable condition at the time of the test.

Duke Response

The SER issued August 14, 2002 provided the staff's evaluation of the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program*. As stated on page 3-409:

The staff finds the approach acceptable because the in-scope, medium-voltage cables exposed to significant moisture and significant voltage are tested to provide an indication of the condition of the conductor insulation.

Later, the SER provides the staff conclusion for the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program* on page 3-411:

On the basis of the staff's evaluation described above, the staff finds that there is reasonable assurance that the effects of aging on inaccessible non-EQ medium voltage cables will be adequately managed so that the intended functions will be maintained

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consistent with the applicant's CLB for the period of extended operation in accordance with the requirements of 10 CFR 54.21(a)(3).

In the above request for additional information, the staff now requests that

“the applicant modify this AMP to indicate that the test to be performed will be a proven test for detecting deterioration of insulation system due to wetting. The staff requests this modification to the AMP so that it can make a reasonable assurance finding that the test will be capable of detecting insulation degradation and that the effects of aging on inaccessible non-EQ medium voltage cables will be adequately managed so that the intended function will be maintained in accordance with the requirement of 10 CFR 54.21(a)(3).”

Duke continues to believe that in-situ, non-destructive, electrical methods are not currently available to effectively detect aging degradation of inaccessible or direct buried cable insulation due to wetting.

Nevertheless, and as a practical matter in order to support the timely resolution of this item and the completion of the license renewal review on schedule, Duke commits to revise the **Parameters Monitored or Inspected** attribute of the summary descriptions of the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program* in the UFSAR Supplement of each station to read as follows:

Parameters Monitored or Inspected – Medium-voltage cables within the scope of the *Inaccessible Non-EQ Medium-Voltage Cables Aging Management Program* are tested to provide an indication of the condition of the conductor insulation. The specific type of test performed will be determined before each test and will be a proven test for providing an indication of the condition of the conductor insulation related to aging effects caused by moisture and voltage stress. Each test performed for a cable may be a different type of test.

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Note: NRC letter dated August 14, 2002 contained New Open Item 3.3.6.2.1-1 and requested a response from Duke by October 28, 2002. Subsequently, the staff in a letter dated October 19, 2002 requested additional information on the same topic of condenser circulating water system expansion joints at Catawba. For the convenience of the reader, both discussions are provided below. The August 14, 2002 item is provided first followed by the October 19, 2002 request.

New Open Item 3.3.6.2.1-1 In its response to RAI 2.3.3.6-6, the applicant provided the AMR results for condenser circulating water system expansion joints at Catawba. The material for these expansion joints was specified as synthetic rubber coated with chlorobutyl rubber; the environment was specified as the yard. The applicant did not identify any aging effects; nor did the applicant specify any AMP for these components. However, the staff concluded that exposure of these expansion joints to ultraviolet (UV) rays could cause degradation over time. Because the applicant's description of the yard environment in the LRA did not address sun exposure, the staff was unable to verify that there are no applicable aging effects for these components. The applicant needs to submit a more detailed description of the yard environment for the condenser circulating water system expansion joints to address UV exposure.

Open Item 3.3.6.2.1-1 (aging effects for condenser circulating water system expansion joint) Open item 3.3.6.2.1-1 reflects the staff's concern that the expansion joint could be degraded by UV exposure. The applicant provided information during a meeting with the staff on September 18, 2002, and stated that the item is subject to very limited UV, and that degradation from exposure to UV is very unlikely. However, the staff recognizes that aging effects may be applicable as a function of exposure to the yard environment over time. Therefore, the staff requests additional information about the composition of the expansion joint.

In its April 15, 2002, response to RAI 2.3.3.6-6, the applicant stated that the expansion joint is synthetic rubber and, more specifically, a woven polyester and/or nylon fabric coated with chlorobutyl rubber. The staff is concerned that, if this material degrades with time, it will lose resilience, will harden, and subsequently will be subject to wear and vibration damage.

The aging of condenser expansion joints is normally monitored by durometer readings obtained during inspections of the inside surface of the condenser seals during refueling outages. This test measures characteristics of the synthetic rubber material to identify reduction in resiliency. Durometer readings are trended over time, and the condenser seals are replaced when a minimum performance threshold is reached. Industry operating experience indicates that a typical main condenser seal, which is constructed of the same or a similar woven synthetic fabric with a rubber coating, may have a service life of 20 to 30 years.

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Since the materials and environments associated with the expansion joint addressed by open item 3.3.6.2.1-1 are similar to those of the main condenser expansion joints, they are subject to degradation over time, irrespective of the extent of UV exposure. Therefore, the staff requests the applicant provide technical basis to justify a service life of up to 60 years without aging management or replacement.

Duke Response

The Duke response to this item is provided in two parts. First, Duke will provide some background discussion of Duke's confusion with the contents of the staff letter dated October 19, 2002 and how this confusion was resolved. Second, Duke will provide its technical response to this item.

Duke reviewed the request contained in the staff letter dated October 19, 2002. The third paragraph within this letter was confusing to Duke. This third paragraph reads as follows:

The aging of **condenser expansion joints** is normally monitored by durometer readings obtained during inspections of the inside surface of the **condenser seals** during refueling outages. This test measures characteristics of the synthetic rubber material to identify reduction in resiliency. Durometer readings are trended over time, and the **condenser seals** are replaced when a minimum performance threshold is reached. Industry operating experience indicates that a typical **main condenser seal**, which is constructed of the same or a similar woven synthetic fabric with a rubber coating, may have a service life of 20 to 30 years.

By electronic communication dated October 23, 2002 (resent on October 24, 2002), Duke requested clarification from the staff as follows:

Within this one paragraph, the staff names three components: condenser expansion joints, condenser seals, and main condenser seal. The use of three different component names in one paragraph is confusing. Duke assumes that the specific component type that the staff is referring to throughout this paragraph is the condenser seals that are located between the low pressure main turbines and the condenser hotwell. However, we are not sure. Please have the staff verify Duke's assumption. If Duke's assumption is incorrect, please advise.

It would also be helpful for the staff to confirm that the interior environment associated with the condenser seals described above is saturated steam with a temperature of greater than 200F and at some pressure greater than ambient. If this is not correct then please identify the specific interior environment for the specific component discussed in the above paragraph. It would also be helpful to Duke for the staff to describe the exterior environment of these components. The

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associated environmental conditions (both internal and external) materially affect the aging of the component.

On October 31, 2002, a telephone conference call was held between the staff and Duke personnel. The staff reviewer requested that Duke describe the different environmental conditions to which the condenser seals and condenser circulating water system expansion joints are exposed and thus demonstrate that there are no aging effects that would result in loss of function of the condenser circulating water system expansion joints. This conference call resolved the confusion that Duke had when reading the staff letter. Accordingly, Duke provides the following technical response to Open Item 3.3.6.2.1-1.

Please note that the condenser circulating water system expansion joints are only located at Catawba Nuclear Station and that the main condenser seals (referred to in the staff letter) are not within the scope of license renewal at either McGuire or Catawba.

The main condenser seals and the condenser circulating water system expansion joints are constructed of similar materials but experience very different internal and external environments. The main condenser seals are located in the neck of the main condenser just below the exhaust of the low pressure turbines and are not within the scope of license renewal. The internal surfaces of the condenser seals are exposed to high velocity water and steam with temperatures over 100 °F. The external surfaces are exposed to the ambient conditions of the Turbine Building that routinely exceeds 100 °F. Finally, the main condenser seals receive seal water from the discharge of the condenser hotwell pumps which is over 100 °F at a pressure of 200 - 300 pounds per square inch (psi). As a result, the main condenser seals are exposed to high temperature and high pressure conditions which would lead to the aging that is of concern to the staff. Duke operating experience shows that main condenser seals will not last 60 years, as several have been replaced at our plants.

The condenser circulating water system expansion joints are woven polyester and/or nylon fabric coated with chlorobutyl rubber. The condenser circulating water system expansion joints are located in the yard near the bottom of open pits adjacent to the Catawba Turbine Buildings. Externally, the condenser circulating water system expansion joints are exposed to the ambient conditions of the surrounding yard environment. The external surfaces are exposed to natural precipitation, limited amounts of ultraviolet radiation, and temperatures that rarely exceed 100 °F. As a result of being located near the bottom of the open pits, the condenser circulating water system expansion joints are exposed to limited amounts of ultraviolet radiation. In addition, butyl rubbers, which included chlorobutyl rubber, are essentially immune to damage from ultraviolet radiation and have a continuous temperature rating of 150 °F [Reference: *Engineering Materials Handbook*, McGraw-Hill, Inc., New York, New York, 1958].

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The internal environment is raw water around 100°F with an internal pressure of about 100 psi. As a result, the Catawba condenser circulating water system expansion joints are exposed to low temperature and pressure conditions, both internally and externally, which do not lead to any aging effects that would result in loss of function.

Therefore, Duke concluded there are no aging effects for the Catawba condenser circulating water system expansion joints that require management for the period of extended operation. This conclusion is supported by a recent inspections of the Oconee condenser circulating water system expansion joints and the Catawba expansion joints that found them to be in excellent condition with no signs of aging after approximately 30 years and 20 years of service, respectively.