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DUKE POWER

July 18, 1991

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

Subject: McGuire Nuclear Station
Docket Nos. 50-369 and 50-370
Proposed Technical Specification Amendment Supplement
Increase Allowable Temperature of the Standby
Nuclear Service Water Pond (SNSWP)
Response to Request for Additional Information

Gentlemen:

By a letter dated February 21, 1991, the NRC staff requested additional information regarding their review of our proposed request to revise the required water temperature and monitoring elevation of the McGuire SNSWP that was submitted by a Duke Power letter dated October 23, 1990. Accordingly, please find attached our response to the questions (Attachment 1).

Please note in response to Question #2, after further evaluation of the proper elevation for the temperature probe, 722 feet was determined to be the proper location instead of 718 feet which was initially proposed. Since this new elevation of 722 feet affects our initially proposed Technical Specifications (TS) Amendment, we have included a new marked page reflecting the current desired changes to the TS (Attachment 2). This elevation change to 722 feet is more conservative and, therefore, does not significantly impact the Justification and No Significant Hazards Analysis provided in our original TS submittal dated October 23, 1990.

If you have any questions regarding our response or the amendment request, please contact David V. Ethington at (704) 373-2025.

Very truly yours,

M. S. Tuckman

M. S. Tuckman, Vice President
Nuclear Operations

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Attachments
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xc: (w/Attachments)

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ATTACHMENT 1
DUKE POWER COMPANY
MCGUIRE NUCLEAR STATION
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

**NRC QUESTION 1**

Identify specifically what the applicable design basis inlet temperature assumptions are for those safety-related systems and components that credit the Standby Nuclear Service Water Pond (SNSWP) as a source of cooling or makeup water. If the design assumptions were changed to accommodate the higher SNSWP temperature of 82°F, provide applicable details.

**DPC RESPONSE 1**

As discussed in attachment 1 of the October 23, 1990 proposed technical specification amendment request, the SNSWP is the back-up source of water for the Nuclear Service Water (RN) system. In addition, the SNSWP is one part of the Ultimate Heat Sink for McGuire. During abnormal or emergency operations, the SNSWP is the assured source of water for one train of the RN system
("B" essential Header). In the event that the Cowans Ford Dam is lost resulting in a loss of Lake Norman (i.e. seismic event), both trains of the RN System can be realigned to the SNSWP. Additional details regarding the SNSWP and the RN system can be found in section 9.2.2 of the McGuire FSAR.

As stated above, the SNSWP is the safety related source for the RN system and is the Ultimate Heat Sink. In turn, the RN System provides assured cooling water for various Auxiliary Building and Reactor Building heat exchanger during all phases of station operation. There are two redundant "essential headers" serving two trains of equipment necessary for safe shutdown. The following is a list of safety related systems and components that, through the RN system, take credit for the SNSWP;

Component Cooling Pump Motor Coolers
Centrifugal Charging Pump Motor Coolers
Safety injection Pump Motor Coolers
Air Handling Fan Coil Unit (AHU) for the Containment Spray Pump Motor
AHU for the Residual Heat Removal Pump Motor
AHU for the Fuel Pool Cooling Pump Motor
Nuclear Service Water Pump Motor Coolers
Containment Spray Heat Exchangers
Diesel Generator Heat Exchangers
Component Cooling Heat Exchangers
Centrifugal Charging Pump Bearing Oil Coolers
Centrifugal Charging Pump Gear Oil Coolers
Control Area Ventilation System Condensers

Auxiliary Feedwater Pump Motor Coolers
Assured Auxiliary Feedwater Supply
Assured Fuel Pool Makeup Supply
Assured Diesel Generator Cooling Water Makeup Supply
Assured Component Cooling Water Makeup Supply
Safety Injection Pump Bearing Oil Coolers

The only systems and components impacted by the increase in the SNSWP Temperature are Containment Spray (NS) heat exchanger and Component Cooling (KC) heat exchanger. All the other systems and components identified above are not impacted by the proposed increase in water temperature for the SNSWP. For those systems and components, the design basis inlet temperature assumption was that the temperature be maintained below 95°F, thus no changes to the design assumption to accommodate the higher temperature of 82°F is necessary.

As discussed in the October 23, 1990 submittal, the impact of the higher inlet temperature on the NS, KC, and the ND heat exchangers was evaluated by re-analyzing the containment peak pressure analysis. The results of the analysis was provided by attachment 3 of the October 23, 1990 letter and additional information regarding the analysis is provided in our responses to questions 3 and 4

**NRC QUESTION 2**

Provide technical justification which supports the assumption that warmer water from elevations higher than 718 feet in the SNSWP will not be introduced as a result of the flow dynamics involved.

**DPC RESPONSE 2**

We have re-visited the calculations regarding the location of the SNSWP temperature probe and determined that a probe elevation (EL) of 722 feet will ensure that no significant volume of water greater than 82 degrees F will be drawn into the intake during the first 12.5 hours of an accident. Placing the probe at EL 722 MSL provides 145 acre feet of cool water above the top of the intake opening at the start of the accident. During the first 12.5 hours of the accident , 85 acre feet of water is drawn into the plant. Therefore, 12.5 hours into the accident there are 60 acre feet of "cool" (< 82° F) water remaining in the pond. This corresponds to the volume of water in the pond below EL 713, providing 7.5 feet of cool water above the intake opening.

Since any warmer water in the pond will be more bucyant in proportion to its temperature, a substantial volume of warmer water will not be drawn into the intake within the first 12.5 hours of an accident.

NRC QUESTION 3

The information pertaining to peak containment pressure that was provided in the amendment application is not consistent with the information contained in Section 6.2 of the Updated Final Safety Analysis Report. Provide clarification.

DPC RESPONSE 3

Based on our review, the only actual difference in terms of input assumptions between the information sent and the updated FSAR is the initial ice weight. The updated FSAR has the reduced ice weight of $1.89 \times 10^6$ lbs. Please note that the NRC staff has reviewed and approved by a separate activity a technical specification amendment request regarding the Ice Condenser reduced ice weight.

The other inconsistencies identified by our review, result from differences in format and from several errors found in the updated FSAR. The information provided with the amendment application is a copy of a Westinghouse package containing analytical results typically submitted to Duke Power to be used for updating the FSAR. Therefore, differences between these two documents in terms of information being presented are frequently found. The errors identified as a result of the review will be corrected for the 1991 update. The errors found are:

1) The RWST water temperature was modelled at 105°F not 100°F.

2) The containment structural heat sinks in table 6.2.1-17 of the FSAR are incorrect, the correct values are those transmitted with the initial Technical Specification Amendment request.

3) The heat transfer coefficient for the containment spray heat exchanger is $1.47 \times 10^6$ BTU/hr-°F not $2.94 \times 10^6$ BTU/hr-°F.

4) The Table 6.2.1-16 has not been updated. The correct table is attached.

TABLE 6.2.1-16

ECCS AND SPRAY FLOW RATES[1] ASSUMED IN CONTAINMENT PRESSURE CALCULATION

| Interval (sec.) | ECCS FLOW from RWST | SPRAY FLOW from RWST | ECCS FLOW from Sump | SPRAY Flow from Sump | Auxiliary Spray Flow from Sump |
|---|---|---|---|---|---|
| 0 - 45 | 0 | 0 | 0 | 0 | 0 |
| 45 - 1886.9 | 4857[2] | 3400 | 0 | 0 | 0 |
| 1887 - 2036.9 | 1064 | 3400 | 3793 | 0 | 0 |
| 2037 - 2999.9 | 0 | 3400 | 3917* | 0 | 0 |
| 3000 - 3319.9 | 0 | 3400 | 624 | 0 | 2400 |
| 3320 - 3499.9 | 0 | 0 | 624 | 0 | 2400 |
| 3500 - End of Transient | 0 | 0 | 624 | 3432 | 2400 |

[1] All flow rates in gpm

[2] This assumes 3793 gpm from the Residual Heat Removal pump plus 603 gpm from the Safety Injection pump and 461 from the Centrifugal Charging pump.

* Recirculation - RHR Flow

NRC QUESTION 4

The input assumptions used in the peak containment pressure analysis have changed significantly from those that were originally reviewed by the NRC. Provide the basis for each of the current input assumptions, or reference licensing documents that have been submitted which explain the bases for these assumptions. Also explain why it was necessary to make changes to those assumptions that have changed.

DPC RESPONSE 4

The input assumptions that have been changed from those originally submitted as part of the License Application for a Facility Operating License (FOL) are as follows:

- Initial ice mass
- Nuclear Service Water temperature
- Containment structural heat sinks
- RWST water temperature
- Active sump volume
- Auxiliary spray flow from the sump
- Nuclear Service Water flow to the Containment Spray and to the Component Cooling heat exchanger

Each of the above changes identified above were made in accordance with the provisions of 10CFR50.59. A brief discussion/explanation for each of the above changes are as follows:

**Initial Ice Mass**

1.89 x $10^6$ lbs

explanation:
The basis for this change can be found in a proposed Technical Specification Amendment request that was submitted by a Duke letter dated June 7, 1990. NRC approved the reduced ice weight amendment request on June 12, 1991.

**Nuclear Service Water temperature**

82°F

explanation:
This input change is the subject of this amendment application.

**Containment structural heat sinks**

The new containment structural heat sinks was provided with the October 23, 1990 submittal.

explanation:
The original structural heat sinks used for the McGuire model were significantly different than the numbers used for the later Catawba model. Since the differences could not be justified, the structural heat transfer areas were recalculated. As expected, the discrepancies were negligible, so that we now use the same structural heat sinks data for both plants.

**Heat Exchanger heat transfer coefficients**

Containment Spray: $1.47 \times 10^6$ BTU/hr-°F

explanation:
Due to fouling of the heat exchanger the original assumption for the heat transfer coefficient of $2.94 \times 10^6$ BTU/hr-°F could not be met. The current value was arrived at by engineering calculations and plant data.

Component cooling water heat exchanger: $1.60 \times 10^6$ BTU/hr-°F

explanation:
The tubes in the KC heat exchanger are exhibiting an increased tendency to pit and, therefore, additional tube plugging may be required in the near future. The current value of $1.6 \times 10^6$ BTU/hr-°F was arrived at by Westinghouse through a sensitivity study, by reducing the original value of $5.0 \times 10^6$ BTU/hr-°F such that the peak containment pressure remained below 14.8 psig

**RWST Water temperature**

105°F

explanation:
this input was originally 120°F. To gain margin to the containment design pressure, this temperature was later reduced. The current value is still conservative because the Technical Specification maximum is 100°F.

**Active sump volume**

90,000 $ft^3$

explanation:
The Westinghouse model divides the sump into an active and inactive sump. The active sump is located within the crane wall and the inactive sump is located outside the crane wall. The excess water that spills into the inactive sump is no longer available for the safety injection or spray flow. At McGuire the suction piping for the recirculation flow was changed and is now located outside the crane wall. Therefore both sump regions can now be considered active. This modification resulted in an increase from the original volume of 46,000 $ft^3$ to the current value.

**Auxiliary spray flow from the sump**

2400 gpm

explanation:
This input was increased from originally 1,623 gpm in order to achieve a safety margin. The new value is based on an engineering calculation.

**Nuclear Service Water flow to the containment spray and to the component cooling heat exchanger**

3,800 gpm/5,500 gpm

explanation
The original flows of 5,000 gpm/8,000 gpm could not be met. Plant data and engineering calculations required a reduction of the flow rates for both heat exchanger.