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SUBJECT: Discusses NRC concerns re possibility of opening flowpath from upper surge tank to hotwell via hotwell Emergency Markup 2 flowpath. Concerns unwarranted based on relative occurrence frequency.

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September 20, 1985

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. J. F. Stolz, Chief
Operating Reactors Branch No. 4

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287

Dear Sir:

During the NRC/consultants review of the Oconee Probabilistic Risk Assessment (PRA), some concern has been raised regarding the significance of a set of event sequences analyzed in the Oconee PRA study. The concern deals with the possibility of opening the flowpath from the upper surge tank to hotwell via the Hotwell Emergency Makeup #2 flowpath. The Oconee Probabilistic Risk Assessment has shown that a complete loss of instrument air will cause valve C-176 to open in this flowpath, draining the upper surge tank and causing a loss of suction to the EFW pumps. Loss of suction to the EFW system, concurrent with multiple human errors and equipment failures, could result in severe core damage.

The dominant set of event sequences in the Oconee PRA is comprised of a loss of instrument air as an initiating event (probability = 0.17), followed by a failure of the operator to switch suction sources to the turbine driven EFW pump (0.15), operator failure to initiate HPI cooling (0.01), and operator failure to initiate EFW from the Standby Shutdown Facility (0.1). An important component in the scenarios is pneumatic valve C-176. The valve begins to open within 30-40 minutes if instrument air is not restored, and starts to drain the upper surge tank (a source of water for the EFW system) to the hotwell - an alternate source of water for the EFW system. The significance of the sequences resulting from these failures is greatly reduced by several key considerations.

First, the Oconee PRA estimates the mean annual core melt frequency to be 2.5×10^{-4} . The sequences of interest are expected to occur with an annual frequency of 4.7×10^{-6} . The contributions of these sequences are thus considered minimal with respect to core melt frequency. As is seen in the dominant sequence the quantification of these specific sequences is almost entirely an exercise in human errors probability assessment. Recent Duke calculations show that one hour would be more appropriate for the time required by the operators to restore instrument air as opposed to 2-6 hours (assumed in the PRA). The shorter recovery period would arguably increase these failure probabilities, however quantification of such an increase is a highly subjective process. In a recent review of the Oconee PRA, Brookhaven National Laboratory (BNL) increased the human error failure probability for restoration of instrument air from 0.055 to 0.5. Such a large increase is clearly conservative and results in a bounding value for the sequence's probability of occurrence. Experience at Oconee during previous loss of instrument air events showed that the operators acted quickly and competently analyzing problems and restoring this support system. This indicates that the BNL review may have overestimated this human error probability.

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Secondly, the upper surge tank is not the sole source of water to the motor-driven pumps, as the PRA assumes. The operator is able to switch suction sources to the hot well by manual action. This consideration would further reduce the occurrence probabilities for these sequences.

Finally, the occurrence of these sequences of events concurrent with multiple human errors and equipment failure resulting in severe core damage is considered by Duke to be extremely remote. However, a modification to air-operated valve C-176 is planned for the near future which would resolve this concern. Meanwhile, Duke Power has taken an interim measure to close valve C-175, the manual isolation block valve upstream of valve C-176. This interim measure would prevent the potential for upper surge tank drainage following loss of instrument air.

In conclusion, significant concerns over the aforementioned sequences are unwarranted based on relative occurrence frequency, conservatisms in the quantification, the interim closure of upstream valve C-175 and planned modifications for valve C-176.

Very truly yours,



Hal B. Tucker

MAH:slb

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