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DUKE POWER

September 28, 1993

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Subject: Catawba Nuclear Station, Units 1 and 2
Docket Nos. 50-413 and 50-414
NRC Generic Letter No. 88-17 (Loss of Decay Heat Removal)
Proposed Technical Specifications Changes (TS 4.5.2d)
Residual Heat Removal System Autoclosure Interlock Removal

Gentlemen:

Pursuant to 10CFR50.4 and 10CFR50.90, attached are license amendment requests to Appendix A, Technical Specifications, of Facility Operating Licenses NPF-35 and NPF-52 for Catawba Nuclear Station Units 1 and 2, respectively. The requested amendments allow removal of the residual heat removal (ND) system autoclosure interlock (ACI) feature. These changes will provide a net improvement in safety. Note that this modification was encouraged by the NRC in Generic Letter No. 88-17, "Loss of Decay Heat Removal".

Attachment 1 contains a background and description of the enclosed amendment request. Attachment 2 contains the required justification and safety evaluation. Pursuant to 10CFR50.91, Attachment 3 provides the analysis performed in accordance with the standards contained in 10CFR50.92 which concludes that the requested amendments do not involve a significant hazards consideration. Attachment 3 also contains an environmental impact analysis for the requested amendments. Attachment 4 contains the marked-up Technical Specification amendment pages for Catawba. Duke Power Company is forwarding a copy of this amendment request package to the appropriate South Carolina state official.

Contingent upon approval, Duke Power Company plans to implement this modification during the Unit 1 End-of-Cycle 8 refueling outage (scheduled to begin on February 3, 1995) and the Unit 2 End-of-Cycle 6 refueling outage (scheduled to begin on April 18, 1994). The Technical Specifications must be revised to delete the required ND ACI surveillance to permit implementation of this modification (i.e., prior to removal of the ACI). Therefore, it is requested that NRC review and approval of these proposed amendments be completed by April 1, 1994, in order that the hardware changes with this

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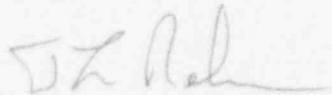
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amendment request can be implemented during these outages. The NRC will be informed of any significant changes to the Unit 2 End-of-Cycle 6 refueling outage schedule.

Since the NRC requires certain plant improvements to be made in order to allow the removal of the ND ACI, and since these improvements cannot be implemented until the Technical Specifications are changed, Catawba will continue to do the surveillances (by administratively implementing the deleted Technical Specifications once this required license admendment is approved) until the modifications can be performed during the refueling outages. This will allow for NRC approval/issuance of the requested license amendments regardless of unit operating status, and for both units at the same time despite the different outage/implementation schedules.

Should there be any questions concerning this amendment request or should additional information be required, please call L.J. Rudy at (803) 831-3084.

Very truly yours,

A handwritten signature in dark ink, appearing to read "D.L. Rehn", written in a cursive style.

D.L. Rehn

LJR/s

Attachments

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xc (W/Attachments):

S.D. Ebnetter, Regional Administrator

Region II

R.J. Freudenberger, Senior Resident Inspector

R.E. Martin

ONRR

Heyward Shealy, Chief

Bureau of Radiological Health, SC

American Nuclear Insurers

M&M Nuclear Consultants

INPO Records Center

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D.L. Rehn, being duly sworn, states that he is Vice President of Duke Power Company; that he is authorized on the part of said Company to sign and file with the Nuclear Regulatory Commission this revision to the Catawba Nuclear Station License Nos. NPF-35 and NPF-52 and that all statements and matters set forth therein are true and correct to the best of his knowledge.


D.L. Rehn, Vice President

Subscribed and sworn to before me this 4 th day of October, 1993.


Notary Public

My commission expires:

Nov. 21, 2000

ATTACHMENT 1

BACKGROUND AND DESCRIPTION OF AMENDMENT REQUEST

Background

As discussed in Sections 5.4.7.2.3 and 7.4.5.1 of the Catawba FSAR, the design of the ND system includes two isolation valves in series on each inlet line between the high pressure reactor coolant (NC) system and the low pressure ND system. These motor-operated gate valves (1&2ND1B and 1&2ND2A on the ND inlet from NC loop B hot leg and 1&2ND36B and 1&2ND37A on the ND inlet from NC loop C hot leg) are normally closed and are only opened for residual heat removal after NC system pressure and temperature have been reduced to the setpoints for ND system operation. Each isolation valve is interlocked with one of the two independent NC system pressure signals. One interlock (the Open Permissive Interlock (OPI)) prevents the valves from being opened when NC system pressure is above 385.5 psig. If the valves are in the open position, the other interlock (the ACI) causes the valves to automatically close when NC system pressure increases to 600 psig. (Note that the actual setpoints of 385.5 psig and 600 psig are conservative with respect to the technical specification required values of 425 psig and 660 psig, respectively, as stated in TS 4.5.2d1a&b.)

The purpose of the ACI is to ensure that there is a double barrier between the NC system and the ND system when the plant is at normal operating conditions (hot and pressurized). The ACI helps to preclude conditions that could lead to a loss of coolant accident (LOCA) outside of containment due to operator error. The sequence of concern is the case in which the operator closes one of the isolation valves and not the other (since if both valves were left open the operator would not be able to pressurize the unit); thus, the operator can pressurize the unit but in turn is subjecting the unit to single failure possibilities.

The primary reasons for removing the ACI are documented in a report from the NRC's Office for Analysis and Evaluation of Operational Data (AEOD), "Decay Heat Removal Problems at U.S. Pressurized Water Reactors" (AEOD/C503). This report, in evaluating the competing risks associated with residual heat removal suction/isolation valve closure and LOCA outside of containment, determined that removing the overpressure interlocks from the residual heat removal suction valves provides the best residual heat removal suction arrangements for pressurized water reactors based upon that analysis. This modification was also encouraged by the NRC in Generic Letter No. 88-17, "Loss of Decay Heat Removal".

Description of Amendment Request

The requested amendment deletes the portion of the eighteen-month surveillance requirement contained in TS 4.5.2d1b associated with verifying that the ND system suction/isolation valves automatically close on a NC system pressure signal. It should be noted that the ND system OPI surveillance requirement remains unchanged, as this interlock feature/function is not being removed. It should also be noted that TS 4.5.3.1 is administratively affected, as it references TS 4.5.2's surveillance requirements. No changes to the TS bases section are required as a result of the ND ACI function removal.

Also, since Catawba does not take credit for the ND system suction relief valves as a means of NC system cold overpressure protection, no changes to the overpressure protection systems specification/bases are necessary. These changes conform to the guidance contained in Section 8.0 of WCAP-11736-A, "Residual Heat Removal System Autoclosure Interlock Removal Report for the Westinghouse Owners Group". The deletion of the ND ACI TS surveillance requirement as discussed above will permit modification of each unit to remove the ND ACI feature.

Also note that the obsolete footnote pertaining to TS 4.5.2e is being deleted, as this footnote is no longer necessary since the Unit 1 first refueling has been completed.

ATTACHMENT 2

JUSTIFICATION AND SAFETY EVALUATION

Justification and Safety Evaluation

WCAP-11736-A provides justification and the technical basis for removing the ACI from the suction isolation valves of the residual heat removal systems at four reference plants and has been deemed an acceptable reference by the NRC for use in making plant-specific licensing submittals. The report provides an analysis that demonstrates that the deletion of the ACI is acceptable from both a core safety and residual heat removal system overpressurization standpoint. The NRC's safety evaluation (SE) for the WCAP concludes that removal of the ACI for Westinghouse plants covered by the WCAP can produce a net safety benefit, provided that five key plant improvements are implemented.

The NRC's SE does not grant permission to remove the ACI for any plant; such permission must be requested on a plant-specific basis. The information in the WCAP can be used to supplement plant-specific requests to remove the ACI from the Westinghouse plants covered by the WCAP. Although the AEOD report concluded that even though it was most likely a good idea to remove the ACI, the effects of ACI removal upon plant safety must be evaluated on a plant-by-plant basis because of numerous plant-specific differences. The WCAP contains such plant-specific analyses for four different groups of plants. While a plant-specific analysis is still required to delete the ACI, substantially less resources would be expended to produce and review such an analysis if reference is made to the concept and methodology presented in the WCAP to show compliance with those items that are not plant-specific. As Catawba Nuclear Station was included in the WCAP, it is being referenced for this Catawba-specific license amendment request. The NRC's SE provides some guidance by summarizing what is expected in the plant-specific submittals.

The Westinghouse plants participating in the WCAP program (including Catawba) were categorized into one of four groups based on residual heat removal system configuration and design characteristics that were similar to one of the four reference plants (Catawba is in Callaway Unit 1's group or Group 2). The applicable reference plant group is intended to provide the best possible fit should a Westinghouse plant choose to delete the ACI by referencing the WCAP (each group has its own specific considerations). The five key plant improvements applicable to Catawba for the ND ACI deletion are summarized as follows:

1. An alarm must be added to each ND suction valve which will actuate if the valve is open and NC system pressure is high.
2. Valve position indication to the alarm must be provided and power to the switches must not be affected by power lockout of the valve.
3. Procedural improvements described in the WCAP should be implemented.
4. Power should be removed from the ND suction valves prior to their being leak-checked, if feasible.

5. ND suction valve operators should be sized so that the valves cannot be opened against full system pressure.

Also, while plant-specific probabilistic risk assessments (PRAs) in addition to the ones performed for the four lead plants are not required, sufficient PRA and safety analyses should be done to ensure the plant (i.e., Catawba) will not show results that will invalidate the conclusions of the WCAP.

A comparison of Catawba Units 1 and 2 to their reference plant (Callaway) was performed (as part of a plant-specific PRA assessment which was conducted for Catawba) to examine the impact of ND ACI removal. The following information is provided to address the Catawba plant-specific aspects of the ND ACI removal as required by the WCAP and the NRC SE. Plant modifications have been developed to incorporate the necessary hardware changes to remove the ND ACI on both units. A description of the proposed hardware changes is as follows:

Wiring revisions will be performed to remove the Train A ACI from the control circuits for valves 1&2ND2A and 1&2ND37A and to remove the Train B ACI from the control circuits for valves 1&2ND1B and 1&2ND36B. Digital optical isolators will be added to separate the safety related power sources from the non-safety related annunciator circuits. Wiring revisions will be performed for applicable penetrations required for valve position indication alarms and deletion of ACIs. Cables for the annunciator circuits will be routed and wiring revisions for the installation of the alarms will be performed.

Catawba's response to each of the above conditions is as follows:

Condition 1 - ND suction valve alarms:

Catawba proposes to add "ND VALVE OPEN AND NC HI PRESS" alarms at annunciators 1&2AD09 in the control room. A single annunciator window will be used for indication for each unit. The four position indications for each unit will be channeled through a reflash monitor to a single window on each annunciator panel. Separate indication to show which specific valve(s) is (are) open (i.e., LEDs on the reflash monitor) will be provided in the Unit 1 and 2 cable rooms.

The safety evaluation in the WCAP states that the alarm setpoint for each suction valve should be greater than the open permissive setpoint and less than the RHR system design pressure minus the RHR pump head pressure. Catawba has an ND open permissive setpoint of 385.5 psig, an ND design pressure of 600 psig, and an ND pump head pressure of 200 psig. Therefore, according to the safety evaluation guidelines the alarm setpoint should be defined by the expression $385.5 \text{ psig} < \text{setpoint} < 400 \text{ psig}$. Catawba proposes a setpoint of 440 psig, which is 10% greater than the upper limit in the above expression. A setpoint of 440 psig will provide adequate notification of increasing reactor coolant pressure while avoiding potential conflicting interaction with the open permissive setpoint of 385.5 psig. Catawba believes that lowering the setpoint would move it too close to the open permissive setpoint. On July 13, 1990, McGuire Nuclear Station submitted a

technical specification amendment request to remove the ND ACI. In that submittal, McGuire also proposed an alarm setpoint of 440 psig and the NRC subsequently approved this setpoint. During conversations between Duke Power Company and the NRC in 1990, the NRC indicated that an alarm setpoint greater than that dictated by the above expression could be acceptable and that the expression was intended as a guideline to keep the value from being picked too high.

Condition 2 - Valve position indication and power:

Catawba proposes to provide valve position indication via limit switches located in the valve actuator. The safety evaluation in the WCAP states that valve position indication to the alarm should be provided from stem mounted limit switches and that power to the limit switches should not be affected by power lockout of the valves. Catawba's ND suction valves do not have stem mounted limit switches and installing them is not feasible. It is Catawba's position that stem mounted limit switches are not required to provide valve position indication. Direct valve position indication is the primary requirement and indication can be achieved through the use of internal limit switch position (operator limit switches) as long as it is not from torque indication. Power lockout of the valves will not affect the indication to the alarm since a separate power supply will be used for the alarm circuit.

The safety evaluation in the WCAP states that the status lights on the operator's panel should remain functional after power has been removed from the valves. Catawba's status lights are supplied by the valve's control circuitry, thus the status lights are not functional after power lockout. It should be noted that the valve circuit for Callaway, the lead plant in Catawba's group, also supplies the indicating lights from the valve control circuitry. It should also be noted that the alarm circuit (annunciator) for Catawba is supplied by a separate power supply.

Condition 3 - Procedural improvements:

Catawba procedures will be reviewed with respect to supporting deletion of the ND ACI per the guidance contained in the WCAP and the requirements contained in the NRC SE. All required procedural changes will be developed and implemented prior to actual deletion of the ACI.

Condition 4 - Power removal from suction valves during leak testing, if feasible:

The purpose of this condition is to provide additional assurance that the valves remain closed during pressurization to normal operating conditions. At Catawba, these valves are leak tested during Mode 5. Following leak testing of the valves in one ND suction line, they are reopened when suction is swapped between the two lines in order to permit leak testing of the valves in the other line. Hence, there is no advantage of removing power to the valves prior to their being leak tested because there is no guarantee that the valves will not be reopened prior to pressurizing the plant to normal operating conditions. The suction valves are eventually closed and power is removed when the ND system is placed in

standby readiness. (At Catawba, power is only removed from three of the four suction valves; ND36B has power maintained to it during normal plant operation to prevent the loss of the interlock between ND36B and NI136B and NS38B). Therefore, there is no need to remove power from the suction valves during leak testing.

Condition 5 - Suction valve operator sizing:

The safety evaluation in the WCAP states that the actuators for the suction valves should not be capable of opening the valves against full reactor coolant system pressure. The valve actuators at Catawba are set at maximum opening torque and the valve control circuitry includes a torque switch bypass in both the open and close circuits. This allows the valve actuators to provide full torque capability to the valve stems during the initial high-load period of unseating at differential pressure conditions, while providing over-torque protection during the intermediate to full open position. The size and setting of the actuators could enable the valves to open on full NC system pressure. Catawba's position is that lowering the torque setting would lessen the ability of the ND suction valves to open when they are needed due to the high initial loads encountered when trying to unseat the valves. Also, there are electrical interlocks in the actuator control circuit that prohibit the opening of the valves when NC pressure is above 385.5 psig. Also, another assurance that the suction valves will not open when the NC system is at full pressure is that three of the four valves will procedurally have power removed from their operators after they are closed, thereby preventing them from spuriously opening. It should also be noted that during 1990 discussions between Duke Power Company and the NRC relative to McGuire's ND ACI deletion technical specification amendment request, the NRC indicated that valve operator undersizing was only a desirable feature (i.e., it provides one additional level of protection) and was not a requirement for amendment approval.

In the WCAP's SE, the NRC stated that licensees submitting amendment requests to delete the ACI should conduct sufficient PRA and safety analyses to ensure that their respective plants do not show results that will invalidate the conclusions of the WCAP. Duke Power Company has conducted an analysis to verify that removal of the ACI for Catawba does not invalidate the WCAP's conclusions. The conclusion of this analysis is that there is no increase in the frequency of an interfacing systems LOCA resulting from the modification to remove the ACI.

ATTACHMENT 3

**NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION
AND ENVIRONMENTAL IMPACT ANALYSIS**

No Significant Hazards Consideration Determination

As required by 10CFR50.91, this analysis is provided concerning whether the requested amendments involve significant hazards considerations, as defined by 10CFR50.92. Standards for determination that an amendment request involves no significant hazards considerations are if operation of the facility in accordance with the requested amendment would not: 1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or 2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or 3) Involve a significant reduction in a margin of safety.

The requested amendments will allow deletion of the RHR ACI feature.

The requested amendments reference Westinghouse topical report WCAP-11736-A, "Residual Heat Removal System Autoclosure Interlock Removal Report for the Westinghouse Owners Group", for the general justification and safety analysis for removing the ACI feature from the Catawba ND suction isolation valves. This WCAP, which specifically covers the Catawba Nuclear Station, has been deemed an acceptable reference by the NRC for use in making plant-specific licensing submittals. Additional Catawba-specific information/improvements and analyses, as required by the WCAP and associated NRC safety evaluation, have been either completed or committed to, thereby ensuring that the WCAP/SE conclusion that removal of the RHR ACI produces a net safety benefit remains valid.

Criterion 1

The requested amendments will not involve a significant increase in the probability or consequences of an accident previously evaluated. The deletion of the RHR ACI was analyzed in the WCAP for Callaway Nuclear Station in terms of (1) the frequency of an interfacing LOCA, (2) the availability of the RHR system, and (3) the effect on overpressure transients. Callaway is the WCAP's reference plant for Catawba Units 1 and 2, and a Catawba-specific Probabilistic Risk Assessment (PRA) review of the WCAP determined that removal of the ND ACI at Catawba will not invalidate the basic conclusions of the WCAP. Consequently, the following information from the Callaway analysis is considered applicable to Catawba Units 1 and 2.

With the removal of the ACI and addition of a control room alarm, the probabilistic risk analysis predicts a decrease in the frequency of interfacing LOCAs from 1.52E-06/year to 1.16E-06/year, a decrease of approximately 24%.

The availability of the RHR system was analyzed in three phases: initiation, short term cooling, and long term cooling. The probabilistic analysis indicated that deletion of the RHR ACI has no impact on the failure probability for RHR initiation. During short term cooling (72 hours after initiation), RHR ACI deletion decreased the RHR failure probability by 12%, from 1.64E-02 to 1.44E-02. The long term cooling RHR failure probability was calculated to decrease by 70%, from 3.91E-02 to 1.17E-02.

Appendix D of the WCAP presents the analysis used to determine the effect of removal of the ACI on overpressurization transients. The analysis categorizes the types of initiating events, determines their frequency of occurrence, and then identifies the consequences of these occurrences both with and without the ACI feature. The result is a list of overpressure consequence categories with associated failure probabilities (reference the WCAP's Appendix D, Tables D-14, -15, and -16). For the charging/safety injection event, consequence frequencies increased on the order of $1.0\text{E-}12$ /shutdown year. This is an insignificant increase, as the overall consequence frequency of the charging/safety injection event is $1.25\text{E-}01$. Likewise, for the letdown isolation with RHR system operable case, one frequency category was increased on the order of $1.0\text{E-}15$. Again, this is insignificant when compared with the total frequency of these events of $1.25\text{E-}01$. For the letdown isolation with RHR system isolated event, the overall consequence frequency was reduced from $4.45\text{E-}01$ to $2.22\text{E-}01$. This occurs because many spurious closures of the RHR isolation valves cause the isolation of letdown. Removing the RHR ACI reduces the frequency of this event by approximately 50%. It is concluded that the removal of the RHR ACI circuitry has an insignificant impact on the frequency of overpressurization events at Callaway (and thus Catawba) Nuclear Station.

Criterion 2

The requested amendments will not create the possibility of a new or different kind of accident from any accident previously evaluated. The effect of an overpressure transient at cold shutdown conditions will not be altered by removal of the ND ACI function. With or without the ACI function, the ND system could be subject to overpressure for which the ND relief valves must be relied upon to limit pressure to within ND design parameters. While it is true that the ACI initiates an automatic closure of the ND suction/isolation valves on high NC system pressure, overpressure protection of the ND system is provided by the ND system relief valves and not by the suction/isolation valves that isolate the ND system from the NC system. (Refer to NUREG-0954, "Safety Evaluation Report related to the operation of Catawba Nuclear Station, Units 1 and 2", Section 5.4.4.3.)

The purpose of the ACI feature is to ensure that there is a double barrier between the ND system and the NC system when the plant is at normal operating conditions (i.e., heated and pressurized) and not in the ND cooling mode. Thus, the ACI feature serves to preclude conditions that could lead to a LOCA outside of containment due to operator error. The safety function of the ACI is not to isolate the ND system from the NC system when the ND system is operating in the decay heat removal mode.

There are several methods to ensure that there is a double barrier between the ND system and the NC system when the plant is at normal operating conditions. First, plant operating procedures instruct the operators to isolate the ND system during plant heatup. Second, the alarm that will be installed as part of this change will annunciate in the control room given an open or intermediate valve position signal in conjunction with a high NC pressure signal. This alarm will alert operators that any of the four suction/isolation valves is (are) not fully closed and that double isolation has not been achieved. In conjunction with this alarm, operators will be trained using an annunciator response procedure to ensure they act to restore double isolation or return to a safe shutdown condition. Third, the Open

Permissive Interlock (OPI), which is not being removed, will prevent the opening of the valves whenever NC system pressure is greater than 385.5 psig.

Since relief valves prevent overpressurization of the ND system during shutdown conditions and since several methods are in place to ensure that the ND system is isolated from the NC system during normal plant conditions, removal of the ACI will not create the possibility of a new or different kind of accident from any accident previously evaluated.

Criterion 3

The requested amendments will not involve a significant reduction in a margin of safety. The ND ACI function is not a consideration in a margin of safety in the basis for any technical specification. Since the probabilistic analysis of the WCAP for Callaway (which is applicable to Catawba as discussed above) indicates that the availability of the RHR system is increased with the removal of the ACI, overall safety will be increased.

In addition, similar amendments for other Westinghouse plants in the past have been determined to not involve significant hazards considerations.

Based upon the preceding analyses, Duke Power Company concludes that the requested amendments do not involve a significant hazards consideration.

Environmental Impact Analysis

The proposed Technical Specification amendment has been reviewed against the criteria of 10 CFR 51.22 for environmental considerations. The proposed amendment does not involve a significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, nor increase individual or cumulative occupational radiation exposures. Therefore, the proposed amendment meets the criteria given in 10 CFR 51.22(c)(9) for a categorical exclusion from the requirement for an Environmental Impact Statement.