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December 18, 2007

U. S Nuclear Regulatory Commission
Washington, D. C. 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC (Duke)
Oconee Nuclear Station Units 1, 2, & 3
Docket Nos. 50-269, 50-270, 50-287
NRC Generic Letter 2004-02
Revised Request for Schedule Relief

On November 19, 2007, Oconee Nuclear Station (ONS) notified the NRC by letter that two corrective actions required for resolution of GSI-191 could not be completed by the schedule specified in Generic Letter (GL) 2004-02. Those corrective actions included the replacement of wear rings and impeller hubs on two High Pressure Injection (HPI) Pumps and replacement of seal flush orifices and cyclone separators for all Low Pressure Injection (LPI) Pumps, High Pressure Injection Pumps, and Building Spray (BS) Pumps. Schedule relief was requested for completion of those corrective actions. That request included a "best estimate" plan extending to the end of the spring 2009 refueling outage for Unit 3 in addition to a "contingency plan" which would allow until the end of the fall 2009 refueling outage for Unit 1 for completion of all corrective actions. Supporting justifications and a qualitative risk assessment were provided with that request.

ONS was subsequently informed by phone call from the NRC that the proposed request for relief was not acceptable. The NRC advised ONS to re-submit the request for relief, with a shorter, more realistic "best effort" completion schedule, omission of any "contingency" schedule, and inclusion of a quantitative risk evaluation.

In response to this NRC feedback, ONS has re-evaluated the work scope and secured "best-case" delivery commitments from the parts manufacturer. Also, ONS was able to replace one of the Unit 3 HPI pumps during the fall 2007 refueling outage. Based upon the best available current information, ONS has developed a revised "best estimate" schedule for completion of all remaining GL 2004-02 corrective actions. Therefore, ONS hereby revises the previous request for relief submitted on November 19, 2007. ONS' revised request is to extend the schedule for completion of all remaining corrective actions until the end of the spring 2009 Unit 3 refueling outage.

Enclosure 1 to this letter provides the basis for Duke's conclusion that it is acceptable to extend the completion of the ONS corrective actions required by Generic Letter 2004-02, including a summary of the supporting quantitative risk analysis. Duke requests approval of this revised extension request by December 31, 2007.

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Enclosure 2 contains the revised commitments for completion of remaining corrective actions identified by ONS' evaluation of downstream effects.

If you have questions regarding this request or require any additional supporting information, please contact Russ Oakley at 864-885-3829.

Very truly yours,

Bruce H. Hamilton, Vice President
Oconee Nuclear Station

Enclosures

xc:

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Bruce H. Hamilton, being duly sworn, states that he is Vice President, Oconee Nuclear Site, Duke Energy Corporation, and affirms that he is the person who subscribed his name to the foregoing and that all the statements and matters set forth herein are true and correct to the best of his knowledge.

Bruce H. Hamilton, Vice President
Oconee Nuclear Site

Subscribed and sworn to before me this 18 day of December 2007

Notary Public

My Commission Expires:

6-12-2013

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Enclosure 1

Basis for Extension Request

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Basis for Extension Request

1.0 Background

On September 13, 2004, the NRC issued Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors." (Reference 1). The GL required that addressees provide by September 1, 2005, a description of and implementation schedule for all corrective actions, including any plant modifications, that are identified while responding to the GL. The GL requested that all licensees complete actions related to the GL by December 31, 2007, or provide justification for continued operation until the actions are completed.

By letter dated March 1, 2005, and supplemented by letter of September 1, 2005, Duke Energy Carolinas LLC (Duke) submitted a combined response to the GL for Oconee Nuclear Station (ONS), McGuire Nuclear Station (MNS), and Catawba Nuclear Station (CNS). In this correspondence, Duke committed to the installation of new post-LOCA containment emergency sump recirculation strainers and completion of other required modifications for ONS Units 1, 2, and 3 by December 31, 2007.

Duke is fully committed to resolving GSI-191. Evaluation of the existing ONS emergency sump strainers in 2004 identified a need to replace them with larger ones in order to ensure adequate emergency core cooling during sump recirculation operation. ONS has installed new sump strainers on all units that increase the available screen area from approximately 100 sq. ft. (all units) to approximately 4800 sq. ft. for Unit 1 and approximately 5200 sq. ft. for Units 2 and 3.

Downstream effects evaluations of component operation identified the need for two additional plant modifications for ONS. One of those modifications is the replacement of the Low Pressure Injection (LPI), High Pressure Injection (HPI), and Building Spray (BS) pump seal flush orifices and cyclone separators due to blockage concerns. Also, ONS is replacing HPI pumps with new ones which utilize more durable materials for wear-susceptible parts. Downstream effects evaluation guidance requires vibration analysis to justify existing materials. ONS elected to replace these pumps using upgraded materials in lieu of performing vibration analysis to justify existing materials.

Duke is requesting schedule relief for replacement of the LPI, HPI, and BS pump seal flush orifices and cyclone separators. Also, deferral of replacement of the ONS 3A HPI pump is requested (replacement of the remaining eight HPI pumps is complete). The requested completion date for these remaining actions is the end of the spring 2009 refueling outage for Unit 3.

Duke believes it is safe and prudent to defer the replacement of these components. The following provides a basis for the proposed schedule extension.

2.0 Justification for Proposed Extension

The NRC staff provided a justification for continued operation (JCO) in 2001 that justifies continued operation of pressurized water reactors through December 31, 2007. Elements of the JCO applicable to ONS include:

- Switchover to emergency sump recirculation following a large-break loss-of-coolant accident (LOCA) will be required no sooner than 44 minutes after accident initiation. This allows time for much of the debris to settle in other places within containment sump pool remote from the Reactor Building Emergency Sump (RBES). Much of this debris will not transport to the RBES strainer due to relatively low transport velocities.

- The probability of the limiting initiating event (i.e., large-break LOCAs) is extremely low. More probable (although still low probability) LOCAs (small, intermediate) will require less ECCS flow, take more time to use up the water inventory in the borated water storage tank, and in some cases may not even require the use of recirculation from the RBES because the flow through the break would be small enough that the operator will have sufficient time to safely shut the plant down.

- ONS has qualified the Reactor Coolant System (RCS) piping for Leak-Before-Break (LBB). LBB-qualified piping is of sufficient toughness that it will most likely leak (even under safe shutdown earthquake conditions) rather than rupture. This, in turn, would allow operators adequate opportunity to shut the plant down safely.

- There are sources of margin which are not credited in the plant's licensing basis. For example, testing has shown that Oconee's BS pumps are capable of operating for extended periods of time at reduced flow rates with substantial deficiency in Net Positive Suction Head (NPSH). Due to similarity in pump designs, the Low Pressure Injection (LPI) pumps would be expected to perform similarly. Also, due to the sensitivity of the NPSH analyses to sump temperature, it should be noted that NPSH margins are substantially improved as the sump water cools and vapor pressure decreases. Thus, the transient nature of the event response itself provides margin that is not credited in the NPSH analyses. In addition, there is a high temperature correction factor for required NPSH which is not credited in the NPSH analyses.

These elements will remain valid during the extension period requested by this submittal.

3.0 Reason for the Request for Proposed Extension

ONS has performed analysis of downstream effects in accordance with WCAP 16406-P, Rev. 0, "Evaluation of Downstream Sump Debris Effects in Support of GSI-191" and Nuclear Energy Institute (NEI) Document NEI 04-07, Revision 0, dated May 28, 2004, "Pressurized Water Reactor Sump Performance Evaluation Methodology". The following components were evaluated for wear and plugging:

- Low Pressure Injection (LPI) Pumps and Heat Exchangers
- High Pressure Injection (HPI) Pumps
- Building Spray (BS) System Pumps and Spray Nozzles
- Flow Orifices
- Throttle Valves
- Flow Restrictors
- Instrumentation
- Check Valves
- Drain Lines

The downstream effects evaluation guidance required vibration analysis to justify the existing materials for wear-susceptible parts in several HPI pumps. ONS' initial goal was to complete the necessary HPI pump replacements by the fall 2007 Unit 3 refueling outage. Replacement of the Unit 1 and 2 HPI pumps and the 3B and 3C HPI pumps is complete. For the 3A HPI pump, manufacturing problems were identified by testing, and delivery was delayed. When ONS received the pump, additional problems were identified with the pump shaft sleeves. These problems required ONS to return the pump to the vendor for repair. Receipt of the repaired pump did not support installation during the fall 2007 Unit 3 refueling outage as originally planned. ONS considered performing this replacement on line following the fall Unit 3 outage. Based on past experience, it is estimated that the time required to do this work would exceed the available 72-hour Technical Specification (TS) Required Action completion time for this pump. Should this occur, TS would require maneuvering the unit to 75% power. Risk assessment has shown that the Core Damage Frequency (CDF) risk of deferring the pump replacement is approximately 1.6E-7/Reactor Year (RY), which is deemed to be insufficient risk to justify the power maneuvers necessary to replace the pump with the unit on line. ONS therefore plans to perform the 3A HPI pump replacement during the spring 2009 Unit 3 refueling outage, which is the next available refueling outage.

The downstream effects evaluation identified the HPI throttle valves, the LPI flow restrictors, and the pump seal flush orifices and cyclone separators associated with the LPI, HPI, and BS pumps as being susceptible to debris plugging. The potential for HPI throttle valve and LPI flow restrictor plugging was addressed by performing actual component testing. The test results showed that the HPI throttle valves could meet the acceptance criteria with higher than predicted post-accident debris loads. The test results were also used to establish a bounding flow coefficient and justify the acceptability of the existing LPI flow restrictors. The LPI, HPI, and BS pump seal flush orifices and cyclone separators will be replaced. Parts availability will not support completion of this work by the end of calendar year 2007. Procurement of these items was delayed to obtain industry test results needed to justify use of cyclone separators with the postulated ONS sump debris composition. ONS has a commitment from the parts manufacturer for a 38-week delivery from the date of purchase order. The expected date of purchase order issue is December 31, 2007. This supports receipt of parts on site by the week of September 22, 2008. With this as the earliest start date for modification of the 24 pumps affected, ONS expects to complete all modifications by the end of the spring 2009 refueling outage.

4.0 Compliance with SECY-06-0078 Criteria

SECY-06-0078 (Reference 3) specifies two criteria for short duration GL 2004-02 extensions, limited to several months, and a third criterion for extensions beyond several months. These three criteria and Duke's responses are provided below.

4.1 SECY-06-0078 Criterion No. 1:

The licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties.

Duke Response:

ONS plans to replace seal flush orifices and cyclone separators for the LPI, HPI, and BS pumps on a schedule utilizing both on-line maintenance windows and unit refueling outages (RFO) between now and spring of 2009.

A milestone schedule for replacement of the LPI, HPI, and BS pump seal flush orifices and cyclone separators that minimizes operational risk and safety system unavailability and utilizes available outage opportunities has been developed. The schedule assumes delivery of necessary parts by the week of September 22, 2008 and allows time for detailed planning. The schedule is given below:

1A and 1C HPI	10/08
3A and 3C HPI	10/08
2A and 2B BS	fall 2008 RFO
2A, 2B, and 2C LPI	fall 2008 RFO
2A, 2B, and 2C HPI	fall 2008 RFO
1A and 1B BS	11/08
1A and 1B LPI	12/08
1B HPI	1/09
1C LPI	1/09
3A, 3B, and 3C LPI	spring 2009 RFO
3A and 3B BS	spring 2009 RFO
3B HPI	spring 2009 RFO

ONS plans to replace the 3A HPI Pump during the spring 2009 refueling outage.

4.2 SECY-06-0078 Criterion No. 2:

The licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS [emergency core cooling system] and CSS [containment spray system] functions during the extension period.

Duke Response:

The following mitigative measures have already been implemented to minimize the risk of degraded ECCS and BS functions during the extension period.

4.2.1 Sump Strainer Replacement

ONS has replaced the RBES strainers on all three units. The existing vertical flat screen design was replaced with a pocket array type strainer designed by Control Components Incorporated (CCI). Strainer surface areas were increased from approximately 100 sq. ft. on all units to approximately 4800 sq. ft. on Unit 1 and approximately 5200 sq. ft. on Units 2 and 3. Strainer openings were reduced in size from the previous 0.12" square to a 0.08" diameter circular opening. Increased surface area will provide several beneficial effects. First of all, the approach velocity at the face of the strainer will be decreased from approximately 0.2 ft/sec to approximately 0.004 ft/sec, making debris accumulation on vertical surfaces less likely. Secondly, there will be more area over which to spread the debris inventory, thereby decreasing the debris bed thickness. The combined effect of these reductions in bed thickness and flow velocity will reduce head loss across the debris bed, which is a function of both fluid velocity and bed thickness. The smaller openings in the strainer will reduce the bypass factor and the size of the downstream debris, providing additional benefit with regard to potential plugging of small downstream flow passages such as throttle valves and orifices.

4.2.2 HPI Pump Replacement

The Unit 1 and 2 HPI pumps as well as the 3B and 3C HPI pumps have been replaced. The replacements have more durable wear-susceptible parts. This will reduce the likelihood of degraded HPI pump performance during recirculation from the RBES.

4.2.3 Debris Generation / Source Removal

Debris generation analysis has been completed. Insulation inside containment that is affected during a LOCA event is mostly Reflective Metal Insulation (RMI) with very little fiber. Fibrous piping insulation within the predicted Zone Of Influence (ZOI) inside containment has been removed. A walkdown of containment, augmented by sampling, has been performed and the amount of latent debris is very small. Extensive remediation of degraded containment coatings has been performed on the ONS units in recent refueling outages. Over the past three refueling outages for Unit 1, over 8500 sq. ft. of degraded qualified/acceptable coatings were remediated (completely

removed and replaced with a qualified coating system). In addition to this, over 2800 sq. ft. of unqualified coatings were replaced with qualified coatings. For Unit 2, over 15,000 sq. ft. of qualified/acceptable coatings and more than 2800 sq. ft. of unqualified coatings were remediated during the three most recent refueling outages. On Unit 3, which has most of its degraded coatings in inaccessible areas in the dome area of containment, about 5400 sq. ft. of degraded qualified/acceptable coatings were remediated and about 3200 sq. ft. of unqualified coatings were replaced during the three most recent refueling outages. Periodic condition assessments are performed each outage. As localized areas of degradation are identified, those areas are evaluated and scheduled for repair or replacement as necessary. These periodic condition assessments and the resulting repair/replacement activities ensure that the amount of coatings that may be susceptible to detachment from the substrate during a LOCA event is minimized.

4.2.4 Leak-Before-Break (LBB)

Postulated breaks in the reactor coolant loop piping have been eliminated for all ONS units by application of leak-before-break methodology. While leak-before-break is not being used to establish the design basis debris load on the new RBES strainers, application of the insights from this methodology would result in a substantial reduction in the postulated ZOI. This would result in a significant reduction in the postulated debris generation, loading on the sump screens, and potential clogging of downstream flow passages.

4.2.5 Procedural Guidance, Training and Actions

By letter dated August 7, 2003, Duke responded to NRC Bulletin 2003-01, "Potential Impact Of Debris Blockage On Emergency Sump Recirculation At Pressurized Water Reactors". Duke's letter stated that ONS would implement the following interim compensatory measures:

(1) Operator training on monitoring of indications of and responses to sump clogging.

(2) Guidance to reduce depletion of the BWST and initiate makeup to the BWST from normal and alternate sources during efforts to restore normal ECCS flow paths.

(3) LPI and BS systems were scheduled for modification to provide additional fixed system resistance to flow. This modification effectively reduces flow requirements such that NPSH requirements for these pumps are reduced for most scenarios.

(4) Reactor Vessel Cavity drains were scheduled for flush to ensure they would provide an unobstructed flow path to prevent holdup of sump inventory.

The above compensatory measures have been implemented at ONS.

4.2.6 Containment Cleanliness

ONS performs a thorough washdown of containment at the start and finish of each refueling outage using high pressure spray equipment. In addition to this practice, maintenance personnel perform a cleanup of containment prior to entry into Mode 4 from Mode 5 during startup from each refueling outage. A containment exit inspection procedure is implemented after every containment entry at power and during each refueling outage, prior to entering Mode 4 from Mode 5 on startup. The primary purpose of this procedure is to ensure that no loose debris (rags, trash, clothing, etc.) is present in the Containment Building which could be transported to the emergency sump and cause restriction of ECCS pump suctions during LOCA conditions. Performance of these inspections is required by Selected Licensee Commitment 16.6.11.

Based on the above discussion, Duke meets the requirements of SECY-06- 0078 Criterion No. 2.

4.3 SECY-06-0078 Criterion No. 3:

For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside containment to better ensure a high level of ECCS sump performance.

Duke Response:

As noted above, specific physical improvements in the RBES and/or materials inside containment include:

1. ONS has installed new RBES strainers that increase the available surface area from approximately 100 sq. ft. on each unit to approximately 4800 sq. ft. on Unit 1 and approximately 5200 sq. ft. for Units 2 and 3. These modifications were completed on the ONS units prior to December 31, 2006.
2. ONS has removed fibrous piping insulation from areas of the Reactor Building that our baseline analysis identified as being within the ZOI of a postulated RCS pipe break.
3. ONS has replaced eight of the nine HPI pumps. The replacement pumps utilize more durable materials for wear susceptible parts.
4. ONS has performed extensive remediation of degraded qualified/acceptable coatings in the reactor buildings and significant replacement of unqualified coatings with qualified systems.

Based on the above discussion, Duke meets the requirements of SECY-06-0078 Criterion No. 3.

5.0 Risk Assessment

Assessment of the risk is evaluated on the basis that loss of function of the LPI and HPI pumps is more likely during the extension period than it would be if the modifications were complete prior to January 1, 2008. The modifications will be made over some period of time after replacement parts are received. This means that the risk is not constant over the extension period. For purposes of

this evaluation, the risk is evaluated as though none of the replacements have been made and the result is reported on a reactor-year basis. The CDF risk per day will begin to fall once modifications begin but the total length of time is longer than 1 year on some replacements. It is judged that reporting the increase in CDF on a 1 year basis provides a reasonable measure for evaluating the significance of the delay.

Certain classes of accidents have been screened from the analysis on the expectation that their contribution to the CDF would be negligible. Some accidents (e.g., external events, fires, and certain high energy line breaks) are screened because the dominant sequences involve loss of major support systems (e.g., ac power) such that independent failure of recirculation is not relevant. Others are screened because they involve containment bypass and sequences where sump recirculation is not typically required for mitigation (e.g., ISLOCA and SGTR). Sequences involving failure to maintain sump recirculation have very low frequencies for these initiating events.

The downstream effects applicable to this analysis are the potential for loss of HPI pump 3A as a consequence of delaying the replacement of the wear ring and impeller hub, and pump seal performance degradation as a consequence of delaying the replacement of the seal flush orifices and cyclone separators.

5.1 HPI Pump 3A Replacement

The ΔCDF is evaluated based on the assumption that this pump fails whenever sump recirculation is initiated. The success criteria for HPI in the recirculation phase is 1 of 3 HPI pumps. Consequently, loss of a single pump results in a system that retains redundancy in performing the function. The ΔCDF for this condition has been conservatively evaluated to be 1.6E-07/RY. The dominant core damage sequences are a loss of 4kV bus for the operating HPI pump with subsequent failure of Secondary Side Heat Removal (SSHR) ultimately requiring HPI forced cooling, and spurious operation of a pressurizer safety valve. High pressure recirculation is assumed to be required for both of these conditions. The conditional containment failure probability for these sequences is on the order of 0.01 and the change in CDF is more significant than the Large Early Release Fraction (LERF) contribution.

5.2 HPI/LPI/BS Pump Seal Flush Orifices and Cyclone Separators

The impact of delaying replacement of the seal flush orifices and cyclone separators is the possibility of seal leakage. Sump pumps in the ECCS pump rooms are installed to remove recirculated fluid that leaks into the room. The sump pumps are not modeled in the Oconee PRA and no plant specific information has been collected on the performance of this system. Failure of the sump pumps to control flooding in an affected LPI pump room is assumed to have a probability of 0.01. Such a value would be typical for a condition where 2 of 2 pumps are required for success (loss of 1 of 2 results in failure). The HPI pump rooms are expected to have a negligible potential for loss of function due to flooding.

The potential for seal leakage is assumed to be a function of the accident initiating event since the amount and type of debris generated is dependent on the source of water to the containment. A pipe break in the RCS is expected to generate more debris than are those transient sequences that result in release of RCS fluid through the pressurizer relief valves with release to containment from the quench tank. For those sequences initiated by pipe breaks in the RCS, the probability that the ECCS pump seals leak with the consequential potential for flooding in the room is assumed to be 0.5. When the quench tank is the source of water entering the containment, this probability for seal leakage is assumed to fall to 0.25.

The ΔCDF for this condition has been conservatively evaluated to be 5.7E-07/RY. The dominant core damage sequences are: transient initiating events (with stuck open pressurizer relief valves or loss of SSHR and subsequent need for HPI forced cooling), transients initiated by internal floods, spurious operation of a pressurizer safety valve, and small break LOCAs. High pressure recirculation is assumed to be required for these conditions. The conditional containment failure probability for these sequences is on the order of 0.01 and the change in CDF is more significant than the LERF contribution.

6.0 Conclusion

Duke's request for extension to the completion schedule for downstream effects related modifications is needed due to parts delivery issues. Duke has exhausted all potential options for expediting the delivery schedule for the needed parts. The vendor has expressed a willingness to shorten the 38-week delivery schedule but has been unwilling to commit to an earlier date. Duke has limited capability to control the factors affecting the manufacturing and delivery of these items. An extension for completing all corrective actions and modifications required by GL 2004-02 until the end of the Unit 3 spring 2009 refueling outage is acceptable because:

The requested extension results in calculated annual increases of CDF and LERF that are very small as defined by RG 1.174.

Per the criteria listed in SECY 06-0078, Duke has established a plant-specific plan with milestones and schedules to address outstanding technical issues with enough margin to account for uncertainties.

Duke has completed significant actions, including extensive analysis and has implemented physical improvements (including larger new RBES strainers), to better ensure a high level of sump performance. These mitigative measures serve to minimize the risk of degraded ECCS or BS functions during the extension period.

7.0 References

1. NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004
2. Nuclear Energy Institute (NEI) 04-07, Volume 1, "Pressurized Water Reactor Sump Performance Methodology," and NEI 04-07, Volume 2, "Safety Evaluation by the Office of Nuclear Reactor Regulation Related to NRC Generic Letter 2004-02," Revision 0, dated December 2004
3. SECY-06-0078, from L. A. Reyes, NRC Executive Director for Operations, to NRC Commissioners, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris Accumulation on PWR [Pressurized Water Reactor] Sump Performance,"' dated March 31, 2006

Enclosure 2

ONS Revised Commitments

Commitment No.	Description	Date
1	Replace seal flush orifices and cyclone separators on the LPI, HPI, and BS Pumps.	spring 2009 RFO
2	Replace the 3A HPI Pump to utilize more durable materials for wear susceptible parts.	spring 2009 RFO