

November 18, 1996

MEMORANDUM TO: Jack W. Roe, Director
 Division of Reactor Projects III/IV
 Office of Nuclear Reactor Regulation

FROM: Geoffrey E. Grant, Director
 Division of Reactor Safety, Region III

SUBJECT: REQUEST FOR TECHNICAL ASSISTANCE: QUAD CITIES
 LICENSING BASIS REQUIREMENTS REGARDING WATER
 HAMMER AS A RESULT OF A LOOP/LOCA (AITS 96-0389)

This memorandum requests that NRR review General Electric (GE) report NEDC-32513, "Suppression Pool Cooling and Water Hammer," and address conclusions contained in the report regarding licensing basis requirements. This report was generated for the BWR Owners Group to address concerns raised in Information Notice 87-10, "Potential for Water Hammer During Restart of Residual Heat Removal Pumps," which alerted licensees of the potential for water hammer in the RHR system. A review of NEDC-32513 by NRR is necessary in order for the Region III staff to adequately evaluate the licensee's response to IN 87-10.

Information Notice 87-10 Issues

Information Notice 87-10, "Potential for Water Hammer During Restart of Residual Heat Removal Pumps," was issued on February 11, 1987, to alert licensees of the potential for water hammer in the RHR system. The specific condition of concern involved a design basis LOCA coincident with a LOOP, with one or more RHR loops in the suppression pool cooling mode. During the power loss and subsequent valve re-alignment, portions of the RHR system could void because of the drain down to the suppression pool as a result of elevation differences. A water hammer may occur in those RHR loops that were in the SPC mode when the RHR pumps restart after the diesel generators re-energize their respective buses. As a result, the integrity of the RHR system could be in jeopardy, which could endanger all modes of RHR, including low pressure coolant injection.

General Electric Report NEDC-32513

General Electric (GE) report NEDC-32513, "Suppression Pool Cooling and Water Hammer," dated December 29, 1995, was prepared for the Boiling Water Reactor Owners Group

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(BWROG) Residual Heat Removal/Suppression Pool Cooling (RHR/SPC) Committee to address the concerns raised in IN 87-10. Part of that report contains licensing basis conclusions which appears to warrant NRR review. The findings of the report as well as the final conclusions are discussed below.

The report states that there are only a few top level licensing basis rules that are required in the design and licensing process of a nuclear power plant, which include: offsite power availability, safe shutdown earthquake (SSE), and single failure criteria. In addition, the report states that these licensing basis rules are imposed for each Design Basis Accident (DBA) without mechanistic or timing requirements (page 10).

With regard to single active failures, the report states that the effect of a single failure is included in the evaluation for each DBA by assuming one safety system or safety component unavailable at a time, but there is no requirement on the timing when the single failure should be imposed, nor the mechanistic consequence of that single failure (page 11).

With regard to SSEs, the report states that whatever happens first, SSE or LOCA, has never been a licensing issue, because SSE is imposed non-mechanistically in the LOCA analysis (page 11).

As a result, the reports states the following conclusions:

- The original regulatory intent of the licensing basis "concurrent loss of offsite power" is no different than "concurrent safe shutdown earthquake" or "concurrent single failure," all of which are required to be postulated with a DBA and considered in a safety analysis non-mechanistically. Therefore, a mechanistic consequence, such as water hammer as a result of a LOCA concurrent with a LOOP, was not an original licensing requirement and was neither intended nor included in the original design and in the licensing review process (page 7).

Specifically, an answer to the following question is requested:

- Was a mechanistic consequence such as a water hammer as a result of a LOCA concurrent with a LOOP a licensing requirement and intended in the original design and in the licensing review process?

For your information, we are enclosing a copy of GE report NEDC-32513.

Docket Nos. 50-254; 50-265

Attachment: As stated

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