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Docket No. 50-461

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Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Illinois Power's (IP's) Supplemental Response to Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves" Request for Additional Information (RAI)

Dear Sir:

This letter supplements IP's response to the May 23, 1996, Nuclear Regulatory Commission (NRC) RAI to GL 95-07. This supplement addresses question one of the NRC RAI:

1. Valves 1E51-F031, RCIC Suppression Pool Suction, and 1E22-F015, HPCS Suppression Pool Suction, may be potentially susceptible to thermally-induced pressure locking from heat transfer from the suppression pool during a design basis event. Has Illinois Power completed any analysis or evaluation of the potential for thermally-induced pressure locking of these valves from heatup of the suppression pool during a design basis event? If so, please provide these analyses or evaluations for our review.

IP Letter U-602601, dated June 27, 1996, submitted in response to your RAI, stated that these valves are not susceptible to thermally induced pressure locking due to suppression pool heat up. However, this letter also stated that further investigation of other scenarios for potential thermally induced pressure locking other than the scenario identified by the RAI was warranted. The additional scenario(s) requiring investigation was that of potential pressure locking due to room temperature increases during a Loss of Coolant Accident/High Energy Line Break (LOCA/HELB). This additional investigation has been completed with the conclusion that potential thermally induced pressure locking due to increased ambient temperature is also not an issue for these valves. The following evaluation provides the bases for our conclusion.

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For thermally-induced pressure locking of a valve to occur, pressurized fluid must be trapped in the valve bonnet and subsequently expanded due to temperature changes. For a gate valve (like 1E51-F031 and 1E22-F015) this requires both disc faces to be tightly sealed. Since there is no condition present to seal both disc faces (i.e., high pressure) of the RCIC and HPCS Suppression Pool Suction Valves, it is highly improbable both faces will be sealed. As a result, ambient temperature heating of the bonnet water would not cause thermally induced pressure locking. The inability to create bonnet pressure due to heating of the water within unpressurized bonnets was confirmed by testing performed for the NRC by Idaho National Engineering Laboratory (INEL) on one six-inch Walworth gate valve. Although the INEL test data was telefaxed to Clinton Power Station (CPS) by our NRC Project Manager for use in evaluating thermally induced pressure locking scenarios, due to the limited amount and scope of INEL test data, additional potential scenarios that could result in significant ambient temperature increases for these valves were evaluated. For example, events such as a HELB outside the containment could result in instantaneous step changes in the ambient temperatures for areas in which the noted valves are located. In these cases, it may be noted that the bonnet water temperature increase would not be instantaneous due to the relatively low thermal conductivity of water. Notwithstanding, and for conservatism, these cases were evaluated for their potential of creating thermally induced pressure locking. The results are described as follows:

CPS valve 1E22-F015 (HPCS Suppression Pool Suction Valve) is in the HPCS pump room which is located in the Fuel Building. This location differs from that of the standard Auxiliary Building location for the BWR/6 Standard Plant. The HPCS Pump Room Cubicle is separated from the Auxiliary Building by water-tight doors and seals. Therefore, the only HELB that could add appreciable direct ambient temperature effects in the HPCS Room is a HPCS High-Energy Line Break in the room. The break would render HPCS incapable of functioning, thus obviating the need to further consider the effects of thermal binding on valve 1E22-F015. Room temperature increases (prior to transferring pump suction to the suppression pool) for breaks other than a HPCS line break are primarily due to heat input from pump operation and are relatively small in magnitude. Therefore, thermally induced pressure locking is not considered a concern for this valve.

CPS valve 1E51-F031 (RCIC Suppression Pool Suction Valve) is in the RCIC pump room which is located in the Auxiliary Building. The design basis for the RCIC System does not include performance of an Emergency Core Cooling System (ECCS) function. The only design basis event requiring RCIC to function is the Control Rod Drop accident. Neither increased room temperature nor transfer of suction to the Suppression Pool would occur for this event. Therefore, thermally induced pressure locking is not a concern for the RCIC design basis event. The RCIC system licensing basis, however, does credit the high pressure injection capability of the RCIC system to support the HPCS 14-day allowable out of service time. Therefore, the following evaluations are for when HPCS is inoperable:

For LOCAs/HELBs located inside containment, ambient temperature increases in the RCIC pump room prior to transferring pump suction to the suppression pool are primarily due to heat input from pump operation and would not be rapid. Therefore, thermally induced pressure locking is not a concern for this valve for breaks inside containment.

For large HELBs located outside containment, rapid temperature increases could occur inside the RCIC pump room. For large breaks (MS/FW) the reactor pressure vessel (RPV) would be rapidly depressurized reducing the effectiveness of RCIC since the RCIC pump/turbine is driven with RPV steam. For these cases, core cooling would be supplied by the low pressure ECCS before the RCIC pump suction would be required to be transferred to the suppression pool.

For small break HELBs/LOCAs outside containment, room temperature increases are not expected to be significant and rapid bonnet water temperature increases should not occur, thus minimizing the potential for ambient temperature caused pressure locking. In addition, the RCIC storage tank inventory would provide more than three hours of injection water supply (based on the nominal RCIC flow rate). For example, assuming a 100 degree per hour cooldown rate, there would be insufficient RPV pressure to operate RCIC before the pump suction would be required to be transferred to the suppression pool. Under these conditions, the RPV pressure would be low enough to operate low pressure mitigation systems (ECCS) at the end of two hours.

Based on the above, thermally induced pressure locking is not considered a concern for this valve.

Attachment 1 provides an affidavit supporting the facts set forth in this letter.

Sincerely yours,

Wilfred Connell

Wilfred Connell
Vice President

JSP/csm

Attachment

cc: NRC Clinton Licensing Project Manager
NRC Resident Office, V-690
Regional Administrator, Region III, USNRC
Illinois Department of Nuclear Safety

Attachment 1
to U-602617

Wilfred Connell, being first duly sworn, deposes and says: that he is Vice President of the Nuclear Program at Illinois Power; that this letter supplying information for Generic Letter 95-07 has been prepared under his supervision and direction; that he knows the contents thereof; and that to the best of his knowledge and belief said letter and the facts contained therein are true and correct.

Date: This 5th day of August 1996

Signed: Wilfred Connell
Wilfred Connell

STATE OF ILLINOIS) SS.
DeWitt COUNTY)

"OFFICIAL SEAL"
Jacqueline S. Matthias
Notary Public, State of Illinois
My Commission Expires 11/24/97

Subscribed and sworn to before me this 5th day of August 1996

Jacqueline S. Matthias
Notary Public