

EVALUATION REPORT FOR RESOLUTION OF

GL 96-06 ISSUES AT WATTS BAR UNIT 1

INTRODUCTION

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. Tennessee Valley Authority (the licensee or TVA) provided its initial response to the GL in a letter dated January 28, 1997.

THERMALLY INDUCED PRESSURIZATION OF PIPING RUNS

The Nuclear Regulatory Commission (NRC) staff's letter dated May 27, 1998 requested additional information on this topic to which TVA responded by letter dated December 21, 1998.

In its submittal of January 28, 1997, TVA stated that piping systems that penetrate the containment are not vulnerable to a water solid volume that may be subjected to an increase in pressure due to heating of the trapped fluid. TVA also stated that the penetrations have been designed or analyzed for thermal expansion of fluid with thermal overpressure relief lines relieving back to containment from the penetrations. TVA relied on valve leakage for isolated sections of piping inside the containment to provide inherent pressure relief for four systems. The affected four systems are: waste disposal system; safety injection system; primary makeup water system; and demineralized water system.

TVA's submittal of January 28, 1997, states that, for spent fuel pool cooling system (SFPCS), the containment penetration was drained and valve leakage would relieve thermal overpressure in piping inside the containment. In its submittal of December 21, 1998, TVA stated that, based on re-evaluation, it has determined that the procedural draining of the containment penetration also results in draining of the affected piping inside the containment, and therefore, it is not relying upon valve leakage to provide thermal pressure relief for the SFPCS.

TVA's submittal of December 21, 1998, provided the design criteria for piping and valves, pressure and associated uncertainty at which the valves were determined to lift off their seats or leak, and the maximum calculated stress in piping based on estimated lift-off or leakage pressure.

The staff finds that TVA's evaluation is reasonable and provides an acceptable resolution for the issue of thermally induced pressurization of piping runs penetrating the containment.

Enclosure

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WATERHAMMER AND TWO-PHASE FLOW ISSUES

GL 96-06 requested 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. TVA provided its assessment for Watts Bar on January 28, 1997, and provided additional information by letter dated August 31, 1998.

Based upon the information provided in TVA's submittals, it is the NRC staff's understanding that the waterhammer and two-phase flow concerns discussed in GL 96-06 would only be applicable if a relief valve in the essential raw cooling water (ERCW) system failed open during the event scenario. In this particular case, TVA feels that venting of the ERCW through the open relief valve would preclude the occurrence of a waterhammer. While the NRC staff does not entirely agree with this view, the staff does believe that venting of the ERCW system through the open relief valve would cushion the effects of waterhammer such that system integrity will not be challenged. For added assurance that waterhammer will not pose a problem, TVA indicated in its August 31, 1998 response that it planned to revise emergency plan implementing procedures (EPIP) to include a precaution to consider the potential for waterhammer when restarting ERCW after a design-basis accident. That revision was included as part of Revision Number 11 to EPIP No. 6. The staff finds TVA's response to be acceptable and considers the waterhammer and two-phase flow elements of GL 96-06 to be closed.

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