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ACCESSION NBR: 9706100252      DOC. DATE: 97/06/04      NOTARIZED: NO      DOCKET #  
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 50-270 Oconee Nuclear Station, Unit 2, Duke Power Co.      05000270  
 50-287 Oconee Nuclear Station, Unit 3, Duke Power Co.      05000287

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SUBJECT: Informs that util will submit rept on HPI sys reliability study to NRC staff by 971231.

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**DUKE POWER**

June 4, 1997

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

Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
High Pressure Injection (HPI) System Reliability  
Study  
NRC TAC No. M98454

Oconee Unit 2 was shut down on April 22, 1997 due to a leak in the 2A1 HPI System injection line. On May 3, 1997, after Unit 3 was shut down, erroneous LDST level indications resulted in the 3A and 3B HPI pumps being damaged during a cooldown of Oconee Unit 3. In light of these events, Duke Power stated in a May 16, 1997 letter to the staff that it would interface with the staff beginning the week of May 19, 1997 regarding the scope of a reliability study of the HPI System. Preliminary concepts for the HPI System reliability study were discussed with the staff during a conference call the week of May 19, 1997, and the scope and schedule were discussed during a conference call on June 2, 1997. Duke Power commits to complete the HPI reliability study, as described below, and submit the results to the staff by December 31, 1997. We believe this study will provide useful insights regarding the reliability of the Oconee HPI System.

The objective of the reliability study is to provide qualitative and quantitative insights, from a probabilistic and deterministic perspective, regarding the reliability of the HPI System under various operating conditions and accident mitigation functions. The study will assess the reliability of the HPI System in performing probabilistic risk analysis (PRA) mitigation functions such as feed and bleed cooling, reactor coolant pump (RCP) seal injection, and Reactor Coolant System (RCS) injection during loss of coolant accidents and steam generator tube rupture accidents. The study will also evaluate the current IPEEE modeling of the HPI System as it relates to external event

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mitigation. The study will assess the reliability of the HPI System in mitigating design basis events, using the design basis success criteria as opposed to the PRA success criteria that will be used for the PRA sequences of interest. In addition to assessing the reliability of the system for various accident mitigation functions, the study will address HPI System functions, such as RCS makeup, RCP seal injection, and chemical control of the RCS associated with normal operation.

This project will use failure modes and effects analysis (FMEA) and PRA methods such as fault trees, reliability data, success criteria, and modeling of appropriate human actions. The HPI System model will be used to analyze all design basis and probabilistically significant events of interest. The modified HPI System model will be incorporated into the plant core melt fault tree and solved. Failures will be ranked to determine their significance. Uncertainty analyses will be performed on the reliability results.

The reliability study will be performed by a team of general office engineers experienced in probabilistic risk analysis with matrixed support from site engineering and operations groups. Significant tasks associated with the study are briefly summarized below:

- Data Collection

The team will evaluate operating experience, both at the Duke sites and from the industry, for insights on failure modes, system dependencies, and interconnections to be considered in the HPI reliability model. The team will collect and review design and operational documentation such as design basis documents, operating and emergency procedures, and drawings for electrical and mechanical systems and components. The team will meet with station personnel to obtain the site's input on essential HPI functions, equipment, and human actions, as well as any sensitivity studies of interest. Walkdowns of the HPI System will be performed to help identify any special failure modes or modeling that is not readily apparent from the review of other sources of information.

- Develop System Models

The significant system configurations for which the HPI System is required to function will be modeled. Success criteria for these configurations will be determined. The systems and sub-systems required to support the

successful operation of the HPI System will be modeled and these functions will be defined for each scenario. Component failures which could result in failure of the system or sub-system functions will be identified. This will include latent and dynamic human errors. In addition, operator actions will be identified which could be used to recover lost functions.

- Develop Reliability Data

Potential common cause failures will be analyzed. The basic event data base (equipment, human, and common cause failure probabilities) for the fault tree solutions will be compiled. The reliability data will consider both Oconee specific data and industry operating experience, as appropriate.

- Solve the Fault Tree Models and Analyze Results

The appropriate fault tree top logic for each scenario will be developed. The system and sub-system fault tree models will be linked to form a complete HPI fault tree model. The appropriate flags and initiators will be set and solved for each scenario. Solutions will be reviewed, invalid cut sets will be deleted, and appropriate recoveries will be assigned. An importance ranking of the failure modes will be performed. Sensitivity studies will be performed to evaluate the expected improvements for potential system enhancements or alternate modes of operation. The sensitivity studies will address certain design characteristics of the Oconee HPI System such as auto start of the second HPI pump on low seal injection flow. The results from the sensitivity studies will be used to develop recommendations for changes to the system's design, operation, and maintenance to minimize the potential for failure vulnerabilities of concern.

- Review Process

The project team will review the results of the reliability study and a peer review by site operations and engineering personnel will also be conducted. The final phase of the review process will be a review of the results of the reliability study, and its recommendations, by site management.

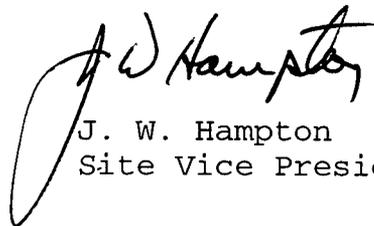
It is expected that approximately six months will be necessary to complete the project. If, in the course of this project, any significant discrepancies are identified

by the project team associated with design basis information or the UFSAR, these issues would be addressed through Duke's corrective action program. Duke will submit a report on the HPI System reliability study to the staff by December 31, 1997. This report will include Duke's plans for addressing any recommendations that result from the study.

Duke Power believes insights from this study will be beneficial to both Oconee Nuclear Station and the staff. We are willing to meet with the staff at its convenience if there are any questions or comments regarding the scope and schedule for this project.

Please address any questions to J. E. Burchfield, Jr. at (864) 885-3292.

Very Truly Yours,



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