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Subject: Arkansas Nuclear One - Unit 2
Docket No. 50-368
License No. NPF-6
Containment Cooling Response Time Technical Specification Change Request - Additional Information (TAC No. M92066)

Gentlemen:

By letter dated April 4, 1995 (2CAN049508), Entergy Operations submitted a technical specification change request to revise the ANO-2 containment cooling response time as a result of a modification to the service water system to protect components from the potential for severe water hammer events. Subsequent conversations with the NRC Staff have been held in which additional information was requested. Please find attached the requested additional information. Should you have any further questions, please contact me.

Very truly yours,

Dwight C. Mims

Dwight C. Mims
Director, Licensing

DCM/gra

Attachments

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RESPONSE TO NRC QUESTIONS

1. The submittal does not discuss the effects of the delayed containment cooler response time on long-term containment performance and on equipment qualification requirements. These issues must be addressed.

Response:

The current containment environmental qualification and long-term containment performance conditions are conservatively based on a constant service water temperature of 120 °F. This temperature is a very conservative estimate of the actual service water temperatures expected following a DBA LOCA. As was credited in the analysis for the containment cooling response time technical specification change, the initial service water temperature will be less than 105°F. Taking credit for this reduced temperature for a very short period of time (200 seconds) ensures that the containment conditions are still bounded by the original safety analysis report values and the current environmental profile. Although no explicit evaluation was performed with the longer containment cooler response time with respect to the long term containment conditions, a 7.9 second delay in the actuation of the coolers has no significant impact on the overall containment conditions. Additionally, the conservative assumption of 120 °F for the full duration of the current containment analysis and the environmental qualification profile will more than offset any slight impact from the longer containment cooler response time.

2. The licensee's analysis assumes a service water temperature of 105°F based on the emergency cooling pond TS temperature limit that currently exists. The staff requires additional explanation of the role that service water plays during the event and justification for using a service water temperature that is less than the temperature that was assumed in the original accident analysis. The licensee must demonstrate that the assumed service water temperature is bounding for the postulated accident condition, including consideration of in-containment heating effects on service water as a result of the accident condition.

Response:

Service water is utilized by both the containment fan coolers and the shutdown cooling heat exchangers to remove energy from containment. As indicated above, the current containment analysis and environmental qualification profile is based on the assumption of 120 °F service water temperature. The use of a constant 120 °F service water temperature was due to the older versions of COPATTA (Bechtel's containment analysis code) not allowing a variation in the service water temperature. As such, a conservative value for the service water temperature was assumed for the full duration of the event. The actual service water temperature will vary with time based on the supply source, heat load, meteorological data, and initial ECP temperature. The newer versions of COPATTA allow for a time dependent service water temperature. To help offset the slight increase in the containment cooler response time, the peak containment conditions were assessed with a service water temperature of 105°F for the first 200 seconds. As

discussed in the technical specification change submittal, the peak containment pressure occurs within 152 seconds of the initiating event. Any heating of the service water inside containment will aid in the total energy removal from containment. Energy added to the service water in this manner reduces the energy that needs to be removed by the containment coolers and shutdown cooling heat exchangers.

The assumption that service water will be at 105°F for the first 200 seconds is still conservative. The technical specifications require that the initial emergency cooling pond temperature be ≤ 100°F. As shown in section 9.2 of the ANO-2 Safety Analysis Report, the emergency cooling pond is a kidney shaped pond with the service water suction and discharge at opposite ends of the pond. Calculations have been performed which demonstrate that the transport time from the discharge to the suction piping is much greater than 200 seconds; therefore, the actual temperature at the suction to the service water system should not change in the first 200 seconds following the initiating event.

3. The licensee's analysis uses 17.1 seconds for the delay time to maintain the containment cooling service water valves closed until the service water pumps start and the slow refill has occurred, and the delay time for 10% opening of the containment cooling service water inlet valve and full opening of the outlet valve are 1.4 seconds and 14.2 seconds , respectively. The staff requires additional explanation of specifically how these delay times were arrived at. Explain why the additional 17.1 second delay time only results in an overall change of 7.9 seconds in the TS requirement. For comparison, the staff also requires a breakdown of the delay times associated with the 28.1 seconds that is referenced for the case when off-site power is available.

Response:

The existing technical specification required response time for containment cooling is 28.1 seconds with offsite power available. Before the modification to eliminate water hammer concerns is installed, the limiting component in the system response time is the start of the cooling fan. Based on the cooling fan, the system response time with offsite power available contains the following individual component times:

1.6 sec.	ESFAS instrument response time
18.2 sec.	Sequencing time for the fan
1.8 sec.	10% tolerance on the sequencing time (10% of 18.2)
6.5 sec.	Fan acceleration time
28.1 sec.	Total response time

Currently, the limiting component in the system response time with a loss of offsite power is also the containment cooling fan, which has a response time of 43.1 seconds (28.1 seconds + 15 seconds for the diesel generator start time.) The service water system modification does not change the containment cooling fan response time. With the added delay in the isolation valve logic to address the water hammer concerns, the isolation valve becomes the limiting component in the response time for the containment cooling system.

Since the delay is only being added when offsite power is not available, it does not affect the 28.1 second response time when offsite power is available.

Based on the isolation valve as the limiting component, the system response time without offsite power available contains the following individual component times:

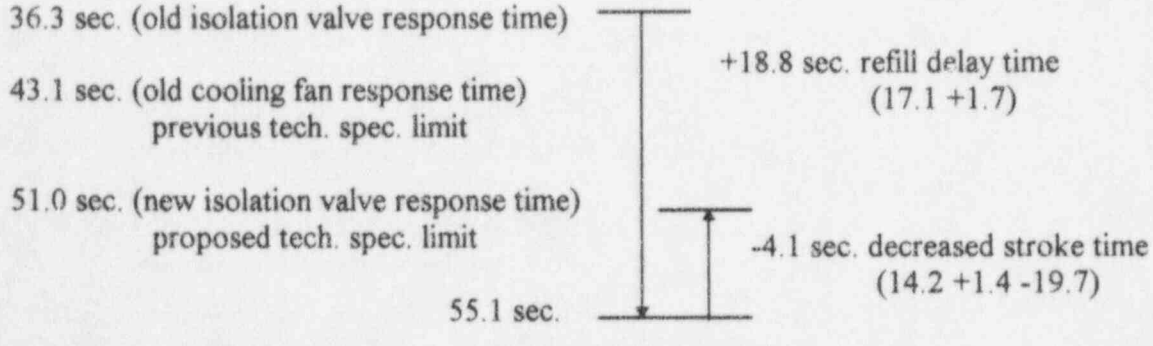
1.6 sec.	ESFAS instrument response time
15.0 sec.	Emergency diesel start time
17.1 sec.	Delay time for refilling the service water piping Total delay time for refilling is the sum of the SW pump sequencing time plus 10% tolerance on the sequencing time(6.0 sec. + 0.6 sec.) and the refilling time (10.5 sec.) (6.0 sec. + 0.6 sec. + 10.5 sec. = 17.1 sec.)
1.7 sec.	Uncertainty in total refill time (10% of 17.1 sec.)
14.2 sec.	Inlet and outlet valve stroke time
1.4 sec.	Delay before outlet valve begins to open (10% of inlet valve stroke time) Total valve stroke time (14.2 sec. + 1.4 sec. = 15.6 sec.)
51.0 sec.	Total response time

The addition of the delay time and uncertainty (17.1 seconds + 1.7 seconds) for refilling the service water piping only results in a 7.9 second increase in the system response time for two reasons: 1) the change in the limiting component from the cooling fan to the isolation valves for the system response time without offsite power, and 2) a decrease in the stroke times of the isolation valves.

The response time of the containment cooling isolation valves before the modification was made contained the following component response times:

1.6 sec.	ESFAS instrument response time
15.0 sec.	Emergency diesel start time
19.7 sec.	Isolation valve stroke time
36.3 sec.	Total system response time

Therefore, the combined effect of the change in the limiting component response time, the added delay times, and the decreased valve stroke time is an increase in system response time of 7.9 seconds.



4. To the extent the bypass valves that are being installed are also containment isolation valves, additional considerations and requirements may be necessary. This issue must be addressed.

Response:

As part of the design change process at ANO many design considerations are evaluated with each Design Change Package (DCP). For the DCP associated with this modification the containment isolation valve requirements for the installed bypass valves were addressed. The bypass valves are containment isolation valves with remote manual capability. These valves are being added to the list of containment isolation valves in the safety analysis report. The DCP also adds manual valves on either side of the bypass valves which may be used to isolate containment. The addition of these valves does not affect the containment cooling response time.

5. Given the system modifications and the delay times that are proposed describe how the system design adequacy and component operability will be confirmed through initial post-modification testing and assured periodically thereafter through routine periodic testing and surveillance activities.

Response:

In accordance with 10 CFR 50 Appendix B Criterion XI, "Test Control," the DCP provides detailed post-installation testing requirements and acceptance criteria. The testing includes:

a) Full voiding and refilling of the containment coolers and piping via the new bypasses,

b) Motor-operated valve testing, and

c) Engineered Safety Features Actuation System testing of the inlet and outlet valves with offsite power available and with simulated loss of offsite power.

The requirement which is being changed by the proposed technical specification change request is the periodic surveillance which demonstrates the design adequacy and component operability for the containment cooling system response time. The specified response time is in Table 3.3-5 of the technical specifications. This table is referenced by Limiting Condition for Operation 3.3.2.1 as the acceptance criteria for Surveillance Requirement 4.3.2.1.3. Upon approval of this technical specification change, appropriate changes will be made to the surveillance procedures which implement this surveillance requirement.