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ACCESSION NBR:9803240081 DOC.DATE: 98/03/17 NOTARIZED: NO DOCKET #
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50-287 Oconee Nuclear Station, Unit 3, Duke Power Co. 05000287
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SUBJECT: Responds to RAI on Oconee Emergency Power Sys,per 980209 telecon.

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March 17, 1998

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Response to Request for Additional Information
on the Oconee Emergency Power System

In a letter dated July 8, 1996, the NRC issued for comment draft reports from the Office of Nuclear Reactor Regulation (NRR) and the Office for Analysis and Evaluation of Operational Data (AEOD). These draft reports contained analyses and recommendations regarding the testing, operation, design and reliability of the Oconee emergency power system and Standby Shutdown Facility (SSF). As requested in the July 8, 1996, NRC letter, Duke Energy reviewed the NRR and AEOD draft reports for accuracy and to determine a disposition for each recommendation.

In a meeting with the NRC on September 19, 1996, Duke Energy presented its understanding of the open issues and recommendations from the NRC draft reports, along with Duke Energy's plan for disposition of the issues. During the meeting, the NRC clarified Duke Energy's understanding of several of the open issues. A written response to the open issues and recommendations was provided by Duke Energy in a letter dated October 31, 1996.

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The NRC reviewed the October 31, 1996, Duke Energy submittal and requested additional information in a letter dated April 22, 1997. In a letter dated May 22, 1997, Duke Energy provided a written response to the NRC's request for additional information.

During a conference call on February 9, 1998, the NRC requested additional information regarding the response

provided by Duke Energy on October 31, 1996. Attachment 1 contains Duke Energy's response to the NRC's verbal request for additional information.

If there are any questions regarding this submittal, please contact Michael Bailey at (864) 885-4390.

Very truly yours,

W. R. McCollum, Jr., Site Vice President
Oconee Nuclear Station

MEB

Attachment

cc:

L. A. Reyes, Regional Administrator
Region II

M. A. Scott, Senior Resident Inspector
Oconee Nuclear Site

D. E. LaBarge, Project Manager
NRR

REQUEST FOR ADDITIONAL INFORMATION
DUKE ENERGY CORPORATION
OCONEE NUCLEAR STATION ELECTRICAL DISTRIBUTION SYSTEM

Question 1

Duke responded to questions regarding a 3 unit LOOP with consequential overcooling event in letters dated October 31, 1996, (Open Issue #1) and May 22, 1997, (Question 12). In those responses, Duke indicated that following a simultaneous LOOP on all three Oconee units, each unit would receive auxiliary power via the overhead path in approximately 15 seconds. At that time, each Oconee unit's motor-driven EFW pumps, two HPI pumps, and essential loads which were previously running would start. It was indicated that if a subsequent ECCS actuation should occur, only ES channels 1 and 2 would actuate which would bring up only one additional HPI pump in each unit.

The staff would like to determine whether a three unit LOOP handled by the Keowee underground path (assuming the overhead path fails or is otherwise unavailable) would result in acceptable equipment response assuming no credit for operator action to control the cooldown. In this situation, power would not be available to the three Oconee units' AC electrical loads for approximately 31 seconds. During this 31 second period, could ES channels 1 and 2 potentially actuate, such that three HPI pumps in each Oconee unit would simultaneously start together with the units' MDEFW pumps and previously running essential loads? If so would adequate starting and operating voltages be supplied to the Oconee loads from the underground path? Has this condition or a condition that envelopes it been analyzed for adequate voltages?

In addition, please provide supporting information for the statements that only ES channels 1 and 2 would actuate. This information could be in the form of other NRC accepted analyses which envelope the conditions of this scenario relative to ECCS actuation.

Response 1

An evaluation has been performed of a three-unit LOOP event to assess the potential for an ES actuation of the HPI pumps at 1600 psig Reactor Coolant System (RCS) pressure. The concern is the timing of any startup of the HPI pumps. Specifically, can the HPI pumps receive a start signal in the 0-31 second time period following a three-unit LOOP.

The evaluation is based on experience gained in analyzing the UFSAR Chapter 15 transients and accidents. The methodology for performing these analyses is detailed in Duke topical report DPC-NE-3005 which is currently under NRC review. The Oconee RETRAN0-02 plant simulation model used in this evaluation is detailed in Duke topical report DPC-NE-3000 which has been approved by the NRC.

A three-unit LOOP event will cause the same plant transient response on each unit. Upon the loss of offsite power, the reactor and turbine trip, the reactor coolant pumps coast down, and the unit evolves into a natural circulation mode of decay heat removal. The Emergency Feedwater (EFW) System actuates and steam generator level is increased to the natural circulation setpoint. Since the EFW System has two 100 percent capacity motor-driven pumps, and one 200 percent capacity turbine-driven pump, all of which actuate, there is an excessive heat sink whenever the EFW System actuates. The EFW flowrate can overcool the RCS as the steam generator levels increase to the controlling setpoint. The purpose of the evaluation is to determine if the overcooling that results is sufficient to decrease RCS pressure to the HPI actuation setpoint within 31 seconds of the LOOP.

Based on experience with analyzing much more severe overcooling events, such as large and small steam line breaks, Duke was able to conclude by inspection that an HPI actuation within 31 seconds for a LOOP transient was not possible. A scoping analysis of a LOOP event was performed in order to quantify if and when an HPI actuation would occur. A bounding LOOP scenario was analyzed from a nominal full power initial condition with a very conservative decay heat multiplier of 0.10. These assumptions were selected to maximize the post-trip depressurization, and to realistically minimize the post-trip decay heat. Full EFW flow was conservatively assumed to start at the time of the LOOP. The results of this analysis showed that the HPI actuation setpoint at 1600 psig would not be reached for more than 3 minutes. With a more realistic decay heat multiplier, the HPI setpoint would not be reached at all. This scoping analysis confirmed the conclusion that HPI actuation is not possible within 31 seconds of a LOOP event.

If an ECCS actuation of HPI should subsequently occur, although not expected based on the information described above, the emergency power system would perform its intended function. As described above, worst case HPI actuation would occur greater than 3 minutes following the LOOP event. If the Keowee overhead path was available, the three Oconee units' LOOP loads and subsequent HPI motors would receive power from this path as described in the May 22, 1997, submittal to the NRC. If the Keowee overhead path was assumed to fail or be out of service

during this event the Oconee LOOP loads would transfer and receive power from the Keowee underground path at approximately 31 seconds after the LOOP initiation. Subsequently, approximately 2.5 minutes later, the remaining HPI pumps would load onto this underground path which is operating at a steady state condition. The load associated with these additional HPI pumps is smaller than the Oconee LOOP or LOCA loads that are currently analyzed to be block loaded onto an overhead or underground path. Also, the cumulative load is well within the capacity of either emergency power path's rating. Thus, the emergency power system would perform its intended function.