



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO AMENDMENT NO. 157 TO FACILITY OPERATING LICENSE NO. DPR-71
AND AMENDMENT NO. 188 TO FACILITY OPERATING LICENSE NO. DPR-62
CAROLINA POWER & LIGHT COMPANY
BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2
DOCKET NOS. 50-325 AND 50-324

1.0 INTRODUCTION

By letter dated October 16, 1991, Carolina Power & Light Company (the licensee) submitted a request for changes to the Brunswick Steam Electric Plant (BSEP), Units 1 and 2, Technical Specifications (TS). The requested changes would change the requirement for the High Pressure Coolant Injection (HPCI) system to be operable when reactor pressure is at or above 150 psig instead of the present requirement of 113 psig.

2.0 EVALUATION

The proposed change is being made to provide additional operating margin between the HPCI steam line low pressure isolation setpoint, presently established at "greater than or equal to 100 psig," and the required HPCI availability pressure, presently established at greater than 113 psig.

The primary purpose of the HPCI system is to maintain reactor vessel inventory after small breaks that do not depressurize the reactor vessel. Use of the 150 psig as the lower operability limit for HPCI is technically supported by the performance specifications given for these systems in the BSEP Updated Final Safety Analysis Report (UFSAR). As stated in the design data Table 6.3.1-1, the minimum pressure for the low pressure accident mode of operation of the HPCI system is greater than or equal to 150 psig. As noted in UFSAR Table 6.3.1-1, the HPCI system uses a single 100 percent capacity pump with a design flow of 4250 gallons per minute over a pressure range of 1120 psid (drywell to reactor vessel) to 150 psid (drywell to reactor vessel).

Presently, T/S 3.5.1 requires the HPCI system to be operable when reactor steam dome pressure is greater than 113 psig. The General Electric Company (GE) has indicated that the existing TS requirement that the HPCI system be operable when reactor pressure is greater than 113 psig is derived from early performance requirements for the core spray system. Originally, the maximum pressure at which the

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core spray system could adequately supply cooling water to all fuel assemblies was 113 psig. The HPCI system was required operable when reactor pressure was greater than 113 psig to provide additional protection, even though rated flow could not be achieved when reactor pressure was less than 150 psig. Since that time, the core spray system has been demonstrated to provide adequate core cooling over a wider range of operating pressure; however, the TS requirements for HPCI system operability have never been revised to reflect this.

During reactor start-up, the HPCI system can be placed in service as required by the TS after the HPCI low steam line pressure isolation switches reset. The pressure switches provide isolation signals for low HPCI steam supply pressure and are required to have a setpoint of "greater than or equal to 100 psig" (see TS Table 3.3.2-2, Item 4.a.3). These switches also are required to reset before the HPCI system steam supply isolation valves can be opened. The actual as-installed setpoint for these pressure switches is set at a few pounds above the required minimum pressure to allow for instrument drift and uncertainty. The resulting operating margin, between the actual as-installed instrument setpoint and the minimum pressure at which the HPCI system is required to be operable, is less than 13 psig. This narrow operating margin, between the HPCI low steam supply isolation setpoint and the minimum HPCI operability pressure, has resulted in several complications in the past, as discussed below:

- (1) During plant start-up, these pressure switches may not reset in a timely manner, resulting in the reactor being maintained for an extended period of time (i.e., hours) at approximately 110 psig while awaiting completion of the special procedure used to reset the pressure switches. Maintaining the reactor in stable condition in this operating condition for an extended period of time provides increased opportunities for inadvertent reactor transients. In addition, the consequences of a control rod drop accident are the most severe when the reactor is operating in this pressure/temperature domain. NRC Inspection Report Nos. 50-325/91-18 and 50-324/91-18 dated August 12, 1991, discusses this operating experience.
- (2) The HPCI system has inadvertently isolated upon opening of the HPCI steam supply isolation valves. This isolation resulted from the sudden pressure decrease in the HPCI system steam line. This phenomenon has been discussed in CP&L Licensee Event Report 1-91-020 dated August 23, 1991.

The above operational problems could be avoided by increasing the operating margin between the actual as-installed instrument setpoint and the minimum pressure at which the HPCI system is required operable. After evaluating several alternatives, the licensee

determined the best overall method of correcting these operational nuisances would be to increase the minimum reactor pressure for HPCI system operability from greater than 113 psig to greater than 150 psig. This alternative is consistent with several other GE BWR facilities, such as Hatch, Fitzpatrick, Browns Ferry, Duane Arnold, Quad Cities, and Fermi 2, which have similar HPCI and low pressure cooling systems. These facilities require their HPCI systems to be operable prior to exceeding 150 psig.

TS 3.5.1 presently requires the HPCI system to be operable when reactor pressure is greater than 113 psig; however, in contrast, the minimum reactor pressure for HPCI rated flow is 150 psig. Based on the fact that (1) the HPCI system may not achieve rated flow at the present minimum pressure at which the system is required to be operable (113 psig), and (2) other backup core cooling systems (the LPCI and core spray systems) are required to be available and capable of fulfilling their functions, the staff concludes that the minimum pressure for the HPCI system operability may be changed to be consistent with the actual minimum reactor pressure at which rated HPCI system flow is designed to be achieved (150 psig). This change (1) will eliminate the current operational constraints that result from the narrow operating margin between the as-installed HPCI system supply pressure-low isolation signal and the minimum HPCI system operability pressure, and (2) will promptly place the HPCI system in service and minimize the amount of time the reactor must remain in a restricted operating region where the consequences of a postulated control rod drop accident would be the most significant.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the State of North Carolina official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there

has been no public comment on such finding (56 FR 57691). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

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AMENDMENT NO. 157 TO FACILITY OPERATING LICENSE NO. DPR-71 - BRUNSWICK,
UNIT 1, AMENDMENT NO. 188 TO FACILITY OPERATING LICENSE NO. DPR-62 -
BRUNSWICK, UNIT 2

~~Docket File~~

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