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

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Seismic Licensing Basis

Per the discussion between the NRC and Duke Power on July 21, 1994, this letter is written to revise an earlier letter dated May 25, 1994. This letter will supplement the licensing basis information that was provided for a seismic event with a postulated single failure. Also, the licensing basis information for the postulation of a Loss of Offsite Power (LOOP), seismic event and simultaneous single failure will be supplemented by this letter.

In the previous letter, Oconee indicated that a single failure was not postulated during a seismic event. After further review of the licensing basis, Oconee has concluded that a seismic event includes the postulation of a single failure. Also, Oconee indicated that a LOOP and seismic event did not occur simultaneously. The review of the licensing information has concluded that postulation of this occurrence is within the licensing bases.

The licensing basis review and conclusions are summarized by the following information. This part of the information examines the original licensing requirements for Oconee. The applicable requirements that apply to this discussion are seismic, single failure, redundancy, electrical power, and pipe break analysis.

The seismic design requirements for the systems at Oconee are contained within the FSAR. The following information summarizes the seismic design requirements.

- FSAR Section 3 Criterion 2 included the seismic design requirements of the systems used for prevention or mitigation of accidents. These systems consisted of the Reactor Coolant System (RCS), Engineered Safeguards (ES), Reactor Protection System (RPS), Emergency Power, and

Reactor Vessel Internals.

- FSAR section 3.2.1.2 listed requirements for the capability to safely shutdown the units in the event of a maximum hypothetical earthquake (MHE). The systems listed in this section include all systems referenced in Criterion 2 and the Secondary Decay Heat Removal systems.

- FSAR Section 3.7.3.9 indicated that a seismically designed single isolation valve with automatic or remote manual capability would provide the boundary between seismic/non-seismic piping.

Single failure requirements for Oconee are contained in the draft Atomic Energy Commission Design Criteria in FSAR Section 3. A summary of the single failure criteria is provide below.

- Criterion 10 provides that no single failure will result in the loss of function for the reactor protection system.

- A single failure during a LOOP is assumed in Criterion 39 for the emergency power for engineered safety features.

- Engineered safety features assumed a single active failure or a long term passive failure in the emergency core cooling system (ECCS) as specified in Criterion 41.

The draft AEC Design Criteria did not include redundancy requirements for Decay Heat Removal (DHR). Evidence of this can be found in the original plant design which included a single DHR drop line and a single Emergency Feedwater (EFW) pump. The requirement for redundancy on Residual Heat Removal (RHR) was later included in 10 CFR 50 Appendix A GDC 34. Secondary side redundancy was provided by a diversity of systems. This included equipment that was not safety-related or seismically qualified.

The draft AEC Design Criteria in FSAR Section 3 contains requirements for the onsite and offsite power systems. A summary of these criteria is provided below.

- Criterion 6 requires that Oconee will be able to shutdown safely with offsite power unavailable. Initially, this capability was provided by the steam driven EFW pump and emergency power to the primary systems.

- Operation of the protective system with offsite power unavailable is specified in Criterion 24.

- The engineered safety features are required by Criterion 39 to operate with onsite or offsite power.

Later in the licensing process of Oconee, the NRC requested that the High Energy Line Break (HELB) be postulated. The HELB analysis postulated breaks in specific locations based on mechanical and seismic loads. A single HELB was postulated and the ability to safely shutdown the reactor was verified. In addition to the single HELB, a single unrelated active failure was assumed. This analysis was reviewed and approved by the NRC. In addition to the HELB analysis, a review of the flooding potential at Oconee was performed as requested by the NRC following a flood at Quad Cities Nuclear Station. A Condenser Circulating Water (CCW) vulnerability was discovered during the review. Corrective actions included the installation of a curb around the doors between the Auxiliary Building and the Turbine Building. These two pipe break analyses looked at the affects of fluid release and its impact on adjacent equipment, not thermohydraulic system response. Postulation of a seismically induced pipe break was not included in these reviews. In response to the request to perform the HELB analysis, Duke Power initially indicated that the postulation of piping failures is not considered credible at Oconee. An additional note about the pipe break analyses is that only a single pipe break was assumed to occur. This is also true for the LOCA analysis, Main Steam Line Break, and Main Feedwater line break examined in the FSAR Chapter 15 analysis.

In summary, the licensing requirements for Oconee prior to 1979 included safety related redundancy in accident mitigation systems. Diversity was designed into the secondary side of Oconee but no requirements existed for seismic or safety related redundancy. Seismic design criteria was used in the design of certain piping, components and structures. The systems included in this criteria were specified by the FSAR. Also, the use of a single isolation valve at seismic/non-seismic boundaries was detailed in the criteria. Specific pipe breaks were analyzed for high energy lines and possible flooding vulnerabilities. Pipe breaks in the RCS, Main Steam line, and Main feedwater line were postulated in Chapter 15 of the FSAR. These analyses did not assume multiple line breaks in the system. Seismically induced pipe breaks in piping was not specifically analyzed in an integrated fashion and was not assumed to be credible. Requirements of the power system included the capability for safe shutdown with offsite power

unavailable. RPS and ES must be operable with onsite or offsite power unavailable assuming a single failure.

Following the Three Mile Accident in 1979, Oconee installed two motor driven EFW pumps per unit. In 1981, Generic Letter 81-14 was issued by the NRC to assure that nuclear plants meet 10 CFR 50 Appendix A General Design Criteria (GDC) 2 and 34 for the EFW system. GL 81-14 required the EFW system to be seismically supported and redundant. Specific requirements for double isolation valves at the seismic/non-seismic boundary for EFW and the support systems were included in the Generic Letter. During the review of GL 81-14, Oconee identified several seismic deficiencies in the EFW system. As part of the resolution of the seismic deficiencies, Oconee proposed the Standby Shutdown Facility (SSF) as a suitable alternate EFW system. The NRC stated in the GL submittal to Oconee that GDC 2 and 34 were outside of the current Oconee licensing basis and would be pursued as a backfit. During the GL 81-14 review, a postulated failure of the non-seismic Condenser Circulating Water (CCW) piping coincident with a single failure of the SSF Auxiliary Service Water (ASW) pump rendered all EFW inoperable. Oconee responded with several modifications including installation of submarine doors between the Turbine and Auxiliary Building to prevent Auxiliary Building flooding with the CCW pipe break. Therefore, the Auxiliary Service Water pump in the Auxiliary Building could supply EFW if a flood occurred in the Turbine Building with a coincident single failure of the SSF ASW pump. Also, the submarine doors would ensure the availability of HPI and LPI during the Turbine Building flood. In the SER for GL 81-14, the NRC accepted the Oconee design and did not pursue a backfit due to the diversity of the systems used to remove decay heat.

The following summarizes the current seismic licensing bases of Oconee. As stated in the May 25th letter, a Loss of Coolant Accident (LOCA) is postulated to occur concurrently with a LOOP and single failure. The single failure is either an active failure or long term passive failure in the ECCS. A concurrent seismic event or independent pipe break was not postulated to occur with a LOCA. The postulation of a LOOP concurrent with a seismic event and single failure is within the Oconee licensing basis. This is based on the fact that part of the switchyard is non-seismic and can be lost during a seismic event. However, pipe failures during a seismic event were not deemed credible and were not postulated. Postulation of a single pipe failure was performed for the LOCA, MSLB, HELB , Main Feedwater Line break, and turbine building flooding events. Finally, a seismic event was not reviewed as a Chapter 15 analysis. A seismic event was used to provide design criteria for piping, equipment and structures used for

mitigation and prevention of accidents for safe shutdown of the plant. During the seismic event, a single failure is postulated.

The Oconee design has been reviewed for design vulnerabilities by the Oconee Probabilistic Risk Assessment (PRA). The Oconee PRA was confirmed and updated by the results of the Individual Plant Examination (IPE) submittal. These reviews included the seismic events, single failures, and flooding events. No significant concerns about our licensing criteria were raised by these reviews. Also, the Individual Plant Examination of External Events (IPEEE) will include a review of the Oconee design for a seismic event. Oconee is included in the industry generic issue A-46 which includes a seismic review.

In response to specific questions about the seismic qualification of Keowee, Keowee is seismically qualified and will be included in the A46 and IPEEE programs. Findings from the walkdown for these programs will be incorporated in the IPEEE submittals.

Very truly yours,

Joe M Davis
for J. W. Hampton

cc: Mr. S. D. Ebneter, Regional Administrator
U. S. Nuclear Regulatory Commission, Region II

Mr. L. A. Wiens, Project Manager
Office of Nuclear Reactor Regulation

Mr. P. E. Harmon
Senior Resident Inspector
Oconee Nuclear Site