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U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Duke Energy Carolinas, LLC (Duke Energy)
Oconee Nuclear Station (ONS), Units 1, 2 and 3
Docket Nos. 50-269, 50-270, and 50-287
Renewed License Nos. DPR-38, DPR-47, and DPR-55
Special Report per Technical Specification 5.6.6
Action Request No.: 02069527

Subject: Special Report per Technical Specification 5.6.6, Inoperability of Unit 1, 2 and 3 Post
Accident Monitoring Containment High Range Radiation Monitors

Pursuant to ONS Technical Specification 3.3.8, Condition I and Technical Specification 5.6.6,
enclosed is a special report regarding the inoperability of the Containment High Range
Radiation Monitors (CHRRMs) for all 3 Units.

This Special Report is being submitted due to CHRRMs RIA-57 and RIA-58, for each Unit,
being inoperable for greater than 7 days. The information required by this Special Report is
enclosed.

There are no regulatory commitments contained in this report.

If you have any questions regarding this submittal, please contact Sam Adams, Oconee
Regulatory Affairs, at 864-873-3348.

Sincerely,

Thomas D. Ray
Vice President,
Oconee Nuclear Station

Enclosure:

Oconee Nuclear Station, Units, 1, 2, and 3 Special Report per Technical Specification 5.6.6

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ONS-2016-098
November 14, 2016
Page 2

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Enclosure:
Oconee Nuclear Station, Units 1, 2, and 3
Special Report per Technical Specification 5.6.6

Inoperability of Post-Accident Monitoring Instrument
Containment High Range Radiation Monitors

Description of Condition

On October 25, 2016, Containment High Range Radiation Monitors (CHRRMs) RIA-57 and RIA-58 were declared inoperable on all three ONS Units due to the potential for Thermally Induced Currents (TIC) to affect the accuracy of the radiation monitor readings during a High Energy Line Break (HELB) event in the associated Unit's East or West Penetration Room. The TIC effect could give a short-lived (less than 1 hour) false high radiation reading, potentially resulting in improper actions, including a misclassification of the actual event, if other monitored plant parameters are not considered. A HELB event in either the East or West Penetration Rooms could affect both RIAs. During a subsequent investigation and walkdown, it was identified that some of the connectors for the CHRRMs were not sealed with environmentally qualified shrink tubing, thereby making them susceptible to moisture intrusion and potential failure during a HELB event in the East or West Penetration Room.

The aforementioned TIC and moisture intrusion issues are only a concern for a HELB in either Penetration Room. It is worth noting that it is beyond the ONS design and licensing basis to have a HELB outside of Containment that would result in an actual high containment radiation condition. Thus, although inoperable, RIA-57 and RIA-58 are considered available to fully perform their intended function under all conditions with the exception of a HELB in the East or West Penetration rooms and, as such, provide reliable assessment capability for design basis events involving the failure of the RCS and/or fuel barriers and their potential to contribute to a release of radioactivity to the outside atmosphere.

The CHRRMs are post-accident monitoring (PAM) instrumentation specifically designed to detect radiation levels in the containment building of their associated unit to allow for assessment of conditions related to fission product barrier status (RCS and fuel barriers) and to assess the potential for a radioactive release to the public when one or more of these barriers are failed, along with a release path from the containment building to the outside atmosphere. The primary purpose of PAM instrumentation is to provide control room indication of selected unit parameters during accident conditions. Operability of the PAM instrumentation ensures that there is sufficient information available to monitor and assess unit status during and following an accident. The PAM instruments are identified by the ONS specific Regulatory Guide 1.97 analysis, Updated Final Safety Analysis Report (UFSAR) Section 7.5 and the NRC's Safety Evaluation Report for the ONS Regulatory Guide 1.97 analysis, which address the recommendations of Regulatory Guide 1.97 as required by Supplement 1 to NUREG-0737. The CHRRMs are identified as Type C and Type E Category 1 variables. Other than an alarm in the Control Room, there are no automatic functions provided by the CHRRMs.

The CHRRMs are addressed by Technical Specifications (TS) Table 3.3.8-1, Function 9. TS Limiting Condition for Operation (LCO) 3.3.8 requires that the Post-Accident Monitoring (PAM) instrumentation for each function in Table 3.3.8-1 be operable. Condition C of TS 3.3.8 states that with two inoperable Containment Area Radiation (High Range) monitoring channels, one must be restored to operable status within 7 days. If this indication is not restored within 7 days, Condition G and Table 3.3.8-1 lead to Condition I which requires initiating action in accordance with TS 5.6.6. TS 5.6.6 requires the submittal of a Special Report within the following 14 days and states that the report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the channel to operable status.

Enclosure:
Oconee Nuclear Station, Units 1, 2, and 3
Special Report per Technical Specification 5.6.6

Cause of Inoperability

The CHRRMs on all three units (1,2,3RIA-57 and 1,2,3RIA-58) are considered inoperable since a HELB in either penetration room could cause the CHRRMs to experience spurious indication spikes due to TIC and could cause moisture intrusion and/or failure of the CHRRMs connectors due to not having environmentally qualified heat shrink tubing on connectors. The indication spikes would likely result in exceeding the RG 1.97 accuracy requirements for these post-accident monitors. Since incorrect CHRRMs indication information could be provided to the operators, this deficiency does not allow for the CHRRMs to accurately monitor the effluent discharge paths to ascertain if there have been significant releases (planned or unplanned) of radioactive materials and to continually assess such releases, as required by UFSAR Section 7.5.1.3.2 for RG 1.97 Type E Instrumentation.

Preplanned Alternate Method of Monitoring

The CHRRMs are functioning at this time and are providing valid data. Although functional, these radiation monitors have been declared inoperable until changes are implemented that resolve the potential impacts of TIC on the credited functions of the CHRRMs. On October 13, 2016 the concern with TIC effects was communicated with licensed operators, along with the distribution of an Operations Guide to each ONS Control Room, directing that an evaluation of the conditions in the East and West Penetration Rooms should be made prior to making E-plan declarations based on the indications provided by 1,2,3RIA-57 and/or 1,2,3RIA-58 during a HELB event affecting the penetration rooms. Additionally, the OPS Guide directs that operators must validate conditions using alternate indications. The CHRRMs are used as one of several diverse methods for evaluating emergency action levels (EALs) for the Loss of RCS Barrier, Loss of Fuel Clad Barrier and for the Potential Loss of Primary Containment Barrier in the Emergency Plan. The specific alternate indications that can be used to assess conditions related to a potential offsite release following an accident are:

- Containment Normal and Emergency Sump levels (PAM) - redundant method for loss of coolant accidents;
- Containment water level (above sump levels) (PAM) - redundant method for loss of coolant accidents;
- Containment pressure (PAM) - redundant method for loss of coolant accidents;
- Reactor Coolant System Sub-Cooling Margin (PAM) - redundant method for loss of coolant accidents;
- Reactor Vessel Head Level and RCS Hot Leg Level (PAM) - redundant method for loss of coolant accidents;
- RCS Pressure (Wide Range) (PAM) - redundant method for loss of coolant accidents;
- Pressurizer Level (PAM) - redundant method for loss of coolant accidents;
- RCS Core Exit Thermocouples (PAM) - redundant method for loss of coolant accidents and fuel barrier losses.

Plans and Schedule for Restoring Operability

Replacement of the non-EQ heat shrink tubing is already in progress. Preliminary reviews indicate that replacing the coaxial cable for the CHRRMs will not completely resolve the TIC concern. Further research into fleet and industry operating experience will be conducted to consider other viable options, including potential licensing changes. Based on the findings of the additional research, an implementation schedule will be developed and the operability of the CHRRMs will be restored within the next two refueling outages for each unit.