



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO GENERIC LETTER 95-07, "PRESSURE LOCKING AND
THERMAL BINDING OF SAFETY-RELATED POWER-OPERATED GATE VALVES"

COMMONWEALTH EDISON COMPANY

LASALLE COUNTY STATION, UNITS 1 AND 2

DOCKET NOS. 50-373 AND 50-374

1.0 INTRODUCTION

Pressure locking and thermal binding represent potential common-cause failure mechanisms, that can render redundant safety systems incapable of performing their safety functions. The identification of susceptible valves and the determination of when the phenomena might occur requires a thorough knowledge of components, systems, and plant operations. Pressure locking occurs in flexible-wedge and double-disk gate valves when fluid becomes pressurized inside the valve bonnet and the actuator is not capable of overcoming the additional thrust requirements resulting from the differential pressure created across both valve disks by the pressurized fluid in the valve bonnet. Thermal binding is generally associated with a wedge gate valve that is closed while the system is hot and then is allowed to cool before an attempt is made to open the valve.

Pressure locking or thermal binding occurs as a result of the valve design characteristics (wedge and valve body configuration, flexibility, and material thermal coefficients) when the valve is subjected to specific pressures and temperatures during various modes of plant operation. Operating experience indicates that these situations were not always considered in many plants as part of the design basis for valves.

2.0 REGULATORY REQUIREMENTS

10 CFR Part 50 (Appendix A, General Design Criteria 1 and 4) and plant licensing safety analyses require or commit (or both) that licensees design and test safety-related components and systems to provide adequate assurance that those systems can perform their safety functions. Other individual criteria in Appendix A to 10 CFR Part 50 apply to specific systems. In accordance with those regulations and licensing commitments, and under the additional provisions of 10 CFR Part 50 (Appendix B, Criterion XVI), licensees are expected to act to ensure that safety-related power-operated gate valves susceptible to pressure locking or thermal binding are capable of performing their required safety functions.

On August 17, 1995, the NRC issued Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," to request that licensees take certain actions to ensure that safety-related power-operated gate valves that are susceptible to pressure locking or thermal binding are capable of performing their safety functions within the current licensing bases of the facility. GL 95-07 requested that each licensee, within 180 days of the date of issuance of the generic letter (1) evaluate the operational configurations of safety-related power-operated gate valves in its plant to identify valves that are susceptible to pressure locking or thermal binding, and (2) perform further analyses and take needed corrective actions (or justify longer schedules) to ensure that the susceptible valves, identified in (1) above, are capable of performing their intended safety functions under all modes of plant operation, including test configuration. In addition, GL 95-07 requested that licensees, within 180 days of the date of issuance of the generic letter, provide to the NRC a summary description of (1) the susceptibility evaluation used to determine that valves are or are not susceptible to pressure locking or thermal binding, (2) the results of the susceptibility evaluation, including a listing of the susceptible valves identified, and (3) the corrective actions, or other dispositioning, for the valves identified as susceptible to pressure locking or thermal binding. The NRC issued GL 95-07 as a "compliance backfit" pursuant to 10 CFR 50.109(a)(4)(i) because modification may be necessary to bring facilities into compliance with the rules of the Commission referenced above.

In a letter of February 13, 1996, Commonwealth Edison Company submitted its 180-day response to GL 95-07 for LaSalle County Station, Units 1 and 2. The NRC staff reviewed the licensee's submittal and requested additional information in a letter dated April 2, 1996. In a letter of May 24, 1996, the licensee provided the additional information. In a letter of June 5, 1996, the NRC issued a second request for additional information and in a letter of July 5, 1996, the licensee provided the additional information. In a letter of May 14, 1997, the NRC issued a third request for additional information and in a letter of May 29, 1998, the licensee provided the additional information. In a letter dated July 27, 1998, the licensee supplemented its 180-day response to GL 95-07.

3.0 STAFF EVALUATION

3.1 Scope of Licensee's Review

GL 95-07 requested that licensees evaluate the operational configurations of safety-related power-operated gate valves in their plants to identify valves that are susceptible to pressure locking or thermal binding. The Commonwealth Edison Company letters of February 13, May 24, and July 5, 1996 and May 29 and July 27, 1998, described the scope of valves evaluated in response to GL 95-07. The NRC staff has reviewed the scope of the licensee's susceptibility evaluation performed in response to GL 95-07 and found it complete and acceptable. The criteria for determining the scope of power-operated valves for GL 95-07 are consistent with the staff's acceptance of the scope of motor-operated valves associated with GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance."

3.2 Corrective Actions

GL 95-07 requested that licensees, within 180 days, perform further analyses as appropriate, and take appropriate corrective actions (or justify longer schedules), to ensure that the susceptible valves identified are capable of performing their intended safety function under all modes of plant operation, including test configuration. The licensee's submittals discussed proposed corrective actions to address potential pressure-locking and thermal-binding problems. The staff's evaluation of the licensee's actions is discussed in the following paragraphs:

- a. The licensee stated that the following valves were modified or are scheduled to be modified during the current outage to eliminate the potential for pressure locking:

1(2) E12-F017A/B	Inboard Containment Spray Isolation
1(2) E12-F042A/B/C	Low Pressure Core Injection
1(2) E12-F068A/B	Service Water From Residual Heat Removal Heat Exchanger
1(2) E21-F005	Low Pressure Core Spray
1(2) E22-F004	High Pressure Core Spray (HPCS) Injection
1(2) E51-F013	Reactor Core Isolation Cooling (RCIC) Injection

The staff finds that physical modification to valves susceptible to pressure locking is an appropriate corrective action to ensure operability of the valves and is, thus, acceptable.

- b. The licensee stated that the following valves would be modified by the end of the Unit 1 refueling outage scheduled for 1999, and the Unit 2 refueling outage scheduled for 2000, to eliminate the potential for pressure locking:

1(2) E12-F027A/B	Suppression Pool Spray Isolation
1(2) E22-F012	HPCS Pump Minimum Flow
1(2) E51-F031	RCIC Pump Suppression Pool Suction

As short-term corrective action, the licensee revised procedures to isolate one(2)E12-F027A/B from the pressure source during evolutions that could create a pressure locking condition. Valves 1(2)E22-F012 are potentially susceptible to pressure locking during the recovery phase of an accident that requires HPCS injection. As the short-term corrective action, the licensee credited operator action to secure the HPCS pump if 1(2)E22-F012 fails to open. This condition would alarm in the control room and operators are trained to secure the HPCS pump if a valve fails to open. Because this condition exists during the recovery phase of an accident, operators would have sufficient time to realign the HPCS system if 1(2)E22-F012 failed to open. During a telephone conversation on October 29, 1998, to the staff, the licensee clarified its short-term corrective action for assuring that 1(2)E51-F031 are capable of opening during a pressure locking event. The licensee stated that procedures were revised to open 1(2)E51-F031 during a station blackout event before the suppression pool temperature increases to eliminate the potential for the valves to pressure lock. The staff finds that

the short-term corrective actions are acceptable until the modifications to eliminate the potential for pressure locking are complete.

- c. The licensee stated that all flexible and solid wedge gate valves in the scope of GL 95-07 were evaluated for thermal binding. When evaluating whether valves were susceptible to thermal binding, the licensee assumed that thermal binding would not occur below specific temperature thresholds. The screening criteria used by the licensee appear to provide a reasonable approach to identify those valves that might be susceptible to thermal binding. Until more definitive industry criteria are developed, the staff concludes that the licensee's actions to address thermal binding of gate valves are acceptable.

4.0 CONCLUSION

On the basis of this evaluation, the NRC staff finds that the licensee has performed appropriate evaluations of the operational configurations of safety-related power-operated gate valves to identify valves at the LaSalle County Station, Units 1 and 2, that are susceptible to pressure locking or thermal binding. In addition, the NRC staff finds that the licensee has taken, or is scheduled to take, appropriate corrective actions to ensure that these valves are capable of performing their intended safety functions. Therefore, the staff concludes that the licensee has adequately addressed the requested actions discussed in GL 95-07.

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