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SUBJECT: Forwards response to GL 98-02, "Loss of RC Inventory & Associated Potential for Loss of Emergency Mitigation Functions While in Shutdown Condition."

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November 24, 1998

U.S. Nuclear Regulatory Commission
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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 Station Units 1, 2 & 3
Docket Nos. 50 -269, 270, 287
Response to Generic Letter 98-02: Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions while in a Shutdown Condition

On May 28, 1998, the NRC issued Generic Letter (GL) 98-02 to request licensees to assess the susceptibility of their residual heat removal (RHR) and emergency core cooling systems (ECCS) to common-cause failure as a result of reactor coolant system draindown while in a shutdown condition.

Duke has completed its assessment of the ECCS design at Oconee, McGuire and Catawba Nuclear stations to determine whether the plants are susceptible to common-cause failure as a result of events similar to the Wolf Creek Reactor Coolant System (RCS) draindown event.

As a result of this assessment, it was determined that Oconee Nuclear Station is not susceptible to the type of

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events described in the GL. This is mainly because of differences in design features. Oconee has identified three potential flowpaths (Train A Low Pressure Injection (LPI) Pump Recirc to Boron Water Storage Tank (BWST), Trains A & B Reactor Building Spray Pump Recirc to BWST and Trains B & C LPI Pump Recirc to BWST) that have the potential for creating an RCS draindown path to the BWST and subsequently creating ECCS suction voiding; however, none of these paths are connected to the BWST common suction header of the ECCS pumps. Additionally, administrative controls are in place that would preclude the system alignments and maintenance activities that led to the Wolf Creek events.

Catawba and McGuire Nuclear Stations were determined to be susceptible to the events described in the GL and the results of their assessments can be found in Attachment 1 for Catawba Nuclear Station and in Attachment 2 for McGuire Nuclear Station.

I declare under penalty of perjury that these statements are true and correct to the best of my knowledge.

If you have questions or need additional information, please contact Allison Jones-Young at (704) 382-3154.

Very truly yours,

M. S. Tuckman

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Executive Vice President
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Attachments

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ATTACHMENT 1
Catawba Nuclear Station's RESPONSE TO GL 98-02

Catawba Nuclear Station

Response to Generic Letter 98-02

Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions while in a Shutdown Condition

Per GL 98-02, the NRC requested that licensees respond to specific questions related to susceptibility of their residual heat removal and emergency core cooling systems to common-cause failures, and to provide details regarding the controls employed to mitigate any such susceptibility.

The specific requests, and the Catawba responses, are as follows:

1) **Perform an assessment of whether your emergency core cooling systems include certain design features, such as a common pump suction header, which can render the systems susceptible to common-cause failure as a result of events similar to the Wolf Creek RCS drain-down event of September 27, 1994.**

Response: The Residual Heat Removal [RHR] systems for Catawba Units 1 and 2 include a similar layout to Wolf Creek. The design and licensing bases and single failure analyses are presented in the following UFSAR references. Nevertheless, none of these Failure Mode and Effects Analyses (FMEAs) or Active/Passive Failure Analyses identified the potential for incorrect operator action to result in inventory loss at reduced inventory (causing core uncovery) or pressure loss (causing flashing/loss of ECCS & Containment Spray pump suction) due to the common Refueling Water Storage Tank suction line like Wolf Creek.

UFSAR section 6.3 ECCS
UFSAR section 5.4.7 Residual Heat Removal
Table 5-31, FMEA - RHR System Active Components - Plant Cooldown Operation
Table 6-73, FMEA - Containment Spray System

Table 6-91, FMEA - ECCS System - Valves
Table 6-92, Single Active Failure Analysis - ECCS Components
Table 6-94, ECCS Recirc Piping Passive Failure Analysis - Long Term Phase
Table 6-97, ECCS Shared Function Evaluation

Per UFSAR sections 5.4.7 and 6.3, the Catawba RHR System has a high degree of redundancy in both normal and ECCS suction lines, valves and components, including separate decay heat drop lines from two different hot legs of the Reactor Coolant System [RCS] and separate suction lines from the Refueling Water Storage Tank [FWST]. Separate RHR heat exchangers and heat exchanger bypass control valves ensure that one RHR cooling train can be isolated for single failures during normal cooldown, or in the short term or long term as required following a LOCA. Separate RHR pump miniflow lines are provided for each pump, and are controlled by train-separated, safety grade flow instruments. Each RHR pump suction line from the containment recirculation sump is interconnected with only its corresponding train separated Containment Spray pump. Each RHR discharge line also provides a train-separated RHR auxiliary containment spray header. None of the preceding interconnections represents a potential single failure path with consequences similar to the Wolf Creek event, and in addition there are interlocks and automatic features as described in the UFSAR to preclude opening valves from incompatible sources and discharges. Finally, all cross-ties between trains are isolated (or isolatable) by two valves in series. Each of these cross-ties is described below. Note the following systems designations are used in valve tag numbers

NC Reactor Coolant System
ND Residual Heat Removal System
NI Safety Injection System
NV Chemical & Volume Control System
NS Containment Spray System
FW Refueling Water System
FWST Refueling Water Storage Tank

The 2" RHR letdown line, used during Modes 4 and 5, is located between two normally closed motor operated crossover isolation valves, ND-24A and ND-58B. There are no automatic interlocks or actions associated with these valves.

The 3" RHR pressurizer auxiliary spray line, used during cold shutdown, is located between two normally closed (power removed) 2" motor operated crossover isolation valves, ND-90 and ND-91. There are no automatic interlocks or actions associated with these valves.

The 8" RHR return path to the Refueling Water Storage Tank, used during Mode 5 and 6 refueling activities, is located between the two normally open 8" isolation valves, ND-32A and ND-65B. These crossover isolation valves must remain open during power operation to ensure that given a failure of either RHR pump, the remaining RHR pump can provide LOCA flow requirements considering a break on any loop of the RCS. Consequently both RHR trains must be declared inoperable if either of these valves is closed during power operation. Located between these normally open cross-tie valves is the 8" return path to the Refueling Water Storage Tank [FWST], which is isolated by a single Locked Closed manual valve, ND-33. This recirculation path is tied to the common suction line for emergency core cooling system [ECCS] pumps from the FWST. While the preceding interconnections discussed above are all adequately described and evaluated in the referenced UFSAR discussions, this is the interconnection that introduces the potential for Loss of suction to the RHR, Containment Spray and ECCS pumps in a manner similar to the Wolf Creek event.

10CFR 50 Appendix B requires all licensees to have a quality assurance program that recognizes the safety function of structures, systems and components, and ensures those safety functions through appropriate control of the associated design, operation, maintenance, surveillance testing, and training. ND-33 is the isolation valve for the sole pathway that makes Catawba susceptible to an event similar to that which occurred at Wolf Creek. In order to avoid common cause Loss of ECCS

events such as the Wolf Creek Event, Catawba Nuclear Station employs engineering controls, training initiatives, scheduling controls, and operating and abnormal procedures that preclude operating alignments and conditions that would allow such events. Additional controls are present in all applicable modes to ensure recovery from such events.

ATTACHMENT 2

McGuire Nuclear Station's RESPONSE TO GL 98-02

McGuire Nuclear Station

Response to Generic Letter 98-02

Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions while in a Shutdown Condition

Per GL 98-02, the NRC requested that licensees respond to specific questions related to susceptibility of their residual heat removal and emergency core cooling systems to common-cause failures, and to provide details regarding the controls employed to mitigate any such susceptibility.

The specific requests, and the McGuire responses, are as follows:

1) **Perform an assessment of whether your emergency core cooling systems include certain design features, such as a common pump suction header, which can render the systems susceptible to common-cause failure as a result of events similar to the Wolf Creek RCS drain-down event of September 27, 1994.**

Response:
The residual heat removal [RHR] systems for McGuire Units 1 and 2 include a similar layout to Wolf Creek. Eight inch diameter cross-over piping is provided between the two RHR trains, with an isolation valve at each end. Between the two isolation valves, ND-15B and ND-30A, is a recirculation path to the Fueling Water Storage Tank [FWST], which is isolated by a single 8" valve, ND-35. This recirculation path is tied to the common suction line for emergency core cooling system [ECCS] pumps from the FWST.

The recirculation path described above, with ND-35 as the single isolation valve, is the sole pathway identified with the potential to induce both a drain-down of the reactor coolant system, and a simultaneous voiding of the ECCS pumps' suction header.

10CFR50 Appendix B requires all licensees to have a quality assurance program that recognizes the safety function of structures, systems and components, and ensures those safety functions through appropriate control of the associated design, operation, maintenance, surveillance testing, and training. ND-35 is the isolation valve for the sole pathway that makes McGuire susceptible to an event similar to that which occurred at Wolf Creek. In order to avoid common cause Loss of ECCS events such as the Wolf Creek Event, McGuire Nuclear Station employs engineering controls, training initiatives, scheduling controls, and operating and abnormal procedures that preclude operating alignments and conditions that would allow such events. Additional controls are present in all applicable modes to ensure recovery from such events.