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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

~~In the~~ Matter of

Duke Power Company

Oconee Nuclear Station Unit No. 1

DOCKET NO. 50-269

EXEMPTION

I.

Duke Power Company (the licensee) is the holder of Facility Operating License No. DPR-38 which authorizes the operation of the nuclear power reactor known as Oconee Nuclear Station, Unit No. 1 (the facility), at steady reactor power levels not in excess of 2568 megawatts thermal (rated power). The facility consists of a Babcock & Wilcox (B&W) designed pressurized water reactor (PWR) located at the licensee's site in Oconee County, South Carolina.

II.

In accordance with the requirements of the Commission's Emergency Core Cooling System (ECCS) Acceptance Criteria, 10 CFR 50.46, the licensee submitted on July 9, 1975 an ECCS evaluation for the facility. The ECCS performance submitted by the licensee was based upon an ECCS Evaluation Model developed by B&W, the designer of the Nuclear Steam Supply System for this facility. The B&W ECCS Evaluation Model had been previously found to conform to the requirements of the Commission's ECCS Acceptance Criteria, 10 CFR Part 50.46, and Appendix K. The evaluation indicated that with the limits set forth in

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the facility's Technical Specifications, the ECCS cooling performance for the facility would conform with the criteria contained in 10 CFR 50.46(b) which govern calculated peak clad temperature, maximum cladding oxidation, maximum hydrogen generation, coolable geometry and long-term cooling.

On April 12, 1978, B&W informed the NRC that it had determined that in the event of a small break Loss of Coolant Accident (LOCA) on the discharge side of a reactor coolant pump, high pressure injection (HPI) flow to the core could be reduced somewhat. Subsequent calculations indicated that in such a case the calculated peak clad temperature might exceed 2200°F.

Previous small break analyses for B&W 177 fuel assembly (FA) lowered loop plants had identified the limiting small break to be in the suction line of the reactor coolant pump. Recent analyses have shown that the discharge line break is more limiting than the suction line break.

The Oconee Nuclear Station Unit No. 1 has an ECCS configuration which consists of two HPI trains which are supplied by three HPI pumps. Each train injects into two of the four reactor coolant system (RCS) cold legs on the discharge side of the RCS pump. The two parallel HPI trains are connected but are kept isolated by manual valves (known as the cross-over valves) that are normally closed.

Duke Power has proposed by letter dated April 21, 1978, to maintain all three pumps in an operable status. The Oconee emergency power system is designed with sufficient capacity for this mode of operation. Upon receiving a safety

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injection signal the HPI pumps are started and valves in the injection lines are opened. Assuming loss of offsite power and the worst single failure (the HPI pump C or the HPI valve HP26), two HPI pumps would still be available and only one of the two injection valves would fail to open.

If a small break is postulated to occur in the RCS piping between the RCS pump discharge and the reactor vessel, the high pressure injection flow injected into this line (about 50% of the output of two high pressure pumps) could flow out the break. Therefore, for the worst combination of break location and single failure, 50% of the flow rate of two high pressure ECCS pumps would contribute to maintaining the coolant inventory in the reactor vessel. This situation had not been previously analyzed and B&W had indicated that the limits specified in 10 CFR 50.46 may be exceeded.

B&W has stated that they have analyzed a spectrum of small breaks in the pump discharge line and have determined that to meet the limits of 10 CFR 50.46(b), operator action is required to open the two manual operated crossover valves and to manually align the motor driven isolation valve which had failed to open. This would allow the flow from the two HPI pumps to feed all four reactor coolant legs. B&W has assumed that 30% of the flow would be lost through the break and 70% would enter the core. The licensee has committed to provide for the necessary operator actions within the required time frame. That is, in the event of a small break and a limiting single failure, manual action will be taken to begin opening these valves within five minutes and have them fully opened and an adequate flow split obtained within the following 10 minutes. The analyses performed by B&W assumed that the flow

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split was established at 650 seconds by operator action. We conclude that the analyses are a reasonable approximation of the operator action that actually will be taken, provided specific procedures are prepared and followed to assure such action.

B&W has prepared a summary entitled "Analysis of Small Breaks in the Reactor Coolant Pump Discharge Piping for the B&W Lowered Loop 177 FA Plants," April 24, 1978 (the B&W Summary), which describes the methods used and the results obtained in the above analysis. The analysis models operator action by assuming a step increase in flow to the reactor vessel (with balanced flow in the three intact loops) ten minutes after the LOCA reactor protection system trip signal occurs.

On April 26, 1978, the Commission issued an Order for Modification of License which amended the license for Oconee Unit 1 requiring (1) submission of a reevaluation of the emergency core cooling system calculated in accordance with the B&W Evaluation Model for operation with operating procedures described in the licensee's letter of April 21, 1978 and (2) operation in accordance with the procedures described in the licensee's letter of April 21, 1978.

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By letter dated May 16, 1978, the licensee submitted a copy of the B&W Summary for our review. In their submittal the licensee stated that the analysis indicates that the ECCS cooling performance calculated in accordance with the B&W Evaluation Model for operation of Oconee units at the rated core thermal power of 2568 Mwt with operating procedures described in their letter of April 21, 1978, is wholly in conformance with the provisions of 10 CFR 50.46. We have reviewed the B&W Summary and find that the methods of analysis meet the requirements of 10 CFR Part 50.46.

By letter dated April 20, 1978 and as supplemented on April 27, 1978, the licensee submitted proposed Technical Specifications to implement the operating procedures and maintenance of all three HPI pumps in an operable status as described in the licensee's April 21, 1978 letter. We are issuing these Technical Specifications in the license amendment accompanying this Exemption.

On August 21, 1978, the licensee requested an exemption from the provisions of 50.46.

In the licensee's submittal of June 8, 1978, it was stated that to meet the limits of 10 CFR 50.46, operator action at the valve

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locations is required to open High Pressure Injection (HPI) Pump B-C discharge header cross over valves (HP-116 and HP-117) and the HPI injection line A engineering safeguards valve (HP-26) within 10 minutes.

Reliance on local operation of valves this soon after the onset of a loss-of-coolant accident is not desirable on a permanent basis. The licensee has requested an exemption from the requirements of 10 CFR 50.46 for operation at Oconee 1 during Cycle 5 until such time as a permanent solution to this problem can be implemented.

The original concern derived from an unexpected but nevertheless inadequate assessment of a spectrum of breaks. This deviation from 10 CFR 50.46 has been ameliorated on a temporary basis by the actions discussed herein. However, combined reliance on prompt operator action to perform the required steps to assure plant safety over a period of years into the future is undesirable and should be replaced as promptly as possible by returning the system to automatic or control room actuation. To this extent, the original defect still remains until the modifications are made to eliminate the reliance on prompt operator actions.

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We have reviewed the effects of changes made to the facility during the current refueling outage and have concluded that operation of Oconee Unit 1 at power levels of up to 2568 Mwt and in accordance with the Technical Specifications will assure that the ECCS system will conform to the performance criteria of 10 CFR 50.46. Accordingly, until modifications are completed to achieve full compliance with 10 CFR 50.46, operation of the facility at power levels up to 2568 Mwt with appropriate operating procedures will not endanger life or property or the common defense and security.

While Oconee Unit No. 1 does not comply with our requirements for ECCS, appropriate actions, as previously described, have been taken to mitigate the consequences of any accidents at this plant. The Technical Specifications will provide protection against the subject small break LOCA and will bring plant operation wholly in conformance with 10 CFR 50.46. These Technical Specifications will be in force only for the brief interval of time until the proposed modifications of the ECCS are completed. The public interest is served in that by issuing this exemption for Unit No. 1 a significant power reduction with no concomitant increase in safety is avoided. Such a power reduction could affect system reliability, cause unemployment and increase consumer power costs in the area.

III.

Copies of the following documents are available for inspection at the Commission's Public Document Room at 1717 H Street, Washington, D.C. 20555, and are being placed in the Commission's local public document room at the Oconee County Library, 201 South Spring, Walhalla, South Carolina.

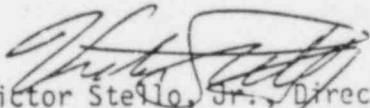
- (1) The application for exemption dated August 21, 1978, and
- (2) This Exemption in the matter of Duke Power Company, Oconee Nuclear Station, Unit No. 1.

IV.

WHEREFORE, in accordance with the Commission's regulations as set forth in 10 CFR 50.12, the licensee is hereby granted an exemption from the provisions of 10 CFR Part 50, Paragraph 50.46(a). With respect to Oconee Unit 1 this exemption supersedes the conditions of the Commission's Order for Modification of License dated April 26, 1978, and is conditioned as follows:

- (1) The licensee has submitted the plans and schedules to modify the facility to eliminate reliance on prompt operator action described herein. Additional guidance in these areas has been provided by the NRC letter of September 26, 1978 to Duke Power Company.
- (2) Upon approval by the staff the licensee shall undertake such modifications in accordance with the approved schedule.
- (3) This exemption shall be terminated upon completion of the modifications in accordance with this exemption or upon shutdown for the next scheduled refueling outage, whichever occurs first.

FOR THE NUCLEAR REGULATORY COMMISSION


Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland,
this 23rd day of October 1978.