March 24, 1995

Mr. J. W. Hampton
Vice President, Oconee Site
Duke Power Company
P. O. Box 1439
Seneca, South Carolina 29679

SUBJECT: EVALUATION OF THE OCONEE, UNITS 1, 2, AND 3 GENERIC SAFETY ISSUES (GSI) RESOLUTION (TAC NOS. M74440, M74441, AND M74442)

Dear Mr. Hampton:

By letter dated November 30, 1990, Duke Power Company (DPC) submitted its Individual Plant Examination (IPE) for the Oconee Nuclear Station, Units 1, 2, and 3. The staff evaluation of the IPE was forwarded to you by letter dated April 1, 1993. As part of the IPE process, you also proposed resolution of GSI-23, "Reactor Coolant Pump Seal Failures," GSI-105, "Interfacing System LOCA in LWRs," and GSI-130, "Essential Service Water Pump Failures at Multi-Unit Sites." Since GSI-130 did not apply to Oconee, the reliability of the service water system at Oconee was addressed under GSI-153, "Loss of Essential Service Water in LWRs." The staff evaluation of the proposed resolution of these GSIs had not been completed at the time the evaluation of the IPE was forwarded to you and was to be provided separately.

The NRC staff has completed its review of your proposed resolution of the three GSIs. Enclosed are the Staff Evaluation Reports documenting the staff's findings for GSI-23 and GSI-105. Based on this review, we conclude that the issues pertaining to GSI-23 and GSI-105 have been adequately addressed for Oconee, Units 1, 2, and 3, and are therefore resolved. Since GSI-153 is being addressed through on-going regulatory and industry initiatives, we determined that it would be inappropriate to close-out this issue on a plant specific basis.

If you have questions regarding this matter, contact me at (301) 415-1495.

Sincerely,

/s/

Leonard A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270 and 50-287

Enclosure:
Staff Evaluation Reports

cc w/enclosure: See next page

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Concur with deletion of unique feature Number 6 for GI-23

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 24, 1995

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Vice President, Oconee Site
Duke Power Company
P. O. Box 1439
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The NRC staff has completed its review of your proposed resolution of the three GSIs. Enclosed are the Staff Evaluation Reports documenting the staff's findings for GSI-23 and GSI-105. Based on this review, we conclude that the issues pertaining to GSI-23 and GSI-105 have been adequately addressed for Oconee, Units 1, 2, and 3, and are therefore resolved. Since GSI-153 is being addressed through on-going regulatory and industry initiatives, we determined that it would be inappropriate to close-out this issue on a plant specific basis.

If you have questions regarding this matter, contact me at (301) 415-1495.

Sincerely,

Leonard A. Wiens, Senior Project Manager
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket Nos. 50-269, 50-270
and 50-287

Enclosure:
Staff Evaluation Reports

cc w/enclosure: See next page

cc:
A. V. Carr, Esquire
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242-0001

J. Michael McGarry, III, Esquire
Winston and Strawn
1400 L Street, NW.
Washington, DC 20005

Mr. Robert B. Borsum
Babcock & Wilcox
Nuclear Power Division
Suite 525
1700 Rockville Pike
Rockville, Maryland 20852

Manager, LIS
NUS Corporation
2650 McCormick Drive, 3rd Floor
Clearwater, Florida 34619-1035

Senior Resident Inspector
U. S. Nuclear Regulatory Commission
Route 2, Box 610
Seneca, South Carolina 29678

Regional Administrator, Region II
U. S. Nuclear Regulatory Commission
101 Marietta Street, NW. Suite 2900
Atlanta, Georgia 30323

Max Batavia, Chief
Bureau of Radiological Health
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

County Supervisor of Oconee County
Walhalla, South Carolina 29621

Mr. Ed Burchfield
Compliance
Duke Power Company
Oconee Nuclear Site
P. O. Box 1439
Seneca, South Carolina 29679

Ms. Karen E. Long
Assistant Attorney General
North Carolina Department of
Justice
P. O. Box 629
Raleigh, North Carolina 27602

Mr. G. A. Copp
Licensing - EC050
Duke Power Company
526 South Church Street
Charlotte, North Carolina 28242-0001

Dayne H. Brown, Director
Division of Radiation Protection
North Carolina Department of
Environment, Health and
Natural Resources
P. O. Box 27687
Raleigh, North Carolina 27611-7687

STAFF EVALUATION REPORT FOR OCONEE

REGARDING GI-23, "REACTOR COOLANT PUMP SEAL FAILURES"

1.0 Introduction

A loss-of-coolant accident (LOCA) can occur if leakage through the reactor coolant pump (RCP) seals exceeds the capacity of the normal makeup system. RCP seals limit the leakage of reactor coolant along the pump shaft, directing the majority of this flow back to the chemical and volume control system (CVCS), with the remainder being directed to the reactor coolant drain tanks. The RCPs use a series of primary and secondary seals to limit the reactor coolant leakage to containment. Therefore, these seals are part of the reactor coolant system pressure boundary.

There are common mode vulnerabilities that could result in an RCP seal LOCA, followed by inoperable mitigating systems, and thus lead to core damage. One such scenario involves the complete loss of the component cooling water (CCW) system, which provides cooling water to the seal thermal barrier heat exchanger, among other systems. In some plants, the reactor coolant makeup system pumps or CVCS charging pumps or high pressure safety injection pumps that supply RCP seal injection flow are also cooled by the CCW system. Therefore, for some plants, complete loss of CCW could result in the equivalent of a small-break LOCA caused by seal degradation, with no high pressure safety injection pumps available for emergency core cooling. This sequence of events could lead to core damage and could be initiated by the loss of all ac power (station blackout).

2.0 Evaluation

Duke Power Company (DPC) has submitted information (Ref. 1 and 2) to the NRC as part of the IPE process, and has included information on the proposed resolution for GI-23 for the Oconee Station. The staff reviewed this information and on July 21, 1992, requested the licensee to provide additional information that was needed to reach a conclusion on this matter (Ref. 3). The staff also provided a Draft Regulatory Guide, DG-1008 (Ref. 4), that contained guidance on RCP seals at the current state of development by the staff. On September 4, 1992, the licensee provided additional information and responses to the staff's specific questions regarding GI-23 (Ref. 5).

Duke Power Company maintains that GI-23 should be considered resolved for Oconee because of some unique features at Oconee leading to the predicted core damage frequency (CDF) from RCP seal failures being low. The unique features include a highly reliable ECCS system with multiple means for coping with random seal LOCAs, a diverse RCP seal cooling system, and a backup seal cooling system capable of functioning during a station blackout event. The

responses to the staff's questions further clarified the information provided in the IPE submittal, but were not necessarily intended to show compliance with the positions described in DG-1008.

The staff reviewed the unique features of Oconee which included the following:

(1) Operating procedures for RCP seals currently in place are consistent with DG-1008 position concerning procedures. The intent is to prevent seal leaks from becoming small-break LOCAs.

(2) Instrumentation relative to RCP seals at Oconee is provided and appears adequate to allow the operator to determine the correct course of action for anticipated operational conditions and occurrences.

(3) The SSF is designed in a manner consistent with or better than the guidelines provided in DG-1008 for independent seal cooling capability.

(4) The criterion to reestablish cooling within 10 minutes of loss of seal cooling mentioned in DG-1008 is also met, as reported on Page 10-10 of the Oconee IPE report that "Operators are trained that seal cooling must be re-established within 10 minutes following a loss of seal cooling to preclude damage," and further confirmed in response to the staff question 5b(2).

(5) At Oconee the service water dependency is of relatively low concern because both the Low Pressure Service Water (LPSW) and High Pressure Service Water Systems are independent systems and, except for relying on ac power and sharing a common suction source, they function to provide a reliable source for HPI pump cooling.

3.0 Conclusion

The staff agrees that information provided by the licensee shows unique features that provide redundant RCP seal cooling and thus provides adequate protection against RCP seal failures at Oconee. Most of these features meet the intent of the staff's approach to the resolution of GI-23 documented in DG-1008. Specifically, Oconee meets the staff's proposed position relative to having the ability to cope with off-normal events. The staff has decided to treat the normal operation aspects of RCP seals as a separate issue.

Based on the results of the evaluation indicated above, the staff concludes that the Oconee IPE submittal for Units 1, 2, and 3, has adequately addressed the draft GI-23 concerns pertaining to the RCP seal failures.

4.0 References

1. Duke Power Company, "Oconee Nuclear Station Units 1, 2, 3 Individual Plant Examination Submittal Report," December 1990.

2. Duke Power Company, "Oconee Nuclear Station Unit 3 Probabilistic Risk Assessment Report," December 1990.

3. L. Wiens, USNRC to J. Hampton, Duke Power Company, "Request for Additional Information Concerning Oconee Individual Plant Examination (IPE) Submittal for Generic Issues (GI)-105, 153, and 23 (TACs M74440/M74442/M74442)," July 21, 1992.

4. USNRC, Office of Nuclear Regulatory Research, Draft Regulatory Guide DG-1008 "Reactor Coolant Pump Seals," April 1991.

5. J. Hampton, Duke Power Company to USNRC, "Oconee Nuclear Site Docket Nos: 50-269, -270, -287 NRC Generic Letter 88-20 Individual Plant Examination Submittal Response to Request for Additional Information," September 4, 1992.

Staff Evaluation Report for Oconee
Regarding GI-105, "Interfacing Systems LOCA in LWRs"

1. Introduction

An interfacing systems loss of coolant accident (ISLOCA) is defined as a breach of the pressure boundary between the reactor coolant system (RCS) and any one of several low pressure systems. Breaching the pressure boundary consists of the failure or improper operation of the two or more pressure isolation valves (typically check valves and/or motor operated valves) that compose the boundary. If high pressure RCS coolant enters the relatively low pressure interfacing system, the possibility exists of overpressurizing and rupturing the system, which typically extends outside containment. This then produces a situation where primary coolant is being lost outside containment. If the break is not isolated, core damage is likely with the subsequent release of radioactive material bypassing containment.

2. Evaluation

Several NRC sponsored studies have analyzed PWR susceptibility to ISLOCA (Ref. 1-4) without revealing generic problems. The major insight from the latest studies is that ISLOCA problems are highly plant specific (Ref. 2-4). Because of that and because the calculated risk is low at the plants analyzed, it was concluded (Ref. 5) that the most effective course of action for resolution of GI-105 was plant-specific analyses at each PWR. However, the IPE submittal guidance (NUREG-1335) mentions ISLOCA as a sequence to be included in the evaluation (Ref. 6) and to be reported upon under certain conditions (Ref. 7, Appendix 2). Given the relatively low risk indicated in the NRC sponsored studies, it is likely that nothing beyond participation in the IPE program will be required for resolution of GI-105.

In the case of Oconee, the submittal and subsequent response (Ref. 8) to questions (Ref. 9) included analyses of the major interfaces of concern (LPI and DHR) and the low pressure auxiliary spray line and adequate justification for not including analyses of other interfacing systems.

3. Conclusion

The core damage frequency (CDF) from ISLOCA at Oconee has been demonstrated to be sufficiently low to consider GI-105 resolved at Oconee. The low CDF was achieved through numbers of valves in series (LPI and auxiliary spray line), individual leak testing of valves (LPI), and use of pressure interlocks plus daily verified valve position indication (DHR).

4. References

1. G. Bozoki, et al., "Interfacing Systems LOCA; Pressurized Water Reactors," NUREG/CR-5102, February 1989.

2. D. L. Kelly, et al., "Assessment of ISLOCA Risk-Methodology and Application to a Westinghouse Four-Loop Ice Condenser Plant," NUREG/CR-5744, April 1992.

3. D. L. Kelly, et al., "Assessment of ISLOCA Risk-Methodology and Application to a Combustion Engineering Plant," NUREG/CR-5745, April 1992.

4. W. J. Galyean and D. L. Gertman, "Assessment of ISLOCA Risk-Methodology and Application to a Babcock and Wilcox Nuclear Power Plant," NUREG/CR-5604, April 1992.

5. Regulatory Analysis for the Resolution of Generic Issue 105: Interfacing System Loss of Coolant Accident in Light Water Reactors (Draft for Comment), NUREG-1463 (Draft).

6. "Individual Plant Examination: Submittal Guidance," NUREG-1335, July 1989.

7. "Individual Plant Examination for Severe Accident Vulnerabilities - 10 CFR50.54(f) (Generic Letter 88-20)," November 23, 1988.

8. J. W. Hampton, Duke Power letter to USNRC, "Oconee Nuclear Site, Docket Nos: 50-269, -270, -287, NRC Generic Letter 88-20, Individual Plant Examination Submittal, Response to Request for Additional Information," September 4, 1992.

9. Leonard A. Wiens, USNRC letter to J. W. Hampton, Duke Power, "Request for Additional Information Concerning Oconee Individual Plant Examination (IPE) Submittal for Generic Issues (GI) -105, -153, and -23 (TACS M74440/M74441/M74442)," July 21, 1992.