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AUTH.NAME AUTHOR AFFILIATION
HAMPTON,J.W. Duke Power Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Forwards comments on preliminary ORNL/accident sequence precursor evaluation of Unit 2 921019 loop event.Recommends info from Augmented Team Insp Repts 50-269/92-26, 50-270/92-26 & 50-287/92-26 be substituted.

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Duke Power Company
Oconee Nuclear Site
P.O. Box 1439
Seneca, SC 29679

J. W. HAMPTON
Vice President
(803)885-3499 Office
(803)885-3564 Fax

DUKE POWER

March 10, 1993

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

Subject: Oconee Nuclear Station, Units 1, 2 and 3
Docket Nos. 50-269, -270, -287
Preliminary Accident Sequence Precursor (ASP)
Analysis of the Oconee Loss of Power Event

Duke Power has reviewed the preliminary ASP evaluation of the October 19, 1992 Loss of Off-site Power event that was transmitted in the February 17, 1993 letter by Mr. L. A. Wiens, and we have several comments. The purpose of the evaluation is to estimate the core melt probability margin of operational events of significance. The preliminary evaluation appears to have used a set of conservative/pessimistic assumptions with respect to the reliability of manually operated equipment (SSF, 100kV standby power source, for example), reliability of human actions, and extrapolation of system perturbations (instrument air pressure) resulting in a conditional core damage probability of 3×10^{-3} for the event.

We have analyzed the same event with data which tend to be Oconee-specific, rather than generic, and with assumptions consistent with the design function and reliability experience, with substantially different numerical results. The estimated core damage probability margin in the Duke analysis is about 10^{-5}. While both studies consider this event as a precursor to a core damage event, there is considerable difference in the numerical results and corresponding significance.

Attached are the specific comments which elaborate on the conservatisms, differences in approach, and areas of omission. We recommend that the preliminary ASP evaluation be modified to include more realistic assumptions and reliability numbers.

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The preliminary ASP evaluation also contains inaccuracies (in the 6th paragraph of the Event Description section) regarding the discussion of Keowee auxiliary power supplies. We recommend that information from the Augmented Inspection Team report be substituted. (See NRC Inspection Report No. 50-269/92-26, 50-270/92-26, 50-287/92-26, pages 12-13, 1st, 3rd and 4th paragraphs of section C, and pages 18-20, sections 4 and 5.)

Please call Ron Harris at (803) 885-3419 if you have any questions.

Very truly yours,

/ HB Barron for

J. W. Hampton

PMA/REH/reh (asp_anal.nrc)

attachment

xc: Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Mr. S. D. Ebneter
Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW., Suite 2900
Atlanta, GA 30323

Mr. P. E. Harmon
Senior NRC Resident Inspector
Oconee Nuclear Station

DUKE COMMENTS ON THE PRELIMINARY ORNL/ASP EVALUATION OF THE ONS-2 LOOP EVENT OF OCTOBER 19, 1992

There are several items concerning the subject evaluation that should be considered in closer detail before assigning a conservative value for core melt probability. Comments are provided starting with the analysis of the Emergency Power System.

1. Although the Keowee units were without auxiliary power for some period of time (about 37 minutes for Unit 2 and about 45 minutes for Unit 1), auxiliary power was restored without loss of the Keowee support function. The ASP evaluation appears to treat the continued operation of Oconee 1 as essential to the recovery of Keowee auxiliary power. This is not the case, since auxiliary power could have been restored (1) through the Keowee overhead path from the 230 kV Switchyard after resetting the Keowee Main Transformer and either a Red or a Yellow Bus lockout; (2) (the eventual choice) from the idling Keowee Unit 1 through ACB-1 and the Main Transformer itself after resetting the Main Transformer lockout; (3) from Keowee Unit 2 through the Keowee underground path, Transformer CT4, the Standby bus, then a non-load shed component of ES Switchgear 1TC, Transformer CX, and ACB-7 for Keowee 1 and ACB-8 for Keowee 2; and, (4) the 100 kV transmission line, Transformer CT-5, and the Standby bus path described in (3). Thus, there are sufficient sources of Keowee auxiliary power to make it very improbable that all paths fail.

CT-5 is a normally energized source of power for the Standby bus. This source was not affected during this event and would have been available, if the Keowee underground source had failed. Power to CT-5 normally comes from the Central Switchyard, but when this source is critical, a Lee Combustion Turbine (CT) is brought on-line and dedicated to CT-5. In this event, although a Lee CT was not started immediately, the 100 kV source was immediately available and could have been connected to the Standby bus by remote manual action from the Control Room. This manual action is proceduralized. The ORNL/ASP evaluation used 0.12 as the failure rate of this source of power, while the Duke analysis used 1.0E-03. Considering that the 100 kV line was energized during the entire time period, and that the Lee combustion turbines were made available as planned, the 100 kV standby source should have been determined highly reliable for the purpose of this analysis.

Perhaps even more important than the multiple options available for the restoration of emergency power for this event was the opportunity to restore off-site power to the switchyard and to the Startup buses. The nature of the problem, which had initiated this event, was soon sorted out as an inadvertent actuation of switchyard protection features. No actual grid disturbances had been experienced, and there were no power path failures in the switchyard. Generally, once the Switchyard Red bus and Yellow bus lockouts are cleared, power is available to the Startup Transformers. This human action is considered to be highly probable and supported by written procedure.

Considering the multiple options available to prevent the loss of emergency power or to recover emergency power, the success of the option chosen, and the availability of sources not considered by the ASP evaluation, the low values assumed for AC Power reliability are considered highly conservative.

2. The ORNL/ASP evaluation used the generic failure rate (0.05) for the turbine driven emergency feedwater pump, increased by a factor of 2 on the suspicion that water accumulation in the steam supply line had the potential for failing the pump. The Oconee specific pump failure rate is 1.4E-03. Therefore, the use of the generic failure rate instead of the more appropriate plant-

specific failure rate results in a conservative estimate of the affected sequence. The SSF Auxiliary Service Water Pump is an additional source of water for the steam generators that was not considered by the ORNL/ASP; thus, the reliability of secondary cooling in the ORNL/ASP evaluation is considered conservative.

The ORNL/ASP evaluation considers that a loss of control power results in a loss of secondary cooling and the ability to monitor Reactor Coolant System (RCS) parameters; however, the Oconee turbine driven pump can operate without control power.

3. The assumption that the loss of instrument air pressure came close to tripping Unit 1 (and Unit 3) is purely speculative. The Instrument Air System has considerable redundancy and diversity as described below. The fact that low pressure alarms existed for only a short period is an indicator of the robustness of the IA System.

ONS IA System

1 primary compressor- (Sullair)-2200 scfm at 100 psi	power from 230 kV switchyard RED Bus
3 backup compressors- (Worthington)-489 scfm each	A - power from MCC 1XD B - power from MCC 1XF C - power from MCC 2XF

This combination can accommodate a 1.5" line break.

The Service Air System backs up IA when its pressure drops below 85 psi. This System consists of 2 electric compressors and a diesel driven air compressor.

The use of a 0.1 failure probability for the IA System is arbitrary and conservative. It should be pointed out that there have been no instances of a loss of IA causing the trip of all three units. It should also be recognized that when IA pressure decreases below the feedwater control valves' functional requirements an immediate trip is not expected, since the valve remains "as is".

4. The ORNL/ASP evaluation did not consider the use of the SSF for mitigating purposes. The assumption that the SSF was degraded does not imply that it was not capable of supporting the safety functions. While it is true that the SSF battery charger ceased to operate when Oconee Unit 2 tripped, if the operation of the SSF had been required at any time during the event, it would have performed as designed. This is evident due to the absence of under voltage alarms during the event.

5. It is believed that the major difference between conditional core damage probability in the ORNL/ASP evaluation and the Duke analysis arises from the lack of credit for the SSF capability and the conservatively low reliability assumed for the 100 kV standby source of power in the ORNL/ASP evaluation.