

October 19, 2002

Mr. M. S. Tuckman  
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SUBJECT: REVISED EXCERPT FROM SAFETY EVALUATION REPORT WITH OPEN ITEMS AND REQUEST FOR ADDITIONAL INFORMATION TO COMPLETE THE STAFF'S REVIEW OF THE MCGUIRE AND CATAWBA LICENSE RENEWAL APPLICATION

Dear Mr. Tuckman:

During its preparation for the presentation to the Advisory Committee for Reactor Safeguards (ACRS), the staff found that the safety evaluation report (SER) with open items contained an earlier version of the staff's evaluation of the Waste Gas System Inspection Program, documented in Section 3.3.38.2.2 of the SER. The staff determined that this version had been inadvertently included in the document that was issued August 14, 2002. The correct version is enclosed for your review and comment. The staff also identified two areas of the SER that require additional review.

Specifically, the staff is seeking confirmation that the cable test described in the Inaccessible Non-EQ Medium-Voltage Cable Aging Management Program will be capable of detecting degradation. Additionally, the staff is concerned that the condenser circulating water system synthetic rubber expansion joint (brought into the scope of license renewal as a result of a staff request for additional information, but for which no aging effects were specified) may be subject to aging effects during the period of extended operation. These issues are discussed in detail below.

#### 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 management 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.

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.

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.

So that the NRC staff can effectively complete its review of your LRA, the NRC requests that you provide this information by November 6, 2002.

M. S. Tuckman

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If you have any questions regarding this matter, please call me at 301-415-1868.

Sincerely,

**/RA**

Rani Franovich, Project Manager  
License Renewal Section  
License Renewal and Environmental Impacts Program  
Division of Regulatory Improvement Programs  
Office of Nuclear Reactor Regulation

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

Enclosure: Waste Gas System Inspection Program

cc w/encl: See next page

M. S. Tuckman

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**/RA**

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## Waste Gas System Inspection Program

The applicant described its Waste Gas System Inspection Program in Section B.3.36 of the LRA. The applicant credits this program with managing the potential aging of waste gas system structures and components that are within the scope of license renewal. The inspection activity is a one-time volumetric or visual inspection to monitor for loss of material and cracking. The staff reviewed Section B.3.36 of the LRA to determine whether the applicant has demonstrated that the waste gas system inspection activities will adequately manage the applicable effects of aging during the period of extended operation as required by 10 CFR 54.21(a)(3).

In Section B.3.36 of the LRA, the applicant stated that the purpose of the Waste Gas System Inspection Program is to provide reasonable assurance that the effects of aging will be managed so that the intended function(s) of equipment and components within the scope of 10 CFR Part 54 will be maintained consistent with the CLB for the period of extended operation. This program is credited with managing any loss of material and cracking of system components within the scope of license renewal that are exposed to unmonitored treated water and gas environments. The applicant described unmonitored treated water as condensation of water vapor in the waste gas stream and effluent from the recombiners and separators. The applicant described the gas environment as a combination of nitrogen, hydrogen, oxygen, and fission product gases. The applicant stated that there is uncertainty as to whether exposure to these environments could cause cracking and/or loss of material for the waste gas system components such that they would lose their pressure boundary intended function.

The waste gas system inspection activities use a combination of volumetric and/or visual examination of selected carbon steel, stainless steel, and brass components in the system. This is a one-time inspection activity. The applicant stated that, should industry experience or evaluation of the inspection findings indicate that continuation of the aging effects will cause a loss of intended function(s), additional inspection will be performed, and/or corrective action will be taken.

The applicant concluded that implementation of this program will adequately verify that the components will continue to perform their intended function(s) for the period of extended operation.

The staff's evaluation of the Waste Gas System Inspection Program focused on how the program manages aging effects through the effective incorporation of the following 10 elements: program scope, preventive actions, parameters monitored or inspected, detection of aging effects, monitoring and trending, acceptance criteria, corrective actions, confirmation process, administrative controls, and operating experience. The LRA indicates that the corrective actions and confirmation process are implemented through the site corrective actions process, while the administrative controls are implemented through the site procedures. The staff's evaluation of the corrective actions, confirmation process, and administrative controls is provided in Section 3.0.4 of this SER. The remaining seven elements are discussed below.

Enclosure

[Scope of Program] Section B.3.36 of the LRA states that the scope of the waste gas system inspection activities includes the carbon steel, stainless steel, and brass materials that are exposed to unmonitored treated water environments, and carbon steel materials that are exposed to gas environments that are within the license renewal boundaries for the waste gas systems at Catawba and McGuire. The scope covers the components that rely on the waste gas system inspection activities for aging management; therefore, this is acceptable to the staff.

[Preventative or Mitigative Actions] There are no preventative actions taken as part of this program, and the staff did not identify the need for any preventative actions.

[Parameters Monitored or Inspected] Section B.3.36 of the LRA identifies loss of material and cracking as the parameters that can be detected by volumetric and/or visual inspection. Because these inspection techniques can be used to identify the degraded conditions noted by the applicant, such inspections of the waste gas system are acceptable to the staff.

[Detection of Aging Effects] Section B.3.36 of the LRA states that volumetric and/or visual inspection will detect loss of material and cracking of the components. Visual exams will be used in lieu of volumetric exams if access to the internal surfaces becomes available. The use of volumetric and/or visual inspection is considered by the staff to be a reasonable means of detecting these aging effects and is consistent with NRC and industry guidance. Therefore, the staff finds this acceptable.

[Monitoring and Trending] Section B.3.36 of the LRA states that the one-time inspections will be performed as follows:

- (1) For the brass seal water control valves on the waste gas compressors at Catawba exposed to unmonitored treated water, an inspection will be performed on one of the two seal water control valves. The results of this inspection will be applied to the other brass seal water control valve.
- (2) For carbon steel components exposed to unmonitored treated water environments at each site, inspections will be performed on the lower portions of decay tanks and associated drain lines where condensate is likely to accumulate. One of eight possible locations at each site will be examined. The results of this inspection will be applied to the remainder of the waste gas system carbon steel components within the scope of license renewal exposed to unmonitored treated water environment.
- (3) For stainless steel components exposed to unmonitored treated water environments at each site, inspections will be performed on the seal water path of the waste gas compressor. One of two possible locations at each site will be examined. The results of this inspection will be applied to the remainder of the waste gas system stainless steel components within the scope of license renewal exposed to unmonitored treated water environment.
- (4) For the carbon steel components exposed to a gas environment at each site, an inspection will be performed on components located between the volume control tanks and the waste gas compressor phase separators. This section of the waste gas system contains a warm, moist gas that could result in condensation on the cooler internal surfaces of the carbon steel components. As a result, corrosion of the carbon steel surfaces is more likely due to the presence of moisture and would serve as a leading indicator for the remainder of the carbon steel components. The results of this inspection will be applied to the remainder of the waste gas system carbon steel components within the scope of license renewal exposed to gas environments.

The applicant stated that if no parameters are known that would distinguish the most susceptible locations for the above inspections, then the inspection locations will be based on accessibility and radiological concerns. In RAI B.3.36-1, the staff requested additional information about the criteria used to distinguish the most susceptible locations. By letter dated March 15, 2002, the applicant responded that the criteria could include component geometry, operating temperatures, system operation, and previous operating experience. These are appropriate criteria for determining the most susceptible locations; therefore, the staff finds the applicant's monitoring of aging effects to be acceptable.

Section B.3.36 of the LRA states that no actions are taken as part of the program to trend the inspection results, since this is a one-time inspection. If evaluation of the inspection findings indicates that continuation of the aging effects will cause a loss of intended function(s), additional inspections will be performed and/or corrective actions will be taken. Since corrective actions and confirmatory actions, as needed, are implemented in accordance with the corrective action program, the staff finds this acceptable.

[Acceptance Criteria] Section B.3.36 of the LRA states that the acceptance criteria for the inspection is no unacceptable loss of material that could result in the loss of the component intended function(s), as determined by engineering evaluation. The LRA also states that the engineering evaluation will determine whether continued aging could cause a loss of system intended function, or whether additional inspection is warranted, and appropriate corrective action will be taken. Because it will maintain the system intended function, the staff finds the acceptance criteria to be reasonable and acceptable.

[Operating Experience] Section B.3.36 of the LRA states that the waste gas system inspection is a one-time inspection for which there is no operating experience. The staff finds this reasonable and acceptable.

FSAR Supplement: The staff reviewed Appendix A of the LRA, Section 18.2.28 of the UFSAR supplement for McGuire, and Section 18.2.27 of the UFSAR for Catawba. The staff finds that the summary description is consistent with the LRA and is acceptable.

In conclusion, the staff has reviewed the information provided in Section B.3.36 of the LRA, the summary description of the waste gas system inspection in Appendix A of the LRA, and the applicant's March 15, 2002, response to the staff's RAI. On the basis of this review and the above evaluation, the staff finds that the waste gas system inspection program will adequately manage the aging effects such that there is reasonable assurance that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).