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SUBJECT: Forwards response to request for addl info re ceratin aspects of main steam line break protection circuitry.

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April 13, 1998

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Proposed Revision to Technical Specifications
Technical Specification Change # 95-03
Response to Request for Additional Information #2

In letters dated July 15, 1997, February 9, 1998, and March 3, 1998, Duke submitted a proposed amendment to the Oconee Nuclear Station (ONS) Technical Specifications to address the newly installed main steam line break protection circuitry.

In an information request via electronic mail dated March 11, 1998, the NRC staff requested additional information regarding certain aspects of the main steam line break protection circuitry. Please find the response to this request for additional information in Attachment 1.

Attachment 2 contains the replacement amendment pages for the proposed amendment, along with instructions for replacing the pages. The purpose of these new pages is: 1) to delete reference to the probability of a main steam line break in the basis of Specification 3.5.7, and 2) to change all surveillance periodicities from "refueling outage" frequency to "18 month" frequency in accordance with an amendment approved by the staff on February 26, 1998.

A001

If there are any additional questions, please call David Nix at (864) 885-3634, or Ed Burchfield at (864) 885-3292.

Very truly yours,

W R McCollum /

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Attachments

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ATTACHMENT 1

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Question #1:

Attachment 3, page 4, para 3, states "A loss of offsite Power......FDW control valves closed." The licensee should provide additional information to justify this claim.

Response #1:

The feedwater control valves are supplied by two redundant subsystems of the Oconee Instrument Air System. These two systems are the Instrument Air System and the Service Air System. In the event that all of the air sources (compressors) to these two air systems are lost due to a loss of offsite power (LOOP), a sufficient air inventory exists in the reservoirs of these two systems to provide air to close the Main Feedwater (FDW) control valves within 25 seconds of the initiation of the MSLB circuitry.

The FDW control valves are required to close in 25 seconds for a MSLB, without a LOOP, to preclude containment overpressurization. A MSLB without a LOOP is more limiting than a MSLB with a LOOP with regard to FDW control valve closure time. As such, an analysis has not been done to determine the required closure time for the FDW control valves in the event of a MSLB/LOOP. Therefore, the capability to close the FDW control valves in 25 seconds for a MSLB/LOOP also contains some design margin.

Question #2:

Attachment 3, page 5, para 2, last but second sentence: Credit for Functional test during refueling outage is not conservative; usually functional tests are conducted more frequently. So not much credit can be claimed for use of components which are not safety related or single-failure proof when their functional tests are conducted during refueling outage only. In fact, the licensee needs to provide adequate justification to perform the functional test on refueling outage described in Attachment 3, page 13.

Response #2:

In order to perform a test which fully verifies the MSLB circuitry-related function for the feedwater control valves, the associated unit must be in the cold shutdown mode. The unit must be in cold shutdown because the decay heat removal mode must be established via the Low Pressure Injection (LPI) System. This allows the steam generator mode of decay heat removal to be unavailable so that the feedwater control valves can be satisfactorily tested. Testing of the feedwater control valves during the Operation at Power or Hot shutdown modes is impractical since testing in these modes could subject the plant to undesirable transients.

Question #3.

Attachment 3, page 9, para 2, last sentence, "72 hours is considered adequate given the low probability of a MSLB inside containment." Need clarification how the low probability of MSLB can justify the 72 hour operation with one channel of FW isolation inoperable.

Response #3:

A proposed allowed outage time of 72 hours was selected because it is consistent with other similar types of protective circuitry, such as in Specification 4.8 for the main steam stop valve control circuitry, and because 72 hours permits appropriate maintenance activities to be completed if needed.

Duke concurs with the staff that the statement in Specification 3.5.7 Bases, "The completion times are considered adequate given the low probability of a MSLB accident", is not necessary, and can be deleted. Accordingly, Attachment 2 contains the revised Specification 3.5.7 Bases page.

Question #4:

Attachment 3, Page 9, para 3, last sentence, and page 10, para 3, last sentence: As such the ISTS does not cover these issues.

Response #4:

After further review, Duke agrees that Item #1 is not consistent with NUREG-1430. It appears that Duke erroneously referenced the Oconee ITS, instead of the stated ISTS. NUREG-1430 requires, upon inoperability of the MSLB circuitry, that a mode below the arming setpoint of the circuitry be achieved in 12 hours (750 psig for ISTS, 700 psig for Oconee ITS). Oconee's current licensing basis typically requires Mode 3 (Hot shutdown) to be achieved within 12 hours for situations such as Technical Specification 3.0 or as a result of other highly safety significant LCOs. Duke believes that achieving hot shutdown in 12 hours, plus the allowance of an additional time of 6 hours to further reduce steam pressure less than 700 psig, is consistent with the existing specification requirements. These time allowances are commensurate with the safety function of the MSLB circuitry, which is for containment overpressurization protection.

Duke believes that Item #2, however, is consistent with NUREG-1430 requirements. For the operability of feedwater control valves, Section 3.7.3, Action B of NUREG-1430 allows 8 hours from time of discovery to close the affected feedwater control valve(s), and allows a 7-day periodicity to verify closed the affected feedwater control valves thereafter. Duke believes that these time allowances are also commensurate with the safety function of the MSLB circuitry and associated components, which are for containment overpressurization protection.

Question #5:

Attachment 3, page 13, para 2: Need supporting information from the study conducted to justify the claims made.

Response #5:

A study to determine the appropriate testing frequency for the circuit function verification test was conducted using standard PRA reliability analysis techniques. Specifically, this analysis entailed a fault tree analysis of functional failure of the system due to component failures, maintenance unavailability, or human error. Functional failure for this system is defined as a failure following a steam line break to isolate feedwater flow to the faulted steam generator. Seven different test cases were examined corresponding to seven different potential test intervals.

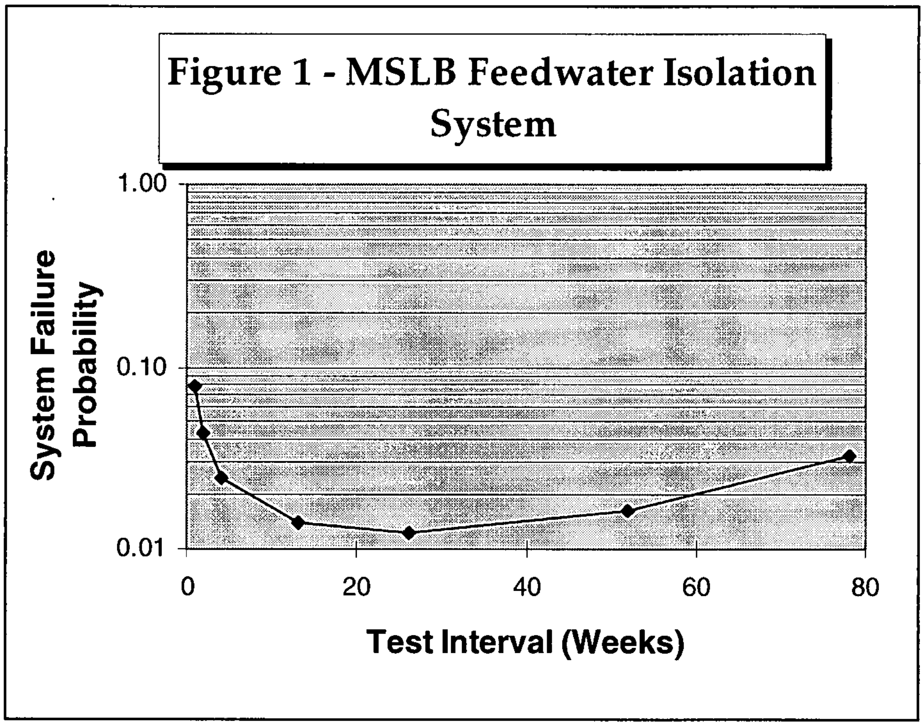
For each test case a different set of failure data was developed incorporating the maintenance unavailability and exposure time associated with the length of the test interval. The duration of each test is assumed to be 12 hours. The exposure time is simply one-half the mean time between tests, and is used to estimate the failure probability of certain components with time-dependent failure rates that can not be verified operable without testing. For components where a failure is indicated by alarms or can be detected by operators checking control board indications on "shift rounds", the mean unavailability was assumed to equal the hourly failure rate (/hr) times 18 hours (6 hours to discover plus 12 hours to repair). Table 1 below shows the corresponding maintenance unavailability and exposure time for each of the seven cases.

Table 1 - Feedwater Isolation Train Unavailability

	Test Frequency	Tests Per Year	Maintenance Unavailability	Mean Exposure Time (Hrs)
Case 1	Weekly	52	0.0714	78
Case 2	Bi-Weekly	26	0.0356	168
Case 3	Monthly	12	0.0164	360
Case 4	Quarterly	4	0.0055	1092
Case 5	Semi-Annual	2	0.0027	2190
Case 6	Annual	1	0.0014	4380
Case 7	Every RFO	N/A*	0.0000	6570

*Note: Maintenance unavailability doesn't count while unit is shutdown.

The analysis also considered common cause failure of similar redundant components and the potential for human errors that would render the system inoperable. The results shown in Figure 1 below show the competing influences of maintenance unavailability and system reliability.



Based on these results, the lowest "system" failure probability is achieved with a semi-annual test interval. While a semi-annual test frequency is optimal from a system reliability standpoint, a test frequency of every refueling outage provides a high level of reliability that is not significantly different than the semi-annual test frequency.

A refueling outage frequency is also more appropriate given the low impact of steam line break events on core damage risk. The risk of core damage from a main steam line break (MSLB) was shown to be very low in the Oconee IPE study and the more recent Oconee PRA Rev. 2 Update analysis. Furthermore, the primary purpose of the system is for the prevention of containment overpressurization from a MSLB inside containment and does not provide core damage mitigation. The fraction of MSLB events located inside containment is estimated to be less than 10 percent of the total frequency of all MSLB events. Because of these factors, it is concluded that a small decrease in the reliability of the system would not impact plant risk. Therefore, this reliability is considered satisfactory for this safety function.

Another aspect of interest in considering the test frequency is the potential risk of feedwater transients caused by inadvertent actuation of the circuitry during testing of the system. Hypothetically, the more often the system is tested, the more often the plant would be exposed to potential errors which could lead to system actuation. While this type event is not expected to have a high frequency, this risk partially offsets potential safety gains for MSLBs through more frequent system testing. System testing conducted during refueling outages or other cold shutdowns, however, avoids the risk of inadvertent actuation altogether.