September 22, 2004

Mr. Thomas Coutu
Site Vice President
Kewaunee Nuclear Power Plant
Nuclear Management Company, LLC
N490 Highway 42
Kewaunee, WI 54216-9511

SUBJECT: KEWAUNEE NUCLEAR POWER PLANT - COMPLETION OF LICENSING ACTION FOR GENERIC LETTER (GL) 96-06, "ASSURANCE OF EQUIPMENT OPERABILITY AND CONTAINMENT INTEGRITY DURING DESIGN-BASIS ACCIDENT CONDITIONS" (TAC NO. M96824)

Dear Mr. Coutu:

The Nuclear Regulatory Commission (NRC) staff issued Generic Letter (GL) 96-06 on September 30, 1996, to all holders of operating licenses for nuclear power reactors, except for those licenses that have been amended to possession-only status. GL 96-06 requested information from licensees related to two concerns: (1) water hammer and two-phase flow in the cooling water systems that serve the containment air coolers and (2) thermally-induced overpressurization of isolated water-filled piping sections in containment. On November 13, 1997, the NRC staff issued Supplement 1 to GL 96-06 informing licensees about ongoing efforts and new developments associated with GL 96-06 and providing additional guidance for completing corrective actions. You responded in letters dated October 30, 1996, January 28 and November 20, 1997, March 6 and July 30, 1998, July 30, 2002, and April 1 and August 18, 2004. The results of the NRC staff's review of your responses to GL 96-06 follow.

Water Hammer and Two-Phase Flow

GL 96-06 included a request for licensees to evaluate cooling water systems that serve containment air coolers to assure that they are not vulnerable to water hammer and two-phase flow conditions. Subsequent to issuance of GL 96-06, the Electric Power Research Institute (EPRI) developed an analytical methodology for evaluating the GL 96-06 water hammer issue that was documented in EPRI Technical Reports 1003098 and 1006456 (previously known as EPRI Report TR-113594), and approved by the NRC in an evaluation dated April 3, 2002, (included as an Appendix to the EPRI Technical Reports). Section 3.3 of the NRC staff's safety evaluation requested that licensees who chose to use the EPRI methodology provide additional information to confirm that the EPRI methodology was properly applied and that plant-specific risk considerations were consistent with the EPRI risk perspective; to justify any proposed exceptions to the EPRI methodology; and to provide any additional information that is required to address the GL 96-06 two-phase flow issue.

The Wisconsin Public Service Corporation (WPSC), the licensee for Kewaunee at that time, provided it's initial response addressing the water hammer and two-phase flow aspects of

GL 96-06 in letters dated October 30, 1996, and January 28, 1997, as supplemented by letter dated March 6, 1998. In response to questions that were asked by the NRC, the licensee provided additional information about the resolution of the two-phase flow issue in a letter dated July 30, 1998, but deferred resolution of the water hammer issue pending completion of the EPRI initiative. Upon completion of the EPRI initiative, the Nuclear Management Company, LLC (NMC), successor to WPSC as the licensee for Kewaunee, provided additional information concerning the GL 96-06 water hammer issue in letters dated July 30, 2002, and April 1 and August 18, 2004.

Based on the NRC staff's review of the information that was provided, the NRC staff is satisfied with NMC's resolution of the GL 96-06 water hammer issue. Consistent with the NRC staff's evaluation of the EPRI methodology (referred to above), the April 1 and August 18, 2004, letters provide confirmation that the EPRI methodology was properly adhered to and applied, and that the plant-specific risk considerations are consistent with the EPRI risk perspective. Based on the analyses that were performed, the licensee has determined that a total of ten pipe support components did not meet the design criteria for the predicted water hammer loads. Corrective actions are planned to either modify the existing supports or to install new supports during the 2006 refueling outage. For the interim, the licensee has determined that the affected components satisfy the operability criteria developed in response to NRC Inspection and Enforcement Bulletin 79-14, "Seismic Analyses for As-Built Safety-Related Piping Systems," and therefore, remain operable.

NMC's evaluation of the GL 96-06 two-phase flow issue was addressed primarily in its letter dated July 30, 1998. In order to resolve two-phase flow concerns, the licensee has installed flow orifices in the service water discharge piping of the containment fan coolers to maintain service water pressure above saturation pressure for containment design temperature conditions. The NRC staff is satisfied with the licensee's response and resolution of this item.

While the NRC staff considers the licensee's response and resolution of the GL 96-06 water hammer and two-phase flow issues to be acceptable, the NRC staff has not performed a detailed quantitative assessment of the licensee's water hammer and two-phase flow analyses and has not reviewed the licensee's use and application of computer codes for performing these analyses. Consequently, these areas may be the subject of future NRC audit or inspection activities.

Thermally-Induced Overpressurization

In its letter dated January 28, 1997, the licensee identified 11 penetrations potentially vulnerable to a water solid volume that may be subjected to an increase in pressure due to heating of trapped fluid. The licensee stated that two of these 11 penetrations may require modification to prevent them from overpressurization following a design-basis accident, and the operability of the remaining penetrations can be assured by evaluation, changes to operating procedures, and changes to system lineups. The licensee committed to complete the modifications for the two penetrations prior to the end of its current refueling outage.

In its letter dated November 20, 1997, the licensee revised to 17 the number of penetrations potentially vulnerable to overpressurization. The licensee also stated that it has modified nine penetrations by installing over-pressure protection devices prior to the plant resumption of

power from the 1996-97 refueling outage. Administrative controls have been placed on three penetrations to ensure that the penetration is either drained or the fluid in the penetration is maintained at a higher temperature than containment design. The remaining five penetrations already contain some form of overpressure protection. In this regard, the licensee determined that at least one of the containment isolation valves in the penetration would momentarily open from the pressurization event and relieve the pressure prior to exceeding the allowable pressure for the system or components. The NRC staff finds that the licensee has provided an acceptable resolution for the issue of thermally-induced overpressurization of piping runs penetrating the containment.

Finally, the NRC staff concludes that all requested information has been provided; therefore, GL 96-06 is considered closed for your facility.

Sincerely,

/RA/

Carl F. Lyon, Project Manager, Section 1
Project Directorate III
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-305

cc: See next page

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