

May 5, 1998

50-305

Mr. M. L. Marchi Manager - Nuclear Business Group Wisconsin Public Service Corporation P.O. Box 19002 Green Bay, WI 54307-9002

## SUBJECT: KEWAUNEE NUCLEAR POWER PLANT - REQUEST FOR ADDITIONAL INFORMATION REGARDING RESOLUTION OF GL96-06 ISSUES

Dear Mr. Marchi:

Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions," dated September 30, 1996, included a request for licensees to evaluate cooling water systems that serve containment air coolers to assure that they are not vulnerable to waterhammer and two-phase flow conditions. Wisconsin Public Service Corporation provided its assessment of the waterhammer and two-phase flow issues for Kewaunee in letters dated January 28, 1997, and March 6, 1998. In order for us to complete our review, we will require additional information as discussed in the enclosed. We ask that you provide this information by July 30, 1998.

If you have any questions regarding this request, please call me at 301-415-3026.

Sincerely,

Original signed by:

William O. Long, Sr. Project Manager Project Directorate III-3 Division of Reactor Projects III/IV Office of Nuclear Reactor Regulation

Enclosure: As stated

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# UNITED STATES NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

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William O

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Enclosure: As stated

cc w/encl: See next page

M. L. Marchi Wisconsin Public Service Corporation

cc:

Foley & Lardner ATTN: Bradley D. Jackson One South Pinckney Street P.O. Box 1497 Madison, WI 53701-1497

Chairman Town of Carlton Route 1 Kewaunee, WI 54216

Harold Reckelberg, Chairman Kewaunee County Board Kewaunee County Courthouse Kewaunee, WI 54216

Chairman Wisconsin Public Service Commission 610 N. Whitney Way Madison, WI 53705-2729

Attorney General 114 East, State Capitol Madison, WI 53702

U.S. Nuclear Regulatory Commission Resident Inspectors Office Route #1, Box 999 Kewaunee, WI 54216

Regional Administrator - Region III U.S. Nuclear Regulatory Commission 801 Warrenville Road Lisle, IL 60532-4531

James D. Loock, Chief Engineer Public Service Commission of Wisconsin 610 N. Whitney Way Madison, WI 53707-7854



#### Kewaunee Nuclear Power Plant

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## REQUEST FOR ADDITIONAL INFORMATION FOR RESOLUTION OF GL 96-06 ISSUES AT KEWAUNEE (TAC NO. M96824)

- 1. If a methodology other than that discussed in NUREG/CR-5220, "Diagnosis of Condensation-Induced Waterhammer," was used in evaluating the effects of waterhammer, describe this alternate methodology in detail. Also, explain why this methodology is applicable and gives conservative results for Kewaunee (typically accomplished through rigorous plant-specific modeling, testing, and analysis).
- 2. For both the waterhammer and two-phase flow analyses, provide the following information:
  - a. Identify any computer codes that were used in the waterhammer and two-phase flow analyses and describe the methods used to bench mark the codes for the specific loading conditions involved (see Standard Review Plan Section 3.9.1).
  - b. Describe and justify all assumptions and input parameters (including those used in any computer codes) such as amplifications due to fluid structure interaction, cushioning, speed of sound, force reductions, and mesh sizes, and explain why the values selected give conservative results. Also, provide justification for omitting any effects that may be relevant to the analysis (e.g., fluid structure interaction, flow induced vibration, erosion).
  - c. Provide a detailed description of the "worst case" scenarios for waterhammer and two-phase flow, taking into consideration the complete range of event possibilities, system configurations, and parameters. For example, all waterhammer types and water slug scenarios should be considered, as well as temperatures, pressures, flow rates, load combinations, and potential component failures. Additional examples include:
    - the effects of void fraction on flow balance and heat transfer;
    - the consequences of steam formation, transport, and accumulation;
    - cavitation, resonance, and fatigue effects; and
    - erosion considerations.

Licensees may find NUREG/CR-6031, "Cavitation Guide for Control Valves," helpful in addressing some aspects of the two-phase flow analyses.

d. Confirm that the analyses included a complete failure modes and effects analysis (FMEA) for all components (including electrical and pneumatic failures) that could impact performance of the cooling water system and confirm that the FMEA is documented and available for review, or explain why a complete and fully documented FMEA was not performed.

ENCLOSURE

- e. Explain and justify all uses of "engineering judgment."
- 3. Determine the uncertainty in the waterhammer and two-phase flow analyses, explain how the uncertainty was determined, and how it was accounted for in the analyses to assure conservative results for the Kewaunee plant.
- 4. Confirm that the waterhammer and two-phase flow loading conditions do not exceed any design specifications or recommended service conditions for the piping system and components, including those stated by equipment vendors; and confirm that the system will continue to perform its design-basis functions as assumed in the safety analysis report for the facility.
- 5. Provide a simplified diagram of the system, showing major components, active components, relative elevations, lengths of piping runs, and the location of any orifices and flow restrictions.
- 6. Describe in detail all corrective actions that have been taken or are planned to be taken to fully resolve the waterhammer and two-phase flow issues, including anticipated completion schedules for completing all remaining actions.