CP&L

Carolina Power & Light Company

June 27, 1980

File: NG-3514(B)

SERIAL NO: NO-80-972

Mr. Darrell G. Eisenhut, Director
Division of Licensing
United States Nuclear Regulatory Commission
Washington, D. C. 20555

BRUNSWICK STEAM ELECTRIC PLANT UNIT NOS. 1 AND 2
DOCKET NOS. 50-325 AND 50-324
LICENSE NOS. DPR-71 AND DRP-62
ADDITIONAL TMI-2 RELATED REQUIREMENTS - ITEM II.K.3.46

Dear Mr. Eisenhut:

In a letter dated May 7, 1980, you requested that Carolina Power & Light Company (CP&L) provide an evaluation of the applicability to Brunswick of the responses submitted by General Electric February 21, 1980, to the list of concerns provided by the ACRS consultant, Dr. C. Michelson (Item II.K.3.46). Attached please find CP&L's response to that request.

If you have any questions on this subject, please contact our staff.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply and
Engineering & Construction

EEU/BLP/JJS/dk
Attachments

cc: Mr. J. N. Hannon (NRC)

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APPLICABILITY OF MICHELSON CONCERNS TO
BRUNSWICK UNITS 1 AND 2

REFERENCES: (1) Letter, D. F. Ross to T. D. Keenan, Information Required to Address Michelson's Concerns for Boiling Water Reactors, dated 10/17/79

(2) Letter, R. H. Buchholz to D. F. Ross, response to Questions Posed by C. Michelson, dated 2/21/80

Reference (1) requested that the BWR Owners Group review and respond to questions posed by C. Michelson which were included as Enclosures A and B of the reference.

Reference (2) is General Electric's prepared response, on behalf of the BWR Owners' Group to the questions posed by C. Michelson.

RESPONSES TO SPECIFIC CONCERNS

Questions 1: Pressurizer level is an incorrect measure of primary coolant inventory.

CP&L Response: GE's response directly applies to Brunswick.

Question 2: The isolation of small breaks (e.g., letdown line; PORV) not addressed or analyzed.

CP&L Response: GE's response (Reference 2) directly applies to Brunswick.

Question 3: Pressure boundary damage due to loadings from a) bubble collapse in subcooled liquid and 2) injection of ECC water in steam-filled pipes.

CP&L Response: The Brunswick units have no geometry equivalent to that identified in Michelson's report on B&W reactors relative to bubble collapse (steam bubbling upward through the pressurizer surge line and pressurizer). Thus the first concern is not applicable to the Brunswick units.

ECC injection in the Brunswick units at high pressure is into the feedwater lines. The feedwater lines are normally filled with relatively cold liquid (420°F or less). ECCS injection at low pressure is either directly into the reactor vessel (CS) or into the recirculation pump discharge line (LPCI) near the automatically-closed recirculation pump discharge valve. Thus the second concern is not applicable to the Brunswick units.

Question 4: In determining need for steam generators to remove decay heat, consider that break flow enthalpy is not core exit enthalpy.

CP&L Response: GE's response directly applies to Brunswick.

Question 5: Are sources of auxiliary feedwater adequate in the event of a delay in cooldown subsequent to a small LOCA?

CP&L Response: GE's response directly applies to Brunswick.

Question 6: Is the recirculation mode of operation of the HPCI pumps at high pressure an established design requirement?

CP&L Response: The high-pressure injection systems utilized in the Brunswick units are the Reactor Core Isolation Cooling (RCIC), and High Pressure Coolant Injection (HPCI).

The RCIC and HPCI systems normally take suction from the condensate storage tank and have an alternate suction source from the suppression pool. A recirculation mode of operation of these systems is established when the system suction is from the supression pool. In this mode, water injected into the reactor following a LOCA is discharged through the break and flows back to the suppression pool forming a closed recirculation loop.

Other recirculation modes include test modes (e.g., suction from and discharge to the condensate storage tank) and system operation on low flow bypass with discharge to the suppression pool.

All of these modes are established design requirements.

Question 7: Are the HPCI pumps and RHR pumps run simultaneously? Do they share common piping? suction? If so, is the system properly designed to accommodate this mode of operation (i.e., are any NPSH requirements violated, etc.)?

CP&L Response: The RCIC/HPCI systems on the Brunswick units share a common suction line from the condensate storage tank. The low pressure core spray (CS) pumps and RHR pumps in the LPCI mode do not share common suction piping. The RHR shutdown cooling operating mode does not share any common suction piping with the RCIC, HPCI, CS or RHR/LPCI systems. It is an established design requirement to size the suction piping, including shared piping, such that adequate NPSH is available to RCIC, HPCI, RHR/LPCI, and CS pumps for all simultaneous operating modes of these systems.

CP&L Response: (cont'd) Pre-operational and/or startup tests have been conducted that demonstrate that the requirement is met.

Question 8: Mechanical effects of slug flow on steam generator tubes needs to be addressed (transitioning from solid natural circulation to reflux boiling and back to solid natural circulation may cause slug flow in the hot leg pipes).

CP&L Response: GE's response directly applies to Brunswick.

Question 9: Is there minimum flow protection for the HPCI pumps during the recirculation mode of operation?

CP&L Response: For Brunswick units 1 and 2, the RCIC, HPCI, RHR, and CS pumps all contain valves, piping, and automatic logic that bypasses flow to the suppression pool as required to provide minimum flow protection for all design basis operating modes of the systems.

Question 10: The effect of the accumulators dumping during small break LOCAs is not taken into account.

CP&L Response: GE's response directly applies to Brunswick.

Question 11: What is the impact of continued running of the RC pumps during a small LOCA?

CP&L Response: GE's response directly applies to Brunswick.

Question 12: During a small break LOCA in which offsite power is lost, the possibility and impact of pump seal damage and leakage has not been evaluated or analyzed.

CP&L Response: The RCIC, HPCI, RHR, and CS pumps are provided with mechanical seals. These seals are cooled by the pump primary process water. No external cooling from auxiliary support systems, such as site service water or room air coolers, is required for pump seals. These types of seals have demonstrated (in nuclear and other applications) their capability to operate for extended periods of time at temperatures in excess of those expected following a LOCA.

Should seal failure occur, it can be detected by room sump high level alarms. The RCIC, HPCI, CS and RHR individual pumps are arranged, and motor operated valves provided, so that a pump with a failed seal can be shut down and isolated without affecting the proper operation of the other redundant pumps/systems.

CP&L Response (Cont'd): Considering the low probability of seal failure during a LOCA, the fact that a pump with a failed seal can be isolated without affecting other redundant equipment, and the substantial redundancy provided in the BWR emergency cooling systems, pump seal failure is not considered a significant concern.

Question 13: During transitioning from solid natural circulation to reflux boiling and back again, the vessel level will be unknown to the operators, and emergency procedures and operator training may be inadequate. This needs to be addressed and evaluated.

CP&L Response: GE's response directly applies to Brunswick.

Question 14: The effect of non-condensible gas accumulation in the steam generators and its possible disruption of decay heat removal by natural circulation needs to be addressed.

CP&L Response: GE's response directly applies to Brunswick.

Question 15: Delayed cooldown following a small break LOCA could raise the containment pressure and activate the containment spray system. Impact and consequences need addressing.

CP&L Response: Mark I Containment:

The Brunswick units have a Mark I containment and do not have an automatically initiated drywell or wetwell spray.

Procedural guidance is provided to the operator to manually initiate drywell sprays given that a LOCA has occurred and the containment integrity is threatened. Some non-essential equipment in the drywell (e.g., recirculation pumps) could be adversely affected by drywell spray. All essential equipment in the drywell has been qualified for the steam and temperature environment that would exist following a LOCA.

There is no equipment in the wetwell that is adversely affected by wetwell sprays.

Question 16*: This concern relates to the possibility that an operator may be inclined and perhaps even trained to isolate, where possible, a pipe break LOCA without realizing that it might be an unsafe action leading to high pressure, and short-term core bakeout. For example, if a BWR should experience a LOCA from a pressure boundary failure somewhere between the pump suction and discharge valve for either reactor recirculation pump, it would be possible for the operator to close these valves following the reactor blowdown to low

Question 16*: (Cont'd)

pressure at thereby isolate the break, stop the blowdown, and repressurize the reactor coolant system. Before such isolation should be permitted, it is first necessary to show by an appropriate analysis that the high pressure ECCS is adequate to reflood the uncovered core without assistance from the low pressure ECCS which can no longer deliver flow because of the repressurization. Otherwise, such isolation action should be explicitly forbidden in the emergency operating instructions.

CP&L Response: GE's response directly applies to Brunswick.

*Excerpt from Reference (1).