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November 1, 2006

U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
ATTENTION: Document Control Desk

Subject: Duke Power Company LLC d/b/a Duke Energy Carolinas, LLC
Catawba Nuclear Station, Unit 1
Docket No. 50-413

NRC Generic Letter (GL) 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors, Request for Relief from December 31, 2007 Implementation

References: Refer to Attachment 3

On September 13, 2004, the Nuclear Regulatory Commission (NRC) issued Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors." Duke Energy Carolinas (Duke) provided the required responses on March 1, 2005 and September 1, 2005.

On February 9, 2006, the NRC issued requests for additional information (RAI) for Oconee, McGuire, and Catawba Nuclear Stations. Subsequent to these requests, on February 28, 2006, the Nuclear Energy Institute (NEI) submitted a request to extend the response dates on behalf of the licensees.

On March 3, 2006, the NRC provided a response to Anthony R. Pietrangelo of NEI granting the requested relief. Duke's April 7, 2006 letter was submitted to inform the NRC that Duke would adapt the schedule relief granted by the NRC by submitting responses to RAIs contained in the February 9, 2006 letters by December 31, 2006.

This letter is being provided to request relief to the December 31, 2007 date for resolution of GSI-191 for Catawba Unit 1 and

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the commitment noted in the September 1, 2005 GL 2004-02 Response letter to install a modified sump strainer and support structure in Unit 1 during the Fall 2006 outage. This relief is requesting a new License Condition be added to the Facility Operating License to require Unit 1 to enter Mode 5 for the outage to install the sump strainer modification no later than May 19, 2008. This will result in a no more than 140 day extension past the December 31, 2007 commitment date. Duke also will request the addition of a License Condition to the Facility Operating License which states that the Unit 1 sump strainer modification will be complete prior to entry into mode 4 after May 19, 2008. The commitment to install the modified sump strainer and support structure in Unit 2 during the Fall 2007 outage will remain unchanged. Since the installation of the first complete sump strainer will not be until the Unit 2 outage in the Fall of 2007, Duke is also requesting that the RAI responses committed to for December 31, 2006 be delayed until 90 days after the initial Unit 2 installation in accordance with the NEI/NRC agreement discussed above

This extension to the sump strainer installation date is being requested due to a delay in the completion of the final design of the sump strainer modification for Unit 1. A large portion of this delay is due to issues involving the final design of the trash racks. Materials needed for prefabrication and mock-up work for the modification are significantly behind schedule: As of November 1 the strainer assemblies have not been delivered versus an initial scheduled delivery date of October 1, 2006. Duke's proposal for the Fall 2006 Outage (1EOC16) strainer modification work is to perform teardown and rerouting of piping and affected hangers to support the strainer installation next outage.

Attachment 1 of this letter provides a detailed justification for the requested extension. Attachment 2 contains a list of commitments made as a result of this letter.

If any questions arise or additional information is needed, please contact Tony Jackson at (803) 831-3742.

Very truly yours,

Dhiaa M. Jamil

Dhiaa M. Jamil affirms that he is the person who subscribed his name to the foregoing statement, and that all the matters and facts set forth herein are true and correct to the best of his knowledge.

Dhiaa M. Jamil
Group Vice President
Nuclear Support

Subscribed and sworn to me: Nov. 1, 2006
Date

Notary Public

My commission expires: Sep. 27, 2011
Date

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xc: w/attachments

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Attachment 1
Justification for Extension of the Resolution of GSI-191 for Catawba Unit 1

SECY-06-0078, "Status of Resolution of GSI-191, Assessment of [Effect of] Debris Accumulation on PWR Sump Performance" dated March 31, 2006 provides criteria for evaluating delay of hardware changes related to resolution of GSI-191. SECY-06-0078 states:

> "Proposed extensions to permit changes at the next outage of opportunity after December 2007 may be acceptable if, based on the licensee's request, the staff determines that:
>
> - 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 and
>
> - 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 and CSS functions during the extension period."

Background

In the Duke September 1, 2005, "Response to GL 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," (Reference 3) Catawba stated the intent to modify the existing containment sump to increase the effective strainer area to approximately 2000 square feet. While the evaluation of chemical effects is ongoing, this surface area was considered by the engineering vendor and Duke to have adequate margin to accommodate these implications.

However, the final design of the modification has been delayed along with parts delivery. A discussion of these issues and the recovery plan follows:

1. Final Design Issues and Delays

- Final design approval is being delayed by an evaluation of the existing requirements in Regulatory Guide 1.82,"Sumps for Emergency Core Cooling and

Containment Spray Systems", Rev. 0 for a trash rack in addition to a vortex suppressor. The new design requires installation of a vortex suppressor, and that design does have inherent trash rack properties. However, it does not meet all the details of the existing requirements outlined in Regulatory Guide 1.82, Rev.0. Also, Catawba currently has a Technical Specification Surveillance to inspect trash racks. The need to install separate trash racks in addition to the vortex suppressors is still under evaluation. The vendor has requested Duke to evaluate the feasibility of removing the vertical trash rack from the design as it may impact the ability of the strainer to perform its design function: The pressure drop would occur across the trash rack rather than the strainer. In addition, the large volume enclosed by the trash rack will cause difficulty in accessing several plant components normally used during outages.

- The submergence of the vortex suppressor requires further supporting analysis.

2. Material Delivery Delays

- Strainer delivery is presently 30 days late from original scheduled delivery. This delivery date severely limits the amount of installation mock-up training and final preparation for implementation that was to occur prior to the start of the outage.

- Some portions of the modification required actual dimensions obtained from the pipechase to complete design and prefabricate the parts. Although there have been recent power entries to confirm certain measurements, a delay of the work by a fuel cycle would allow these measurements, design, and fabrication to be completed this outage and installed next outage resulting in reduced dose.

3. ALARA concerns

- Dose projections for the installation of the new strainer are approximately 100 Rem. Duke is evaluating flushing and chemical cleaning processes to

significantly reduce dose if the project is implemented in the Spring 2008 outage.

4. Recovery Plan

- Duke plans to evaluate the feasibility of submitting a License Amendment Request (LAR) for removal of the requirements for a trash rack. Approval of the amendment will facilitate design changes to be approved for removal of the trash rack.

- Duke plans to perform evaluations and develop modifications, as necessary, to enhance dose reduction.

Modifications Planned to be Completed During the Fall 2006 Refueling Outage for Unit 1

1. ECCS Sump Strainer Modification Preparation

The current ECCS sump screens will be left intact. The area of the pipechase, which requires pipe and hanger rerouting, will be modified during the Fall 2006 Outage to prepare for the future installation of the strainer modification. Note: The valve stem leak-off header and associated flow switches will not be able to be removed along with several electrical cable trays. These items rely on the new sump strainer to be installed in order to mount these items on the vortex suppressor.

2. Steam Generator (S/G) Insulation Modification

This modification will replace the fiberglass blankets (Nukon) insulation on the bottom bowls of the Unit 1 Steam Generators with reflective metal insulation (RMI). This replacement will remove approximately 400 cubic feet of fibrous insulation of which approximately 280 cubic feet are below the maximum flood level in containment.

3. Reactor Vessel Head Flange Insulation Modification

   The reactor vessel head flange insulation contains Microtherm inside the reflective panels. Microtherm is a micro-porous type fiber that is expected to break down into 100% small fines during a LOCA. This modification will replace the current insulation on the reactor vessel head flange with Transco reflective insulation to enhance ECCS sump performance margins.

4. Downstream Effects Modification

   This modification will replace existing orifice plates with smaller diameter orifice plates to allow the ECCS throttle valves to be opened greater than currently allowed for flow balancing. This will address concerns with plugging and/or erosion of the valves during the recirculation phase of an accident. At the current time the parts required for this modification are due to be delivered November 20, 2006 with a scheduled installation date of November 23, 2006. Any further delays in the material deliver could delay this modification to a later outage.

Favorable Site Conditions

1. Programmatic Controls to Reduce Debris in Containment

   Catawba has several programmatic controls in place to ensure that potential sources of debris that may be introduced into containment will be assessed for adverse effects on the ECCS and Containment Spray System recirculation functions. These programmatic controls include requirements related to coatings, containment housekeeping and materiel condition. Typical programmatic controls are described below:

   a. Coatings Program

      As described in Duke's November 11, 1998 response to Generic Letter 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies

and Foreign Material in Containment," (Reference 5), Duke has established controls for the procurement, application, and maintenance of Service Level 1 protective coatings used inside containment. The requirements of 10 CFR 50, Appendix B are implemented through the specification of appropriate technical and quality requirements for the Service Level 1 coating program. For Service Level 1 coatings, Duke is committed to comply with Regulatory Guide 1.54 at Catawba. As described in Attachment 1 to the November 11, 1998 letter, vendor-coated mechanical and electrical equipment coatings are considered unqualified.

The Service Level I Coatings inside the Catawba Unit 1 Containment are in good condition. Minimal degradation has been noted during outage walkdowns. The majority of coatings inside containment are qualified. The majority of coatings in containment, including most walls, floors, and hangers, are qualified coatings

Catawba has a program to identify and repair damaged qualified coatings. Degraded coatings are evaluated, removed, and repaired as necessary to maintain the inventory of unqualified coatings that may be susceptible to detachment during a Design Basis Accident (DBA). Catawba has not undertaken a specific program to remove unqualified coatings from the inventory and replace them with qualified coatings.

b. Containment Housekeeping/Materiel Condition

Duke's August 7, 2003 response to Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors," (Reference 6), described planned actions regarding containment cleanliness. These actions have been implemented and provide for containment cleaning and visual inspections.

Extensive containment cleaning is performed during each refueling outage using water spray, vacuuming, and hand wiping. In general, this is limited to the space in lower containment that would be submerged

under large break LOCA conditions. Additionally, localized wash downs are performed as needed. Visual inspections are performed on the remaining areas of containment. Foreign material is removed as necessary. Material accountability logs are maintained in Modes 1 through 4 for items carried into and out of containment. These controls are implemented using administrative procedures.

c. Operator Actions and Training

Duke's May 27, 2004, "Response to NRC Bulletin 2003-01; Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," (Reference 7), committed to the following actions that were recommended by WCAP-16204 to reduce the risk associated with potential containment emergency sump blockage during ECCS and Containment Spray recirculation functions. These completed commitments were:

- Revised a procedure to initiate refueling water storage tank makeup following the successful transfer of ECCS and containment spray suction to the containment emergency sump.

- Relocated the step to shut down a containment spray pump when it is no longer required to mitigate the event. This step now occurs earlier in the procedure.

- Provided training to licensed operators on BL 2003-01 ECCS sump clogging operating experience and procedure enhancements.

- Originated a response procedure to provide guidance for the potential of both trains of ECCS and containment spray being affected by containment sump blockage.

- In response to BL 2003-01 Duke requested an amendment to allow operators to manually start a containment air return fan early during certain

SBLOCA events. The subject License Amendment Request was approved by the NRC on September 25, 2006. Duke has committed to completing the required training and implementation of revised procedures on or before November 24, 2006. This new operator manual action will, for a certain range of small-break-loss-of-coolant-accident (SBLOCA) breaks, mitigate the effects of debris accumulation in the containment sump.

2. Conservative Assumptions-Fibrous Debris Generation due to Postulated Pipe Rupture

It is recognized that pipe rupture resulting from random events induced by unanticipated conditions is unlikely. For any type of piping failure mechanism postulated, the actual location of the failure is governed by the local conditions of stress and fatigue. Therefore, pipe break criteria assume that the points on a given pipe run where a rupture would most likely occur would be associated with those points of high stress and fatigue. Regulatory Guide 1.46,"Protection from Pipe Whip in Containment," provides numerical limits on stresses and fatigue damage, above which breaks should be assumed to occur. The Catawba Reactor Coolant Loop (RCL) has been analyzed consistent with these limits.

The staff has concluded that it is inappropriate to cite SRP 3.6.2 and BTP MEB 3-1 as methodology to be applied for determining break locations to be considered for PWR sump analysis because they may not identify the limiting break location. However in this case the breaks which have been identified as contributing the most debris are also the breaks postulated per MEB 3-1. Since these locations are valid break locations, significant restraints exist to limit the movement of the pipe in the event of a rupture. By limiting the effects from the postulated pipe rupture the resultant debris generation is also greatly limited.

The RCL at Catawba was designed such that pipe lateral displacements following a postulated rupture are held to less than one pipe wall thickness through the use of rigid rupture restraints. While some of these devices were modified during steam generator replacement, the support

steel and concrete substructures remain. While some of the postulated breaks may no longer be limited to less than one pipe wall thickness separation, their movements are still limited.

Debris generation per GSI-191 is based upon a double ended guillotine break with no consideration of the physical structures that would prevent the amount of damage currently calculated. Due to the rigid restraints required to mitigate the consequences of a High Energy Line Break (HELB) it is physically impossible for this piping to separate to the extent that significant areas of lower containment would be adversely affected. The RCL and associated rupture restraints were designed to limit the effects of a pipe break in the event that one would ever occur.

Based on Duke's preliminary review of excess conservatisms in Catawba's debris generation analysis, break locations in the RCL may not be the breaks that generate the most debris. The next most significant breaks would be postulated in the 14" Surge Line, the 12" RHR pipe or the 10" Accumulator connection to the Cold Leg. Due to pipe size and location, these breaks would reduce the ZOI by more than half with a substantial reduction in debris generation. With the exception of the surge line to Pressurizer nozzle, all of these postulated LOCAs are below the S/G lower lateral elevation of 571'-0". It should be noted that these sections are also heavily restrained in order to protect safety related equipment from the dynamic effects of a HELB.

There is approximately 4500 ft^3 of fibrous debris inside lower containment. The majority of this is above the S/G lower lateral support (el. 571'). There is approximately 150 ft^3 of fiberglass insulation for each loop below the lower lateral or 600 ft^3 total below the maximum flood level which is also 571'-0". As discussed earlier, Catawba is replacing the S/G bottom bowl and first row of blanket insulation with RMI during 1EOC16. This eliminates the major portion of fibrous debris below the S/G lower lateral support. The only remaining fiberglass insulation below elevation 571' will be the pads on the RCL piping (80 ft^3 per loop or approximately 320 ft^3 total).

3. Inspections and Modifications of the Reactor Coolant System Pressure Boundary

- In an effort to implement Materials Reliability Program (MRP-139), Duke will be apply overlays on the pressurizer nozzle connections as a Unit 1 modification during the Fall 2006 (1EOC16) outage.

- A volumetric inspection of the Unit 1 reactor vessel (RV) head penetrations is planned for the Fall 2006 outage, also. A 100% bare metal visual inspection of the 73 CRDMs, 5 thermocouples, 1 vent line and (4) Auxiliary Head Adapter (AHA) head penetrations will be performed in conjunction with the RV head volumetric inspection.

- A 100% bare metal visual inspection of the 58 bottom mounted instrumentation penetrations will be performed during 1EOC16.

- A 100% bare metal visual inspection of the 78 pressurizer heater penetrations as recommended by Westinghouse NSAL 06-08 letter will be performed during 1EOC16.

- Several walkdowns and an ASME XI pressure test will be performed during the refueling outage to validate the continued integrity of the reactor coolant system.

Risk Assessment

A probabilistic risk assessment (PRA) was performed by Duke to specifically assess the impact of extending the time for implementing the final sump strainer modification at Catawba Unit 1 until the May 2008 refueling outage (a 140-day delay was assumed).

The risk assessment is conservative because it:

- takes no credit for actual available net positive suction head (NPSH) margin that exists at the plant;

- gives only modest credit for operator mitigation regarding the failure of actions to recover from loss of the Emergency Core Cooling System (ECCS) during recirculation and restoring injection from the Refueling Water Storage Tank (RWST);

- gives only modest credit for previous compensatory actions taken by the plant in response to NRC Bulletin 2003-01 and GL 2004-02, such as development of a specific Emergency Procedure and associated operator training to address containment sump blockage; and

- includes conservative assumptions regarding the potential for sump blockage.

The following documents were reviewed to ensure the approach taken in the analysis was reasonable and consistent with industry documents listed below:

- WCAP-16362, *PRA Modeling Template for Sump Blockage* (April 2005),

- NUREG/CR-6771, *GSI-191: The Impact of Debris-Induced Loss of Emergency Core Cooling System (ECCS) Recirculation on Pressurized Water Reactor (PWR) Core Damage Frequency,*

- *NEI 04-07, Pressurized Water Reactor Sump Performance Evaluation Methodology, and the companion NRC SE on NEI 04-07,*

- *LA-UR-02-7562, The Impact of Debris-Induced Loss of ECCS Recirculation on PWR Core Damage Frequency, and*

- *WCAP-16204, Evaluation of Potential ERG and EPG Changes to Address NRC Bulletin 2003-01 Recommendations.*

The methodology described in NEI 04-07 and evaluated in the NRC SE provides guidance for use in evaluating the susceptibility of PWR containment sumps to

blockage resulting from the effects of a postulated LOCA. The evaluation methodology allows for incorporation of either a deterministic evaluation process (Option A) or a risk-informed evaluation process (Option B).

Duke reviewed these and the other documents to determine if any information existed regarding a risk argument to extend the commitment time to install the final sump blockage modifications. The documents listed were not inclusive of all documents that were reviewed. Additional documents were reviewed that included previously submitted and approved risk assessments from other licensees that specifically evaluated the impact of extending the time for implementing the sump modifications.

The results of the PRA demonstrated that the risk associated with extending the modification schedule by 140 days is $\leq$ 1E-6.

Attachment 2
Commitments

1.	Duke will submit a License Amendment Request (LAR) which requests the following: Add a License Condition (LCO) to the Facility Operating License which requires: a. Unit 1 to enter Mode 5 for the outage to install the sump strainer modification no later than May 19, 2008. b. The Unit 1 sump strainer modification to be completed prior to entry into Mode 4 after May 19, 2008. This submittal will be sent to the Commission no later than 11/30/06.
2.	Duke will implement the containment air return fan early manual start procedure and complete initial Operator training (read-packages) by 11/24/06.
3	Duke will complete the following modification work during the Fall 2006 (1EOC16) outage: 1. Piping and Hanger removal and relocation work in support of the ECCS Sump Strainer modification. Removal will take place to the extent possible, as described on Attachment 1. 2. Steam Generator Insulation Modification. 3. Reactor Vessel Head Flange Insulation Modification.
4	Duke will evaluate the need for a trash rack on the ECCS sump strainer and submit a license amendment, if required, by 2/1/2007.

Attachment 3
References

1. Letter, J. R. Morris, Duke Power Company to U.S. Nuclear Regulatory Commission, Dated September 1, 2005, SUBJECT: Duke Energy Corporation, Oconee Nuclear Stations, Units 1, 2, & 3, Docket Nos. 50-269,50-270, 50-287, : McGuire Nuclear Station, Units 1 and 2 Docket Nos. 50-369, 50-370, Catawba Nuclear Station, Units 1 and 2, Docket Nos. 50-413 and 50-414, Response to NRC Generic Letter 2004-02, Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors (ML052500399).

2. Letter, J. R. Morris, Duke Power Company to U.S. Nuclear Regulatory Commission, Dated June 29, 2005, SUBJECT: Duke Energy Corporation, McGuire and Catawba Nuclear Stations, Units 1, and 2, Docket Nos. 50-369,50-370; and 50-413 and 50-414, respectively, Amendment to Allow and Additional Operator Action to Manually Start One Containment Air Return Fan in Response to NRC Bulletin 2003-01 (ML051890090).

3. Letter, M. S. Tuckman, Duke Power Company to U.S. Nuclear Regulatory Commission, Dated November 11, 1998, SUBJECT: Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-413, 414, McGuire Nuclear Station, Units 1 & 2 Docket Nos. 50-369, 370, Oconee Nuclear Stations, Units 1, 2, & 3, Docket Nos. 50-269, 270, 287, Response to Generic Letter 98-04: Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System After a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment.

4. Letter, W. R. McCollum, Duke energy Corporation to U.S. Nuclear Regulatory Commission, Dated August 7, 2003 SUBJECT: McGuire Nuclear Station, Units 1 & 2 Docket Nos. 50-369, 370, Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-413 & 414, Oconee Nuclear Stations, Units 1, 2, & 3, Docket Nos. 50-269, 270, 287, Response to NRC Bulletin 2003-01: Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors (ML032260651).

Attachment 3
References

5. Letter, W. R. McCollum, Duke energy Corporation to U.S. Nuclear Regulatory Commission, Dated May 27, 2004, SUBJECT: Catawba Nuclear Station, Units 1 & 2, Docket Nos. 50-413 , 414, McGuire Nuclear Station, Units 1 & 2 Docket Nos. 50-369, 370, Response to NRC Bulletin 2003-01: Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized Water Reactors (ML041540365).