UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW, SUITE 23T85
ATLANTA, GEORGIA 30303-8931

October 27, 2008

EA-08-220

Mr. Bruce H. Hamilton
Vice President
Duke Power Company, LLC
d/b/a Duke Energy Carolinas, LLC
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: FINAL SIGNIFICANCE DETERMINATION OF WHITE FINDING AND NOTICE OF VIOLATION (NRC INSPECTION REPORT NO. 05000369/2008009 AND 05000370/2008009, MCGUIRE NUCLEAR STATION)

Dear Mr. Hamilton:

This letter provides you the final significance determination of the preliminary greater than Green finding discussed in NRC Inspection Report No. 05000369/2008008 and 05000370/2008008, dated August 20, 2008. The finding involved a failure to correct a significant condition adverse to quality related to macro-fouling of the nuclear service water (RN) strainer backwash system. The finding also involved an apparent violation of 10 CFR 50, Appendix B, Criterion XVI.

At your request, a Regulatory Conference was held on September 18, 2008, to discuss your views on this issue. During the meeting, your staff described Duke Energy Carolinas', LLC (DEC's) assessment of the significance of the finding, and the corrective actions taken to resolve it, including the root cause evaluation of the finding. DEC highlighted four differences between its risk assessment and the NRC's preliminary estimate as documented in our Inspection Report of August 20, 2008. In summary, the differences involved the period of RN system vulnerability, the probability of RN pump failure, the loss of instrument air initiator frequency, and credit for certain operator actions. Based on these differences, DEC concluded that the finding was of very low safety significance (Green). Enclosure 2 provides additional details of the differences as discussed above, and the NRC's basis for its final significance determination. DEC did not contest the apparent violation of 10 CFR 50, Appendix B, Criterion XVI, but attributed the root cause of the issue to a change to the plant's configuration without a comprehensive understanding of the design and licensing bases of the RN system.

After considering the information developed during the inspection and information provided by DEC at the regulatory conference, the NRC has concluded that the finding is appropriately characterized as White. In summary, the NRC agreed that a reduction to the change in the core damage frequency estimate was appropriate, based on some of the factors and information presented by DEC at the conference. Although the magnitude of the reduction was considerable, the NRC concluded that the final significance of the finding is appropriately characterized as low to moderate, increased importance to safety (i.e., White), as discussed in detail in Enclosure 2.

You have 30 calendar days from the date of this letter to appeal the staff's significance determination for this finding. Such appeals will be considered to have merit only if they meet the criteria given in NRC Inspection Manual Chapter 0609, Attachment 2.

The NRC has also determined that the failure to correct a significant condition adverse to quality related to macro-fouling of the RN strainer backwash system is a violation of 10 CFR 50 Appendix B Criterion XVI, Corrective Action, as cited in the enclosed Notice of Violation (Notice). The circumstances surrounding the violation were described in NRC Inspection Report No. 05000369/2008008 and 05000370/2008008. In accordance with the NRC Enforcement Policy, the Notice is considered escalated enforcement action because it is associated with a White finding. This violation is identified as: VIO 05000369,370/2008009-01, Failure to Take Adequate Corrective Action for Implementation of Safety-Related RN Strainer Backwash. Accordingly, for administrative purposes, apparent violation AV 05000369,370/2008008-01 is considered closed.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response.

Because plant performance for this issue has been determined to be beyond the licensee response band, we will use the NRC's Action Matrix to determine the most appropriate NRC response for this event. We will notify you, by separate correspondence, of that determination.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Luis A. Reyes
Regional Administrator

Docket Nos.: 50-369, 50-370
License Nos.: NPF-9, NPF-17

Enclosures:
1. Notice of Violation
2. NRC Basis for Final Significance Determination

cc w/encls: (See page 3)

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ADAMS: ☐ Yes ACCESSION NUMBER:_____ X SUNSI REVIEW COMPLETE

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E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

OFFICIAL RECORD COPY DOCUMENT NAME: P:\MCGUIRE EA-08-220.DOC

NOTICE OF VIOLATION

Duke Power Company, LLC
d/b/a Duke Energy Carolinas, LLC
McGuire Nuclear Station
Units 1 and 2

Docket Nos. 50-369, 50-370
License Nos. NPF-9, NPF-17
EA-08-220

During an inspection completed by the NRC on August 20, 2008, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is set forth below:

> 10 CFR 50 Appendix B Criterion XVI, Corrective Action, states that measures shall be established to assure that conditions adverse to quality, such as deficiencies, deviations, and non-conformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. This requirement is implemented through the Duke Quality Assurance Program Topical Report and procedure NSD 208, Problem Identification Process.
>
> Contrary to the above, between 2003 and August 7, 2007, the licensee failed to correct a significant condition adverse to quality related to macro-fouling of the nuclear service water (RN) strainers, in that the corrective action that was implemented failed to ensure that the design and licensing basis required capability for manual strainer backwash be maintained during accident conditions. Specifically, the 2003 plant modification that was implemented to address macro-fouling (i.e., upgrade and reclassification of the strainer backwash function to safety-related): (1) utilized non-safety-related instrument air (VI) to maintain each RN pump's strainer backwash discharge valve open, but did not provide a means to manually open (or bypass) the discharge valve to support backwash operations upon a loss of VI; and (2) did not account for the impact on timely operator response from higher strainer macro-fouling rates and expected (nuisance) strainer differential pressure alarms (without fouling) at the onset of high RN flow events (i.e., safety injection (SI) and loss of VI). As such, there was a lack of reasonable assurance that the RN system would be able to perform its safety-related function upon a SI or loss of VI event during periods of macro-fouling.

This violation is associated with a White finding for Units 1 and 2.

Pursuant to the provisions of 10 CFR 2.201, Duke Energy Carolinas, LLC, is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation; EA-08-220" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a

Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Because your response will be publicly available in the NRC Public Document Room or from the NRC's document system (ADAMS), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 27th day of October 2008

NRC Basis for Final Significance Determination

On September 18, 2008, the NRC held a Regulatory Conference with representatives of Duke Energy Carolinas, LLC (DEC), McGuire Nuclear Station (MNS), to discuss a finding involving a failure to correct a significant condition adverse to quality related to macro-fouling of the nuclear service water (RN) strainer backwash system. At the conference, DEC highlighted four differences between its risk assessment and the NRC's preliminary estimate as provided in NRC Inspection Report No. 05000369,370/2008008, dated August 20, 2008. The information below provides a summary of DEC's information as presented at the conference, and the basis for the NRC's final significance determination.

I. Event Frequency/Period of Macro-Fouling

DEC: The period of RN system vulnerability was reduced by: (1) eliminating periods of discerned high flow due to testing and maintenance; (2) eliminating periods of discerned transient flow conditions due to increasing/decreasing pump flow or starting/stopping a pump (included partially clogged impulse line on the low side of the differential pressure (dP) switch for the 2A RN pump); (3) eliminating periods of low frequency automatic backwashes that were not considered to challenge the associated RN pump; and (4) attributing macro-fouling solely to fish and therefore, based on dissolved oxygen levels, considered a limited seasonal occurrence.

NRC: Lacking any other supporting information, all strainer backwash events over a year period were initially considered. Reflective of DEC's arguments presented at the Regulatory Conference, fish was subsequently considered the only source of RN strainer macro-fouling for the time period in question. Accordingly, the effective exposure period was narrowed to 7/15/07 – 8/10/07, based on bait fish concentrations shown in 2007 echogram survey results provided by DEC. In effect, this eliminated those preceding backwash occurrences identified by DEC to be attributable to transient flow conditions (including the partially clogged 2A RN pump impulse line) and system maintenance/surveillance. It is likely that the fouling rates are greater for those periods where HI strainer dP alarms occur more frequently. However, because definitive strainer fouling rate data (actual or from testing) does not exist without the influence of the 900 gpm backwash, several sensitivity risk studies were conducted. One calculation was made using the assumptions from the original Significance Determination Process (SDP), only modified for the assumption that the only macro-fouling that occurs is from fish between 7/15/07 – 8/10/07. Another calculation was made assuming all HI strainer dP alarm occurrences within the effective time period (7/15/07 – 8/10/07) were reflective of fish in the common low level intake RN pump suction and, therefore, equally detrimental to all RN pumps, no mater what the frequency. In addition, if an initiating event occurred prior to a fish run, and if the strainer backwash function had not been reset, additional exposure time was added. The second calculation added this time prior to each HI dP occurrence, whereas the first calculation just added a single 24-hour exposure to the total hours.

II. Probability of RN Pump Failure

DEC: The exposure period was further reduced by 50% based on perceived pump survivability, from net positive suction head (NPSH)/pump flow testing results, during

discerned periods of low fouling (i.e., backwashes less than 1 per hour, 6 or less backwashes total on any one train, and quick clearing alarms). Inherent in this reduction, was the assumption of a linear strainer fouling rate and 1 psid across the strainer for each HI dP alarm (increasing no more than 6 psid). Based on DEC's NPSH/pump flow testing results, an additional 6 psid across the strainer would not have an adverse impact on the associated RN pump and its ability to provide sufficient flow.

NRC: It is acknowledged that DEC's NPSH/pump flow testing demonstrated RN pump survivability with as little as 8 feet of NPSH and 9500 gpm flow. However, in absence of definitive strainer fouling rate data (without the influence of the 900 gpm backwash) that relates fish input to strainer dP, the impact of strainer fouling cannot be bounded within the test conditions of the pump. Similarly, the application of linear fouling rates and quick clearing alarms that result in no more than 6 psid across the strainer is not justifiable. As such, an additional 50% pump survivability factor was not credited.

III. Loss of Instrument Air Initiator Frequency

DEC: The NUREG CR/6928 data from 2002 was updated using MNS data and two industry-related events [7.4E-3/yr].

NRC: The NUREG CR/6928 data from 2002 was updated using applicable industry data (three events) [9.69E-3/yr]. Use of this value is consistent with the usage rules for the NRC's SDP. The licensee has a plant specific Loss of Instrument Air fault tree. The third industry event was credited but had a lower impact. The NRC uses a single initiating event value (i.e. no fault tree).

IV. Additional Operator Action

(a) Recovery of RN with the other (donor) Unit or the containment ventilation cooling water system (RV).

DEC: This recovery action was applied to safety injection (SI) events on the effected Unit. It was assumed that the donor Unit is not in a SI event and has two RN pumps available. A human reliability analysis (HRA) failure rate of 5.2E-2 was applied for use of the Unit 2 crosstie, and a failure rate of 8E-4 was applied for use of either RN or RV.

NRC: DEC has not performed a flow calculation which proves the donor pump is capable of supplying any essential heat exchanger required flow rates on either Unit when aligned to the Unit crossover supply header. However, it is recognized that procedural guidance was in place for the subject exposure period to use the second RN pump from the donor Unit to supply the degraded Unit. During those times, it is recognized that the risk to the donor Unit would increase somewhat. Overall, a failure rate of 0.1 was applied for cross tying RN to account for the human actions and the chance that a strainer failure will occur on the donor unit due to macro-fouling or other causes. The NRC assumed that the RV strainers fouling will be alarmed on the plant operator aid computer. Also, the operators will be in AP-20, which would have them cross-tie and monitor RV. However, credit for RV did not seem as reasonable, because of the reasons previously stated in the Phase 3 Summary that was enclosed in

Inspection Report 05000369,370/2008008, dated August 20, 2008. Those reasons included the reduced flow available from the RV pumps, their susceptibility to strainer macro-fouling due to their reliance on the low level intake as a source of water, and the lack of significant/hierarchical cues/alarms that the RV system is fouled.

(b) Use of Condensate for Secondary Side Heat Removal

DEC: This recovery action was applied to loss of instrument air sequences. Having recently tested the manual valves and check valves in the steam generator tempering lines, DEC applied an HRA failure rate of 1.7E-2.

NRC: It is agreed that the use of condensate for secondary side heat removal is a viable recovery action for loss of instrument air sequences. Due to the multiple actions required outside the control room and dependence between the event and previously performed human actions, a failure rate of 0.1 was applied.

Based on the above, the NRC performed calculations to estimate the change in core damage frequency. The calculation incorporated those items agreed to above, and used a method for calculating exposure period that treated the HI strainer dP alarm occurrences within the reduced exposure period as equally detrimental to all RN pumps. In addition, the exposure period included times that compensate for the initiating events that could occur prior to periods of high strainer fouling. The NRC's best estimate of the change in CDF is 4.7E-6 for both units. Accordingly, this is assessed to be a White finding.