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SUBJECT: Forwards summary of preliminary ASP analyses re LERs 269/92-04,92-05 & 92-08.

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DUKE POWER

June 24, 1993

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269,-270,-287
Preliminary Accident Sequence Precursor Analyses

By letter dated June 2, 1993, the NRC staff requested comments on the preliminary Accident Sequence Precursor (ASP) analysis regarding LER 269/92-04 and 269/92-05 (Reactor Trip with One Emergency Feedwater Pump Inoperable) and LER 269/92-08 (Emergency Power Unavailable). A summary of the review of the preliminary ASP analyses is attached. Detailed evaluations of the subject events by Duke Power Company indicate that the events should not be classified as accident sequence precursors.

Very Truly Yours,

J. W. Hampton

J. W. Hampton

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DUKE COMMENTS ON THE PRELIMINARY ORNL/ASP
EVALUATION OF LER 269/92-004 AND LER 269/92-005

General Remarks

The event described in the subject precursor analysis is a trip caused by a pressure transient in the main feedwater system at Oconee. Following the event, it was discovered that one of two emergency feedwater control valves, valve FDW-315, did not open. This event has been evaluated by consultants at Oak Ridge National Lab (ORNL) and found to have a conditional core damage probability (CCDP) of 9.6E-06. Events, such as this one, with a CCDP quantified greater than 1.0E-06 are considered to be accident sequence precursors.

The following typographical errors are noted:

Figure B.15 should read "...compared with other Oconee 1 potential events"

Under B.9.4 "...the non recovery estimate was set to 0.26...", however, 0.12 is used in actual solution.

It is noteworthy that a previous event identified by Oak Ridge as a precursor, LER 287/91-007, 269/91-009 (NUREG/CR-4674, Volume 16, Page B-157) also involved a failure of valve FDW-315.

Characterization of Plant Response

The dominant core damage sequence for a similar transient in the Oconee PRA includes a failure to recover feedwater, a failure of emergency feedwater and a failure to initiate high pressure injection. This is the same path which is dominant in the subject Oak Ridge analysis. Therefore, the dominant plant response predicted by the event tree shown in the Oak Ridge analysis is the same as the plant response modeled in the Oconee PRA.

Credit for Configurations and Capabilities and Analyst's Assumptions Regarding Equipment Recovery

Oconee has unique capabilities to supply feedwater to the steam generators. The following actions proceduralized in Oconee procedure AP/1/A/1700/19 "Loss of Main Feedwater" could be used to mitigate a failure of Emergency Feedwater (EFW) flow control valves if main feedwater fails:

Manual control of EFW flow control valves can be taken.

EFW discharge can be aligned to the main feedwater header.

Feedwater flow can be aligned from the SSF ASW system

Only the first action above (manual control of feedwater control valves) is mentioned in the subject precursor analysis. A failure probability of 0.12 is assigned to this action. This failure probability is inconsistent with the 0.04 failure probability assigned to the same action in the previous ORNL evaluation

of an event involving valve FDW-315 failure (see page B-159 of NUREG/CR-4674, Volume 16).

If the previous EFW recovery value 0.04 is applied to the ORNL model in the subject evaluation the conditional core damage frequency would be 3.1E-06 and this event would be considered an accident sequence precursor.

Due to the redundancy of methods available to recover EFW flow control valve failures, a number of 1.0E-02 can be justified for recovery of EFW. If this lower value is used in the ORNL model the conditional core damage frequency would be 7.9E-07 and this event would not be considered an accident sequence precursor. This event is not considered to be an accident sequence precursor by Duke Power Company.

DUKE COMMENTS ON THE PRELIMINARY ORNL/ASP EVALUATION OF THE UNAVAILABILITY OF EMERGENCY POWER EVENT AT OCONEE ON JULY 16-17, 1992; LER 269/92-008

There are several parts of the subject evaluation where the plant response characterizations can be improved upon. The following addresses the emergency power aspect of the preliminary report:

An Oconee unit is evaluated for core damage probability given a loss of off-site power (LOOP) initiator with one Keowee unit out of service for maintenance and a second train of emergency power failing after about one hour due to loss of control of the remaining hydro unit. The sequence of concern proceeds as follows:

(1) With Keowee #1 out of service for maintenance, Keowee #2 is started and connected to the Standby Bus at least every 8 hours to verify emergency power operability. Power to Keowee #2 auxiliaries is back-fed from the 230kV Switchyard through the Keowee Main Transformer and Breaker ACB-6, which is the normal power path.

(2) A LOOP occurs, power to Keowee #2 auxiliaries is interrupted, but Keowee #2 starts automatically, energizes the Standby Bus, and (after load shed is accomplished on each unit) connects to the Main Feeder Buses. When power is regained on the Engineered Safeguards Switchgear of Oconee Unit 1, Keowee #2 auxiliaries are expected to be re-energized through Keowee's CX Transformer with the automatic closure of Breaker ACB-8 establishing the alternate power path.

(3) Given that the control power fuse for Breaker ACB-8 is failed, ACB-8 will not close electrically. Without power to the Keowee #2 auxiliaries the Keowee Alarm Response Manual directs the operator to verify the feeder breaker (ACB-6) tripped, and to close the alternate breaker (ACB-8). Since this response is rule based (documented), the response can be considered for several minutes, and the time available to take the corrective action is between a half hour and an hour, the probability of failure is about 1.0E-03.

The ORNL/ASP evaluation modeling assumptions used 0.5 as the probability of failing to recover the emergency power system within 30 min. based on the failure of the Keowee operator to restore auxiliary power during the Unit 2 LOOP on October 19, 1992. In addition, the ORNL/ASP assumed a probability of 0.12 for failure to recover emergency power in the short term from the Central Switchyard via Transformer CT-5. "These assumptions result in a combined short-term emergency power non-recovery probability of 0.06." As shown in the sequence of concern description above, the Duke analysis uses 1.0E-03 for short-term emergency power non-recovery without considering the availability of the Central Switchyard, since it is considered lost with the grid due to the initiator.

The single change in the short-term emergency power failure factor from 0.06 to 0.001 changes the conditional core damage probability from 2.6E-06 to 4.3E-08, which is an insignificant sequence probability. This event is not considered to be an accident sequence precursor by Duke Power Company.