August 12, 2003

Mr. Bryce L. Shriver
Senior Vice President
and Chief Nuclear Officer
PPL Susquehanna, LLC
769 Salem Boulevard, NUCSB3
Berwick, PA 18603-0467

SUBJECT: SUSQUEHANNA STEAM ELECTRIC STATION, UNITS 1 AND 2 - GENERIC LETTER 96-06, "ASSURANCE OF EQUIPMENT OPERABILITY AND CONTAINMENT INTEGRITY DURING DESIGN-BASIS ACCIDENTS," (TAC NOS. MB96875 AND MB96876)

Dear Mr. Shriver:

On September 30, 1996, the U.S. Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions." 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 to inform the licensees about ongoing efforts and new developments associated with GL 96-06 and to provide additional guidance for completing corrective actions.

In letters dated October 28, 1996, and January 29, 1997, PPL Susquehanna, LLC (PPL, the licensee), submitted its 30-day and 120-day responses to GL 96-06, respectively, for Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2). In addition, PPL provided additional information in letters dated May 9 and June 30, 1997; November 9, 1998; July 9 and August 3, 1999; September 5 and December 3, 2001; and June 26, 2003. The results of the NRC staff's review of PPL's 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. PPL provided its assessment of the water hammer and two-phase flow issues for SSES 1 and 2 in letters dated January 29 and May 9, 1997, and additional information was submitted in a letter dated November 9, 1998. Based on the NRC staff's review of the information that was provided, it is our understanding that: (a) the drywell coolers are not required for accident mitigation, and (b) revisions have been made to the emergency support procedures that govern the recovery of the drywell cooling system to prohibit the restoration of the drywell coolers following the event scenarios of interest. This eliminates the potential for water hammer or two-phase flow during these event scenarios. The NRC staff is satisfied with PPL's response and considers the water hammer and two-phase flow issues of GL 96-06 to be closed.

Thermally Induced Overpressurization

In its submittal of May 9, 1997, PPL identified the potential for thermally induced overpressurization of several containment closed-loop piping systems during design-basis accidents (DBAs). The systems that were identified as susceptible to this phenomenon were the nonsafety-related reactor building closed cooling water (RBCCW) system, the reactor building chilled water (RBCW) system, and the drywell floor drain sump pump discharge lines. In addition, PPL identified the potential for thermally induced overpressurization of 12 containment penetrations (per unit) during the DBAs. The NRC staff performed an assessment of PPL's January 29 and May 9, 1997, responses to GL 96-06 and developed a request for additional information which was transmitted to PPL by letter dated August 20, 1998. PPL provided additional information to resolve the staff's concerns in its letters dated November 9, 1998, and July 9 and August 3, 1999. The staff's review of these letters led to an additional staff request for additional information which was transmitted to PPL by letter dated July 26, 2001. PPL provided its response to the request for additional information by letters dated September 5 and December 3, 2001, and June 26, 2003.

PPL originally identified 12 containment penetrations as vulnerable to thermally induced pressurization. In its August 3, 1999, submittal, PPL indicated that the susceptibility of one penetration, a 1-inch demineralized water line used for outage and maintenance activities, was eliminated by procedural changes. The submittal further indicated that the potential for overpressurization of the drywell floor drain sump pump discharge piping during a DBA could potentially affect an additional penetration, X-72B. PPL performed an assessment of the drywell sump pump discharge piping and concluded that the penetration for this line was not susceptible to failure. PPL's previous assessment indicated that failure of the drywell floor drain sump pump discharge line would not pose a safety concern. PPL also indicated that failure of the nonsafety-related closed-loop piping systems, RBCCW and RBCW, do not pose a safety concern. The NRC staff finds PPL's assessment of these lines acceptable.

In its September 5 and December 3, 2001, submittals, PPL provided an assessment of the remaining 11 penetrations. PPL performed heat transfer analyses to obtain the maximum pressure in the piping associated with each penetration. PPL evaluated the piping and demonstrated that the resulting stresses were within allowable limits contained in Appendix F of the American Society of Mechanical Engineers *Boiler and Pressure Vessel Code* (ASME Code). The NRC staff accepts the use of ASME Code, Appendix F, criteria for this assessment. PPL indicated that, as a result of the analyses, insulation would be added to two sections of piping inside the drywell. The valve vendor performed an analysis of the valves associated with penetrations X-23 and X-24 to demonstrate that leakage would occur through the gasket at the body-bonnet flange at a pressure substantially lower than the valve body or valve disc pressure capacity. The NRC staff finds this evaluation, which demonstrates that leakage through the valve gasket will relieve the pressure prior to failure of the valve body, an acceptable resolution of this issue. PPL performed a qualitative assessment to disposition the remaining nine penetrations. In a telephone conference held on December 18, 2002, the NRC staff requested that PPL provide quantitative support for its qualitative assessment.

PPL provided the quantitative assessment of the remaining nine penetrations in its June 26, 2003, submittal. PPL calculated the pressure capacity of the inboard and outboard valve bodies, and calculated the pressures which would cause leakage through the valve bonnets and discs for each of the nine penetrations. PPL's calculation indicated that leakage through either the valve disc or the valve bonnet would occur at pressures less than the piping or valve body capacity. Therefore, PPL concluded that failure of the pressure boundary of the piping or valve body will not occur at these penetrations. The NRC staff finds PPL's evaluation of the remaining nine penetrations provides an acceptable resolution of the issue. Based on the above, the NRC staff concludes that PPL's corrective actions and evaluation provide an acceptable resolution for the issue of thermally induced overpressurization of piping runs penetrating the containment.

Summary

The NRC staff has reviewed PPL's responses to GL 96-06 and finds that all of the requested information has been provided, and that the responses are an acceptable resolution for the issues of water hammer and two-phase flow, and thermally induced overpressurization of piping runs penetrating the containment. Therefore, the NRC staff considers GL 96-06 to be closed for SSES 1 and 2.

If you have any questions, please contact me at 301-415-1030.

Sincerely,

/RA/

Richard V. Guzman, Project Manager, Section 1
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-387 and 50-388

cc: See next page

bonnets and discs for each of the nine penetrations. PPL's calculation indicated that leakage through either the valve disc or the valve bonnet would occur at pressures less than the piping or valve body capacity. Therefore, PPL concluded that failure of the pressure boundary of the piping or valve body will not occur at these penetrations. The NRC staff finds PPL's evaluation of the remaining nine penetrations provides an acceptable resolution of the issue. Based on the above, the NRC staff concludes that PPL's corrective actions and evaluation provide an acceptable resolution for the issue of thermally induced overpressurization of piping runs penetrating the containment.

Summary

The NRC staff has reviewed PPL's responses to GL 96-06 and finds that all of the requested information has been provided, and that the responses are an acceptable resolution for the issues of water hammer and two-phase flow, and thermally induced overpressurization of piping runs penetrating the containment. Therefore, the NRC staff considers GL 96-06 to be closed for SSES 1 and 2.

If you have any questions, please contact me at 301-415-1030.

Sincerely,

/RA/

Richard V. Guzman, Project Manager, Section 1
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Division of Licensing Project Management
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ACCESSION NO.: ML032240610 * Input provided by memo. No major revisions were made.

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NAME	RGuzman	MO'Brien	GHubbard	KManoly	PMilano for RLaufer
DATE	08/12/03	08/12/03	05/18/00	08/05/03	08/12/03

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