

**PECO ENERGY**

G.L. 95-07

PECO Energy Company
Nuclear Group Headquarters
965 Chesterbrook Boulevard
Wayne, PA 19087-5691

February 13, 1996

Docket Nos. 50-277
50-278
50-352
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DPR-56
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

SUBJECT: Peach Bottom Atomic Power Station, Units 2 and 3
Limerick Generating Station, Units 1 and 2
180 Day Response to Generic Letter 95-07, "Pressure Locking and
Thermal Binding of Safety-Related Power-Operated Gate Valves."

REFERENCE: Letter from G. A. Hunger, Jr., (PECO
Energy Company) to NRC dated
October 16, 1995

Dear Sir:

The NRC issued Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," on August 17, 1995. In the GL the NRC requested that addressees perform, or confirm that they previously performed, evaluations of operational configurations of safety-related, power-operated gate valves for susceptibility to pressure locking and thermal binding.

GL 95-07 contained both a 60 and 180 day reporting requirement. The referenced letter provided PECO Energy's 60 day response. This letter provides our 180 day response for the Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3, and the Limerick Generating Station (LGS), Units 1 and 2. The information requested by GL 95-07 is provided in Attachments 1, 2 and 3 of this submittal. The requested information, as stated in the GL, has been restated and followed by our response.

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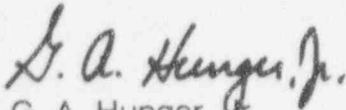
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If you have any questions concerning this submittal or require additional information please contact us.

Sincerely,

A handwritten signature in dark ink, appearing to read "G. A. Hunger, Jr.", written in a cursive style.

G. A. Hunger, Jr.
Director- Licensing

Attachments 1,2,3

cc: T. T. Martin, Administrator, USNRC, Region 1
W. L. Schmidt, Senior Resident Inspector, PBAPS
N. S. Perry, Senior Resident Inspector, LGS

ATTACHMENT 1

NRC Requested Information

All addressees, including those who have already satisfactorily addressed pressure locking and thermal binding for MOVs by implementing the guidance in Supplement 6 to GL 89-10 (or equivalent industry methods), are requested to provide a summary description of the following:

1. The susceptibility evaluation of operational configurations performed in response to (or consistent with) 180-day Requested Action 1, and the further analyses performed in response to (or consistent with) 180-day Requested Action 2, including the bases or criteria for determining that valves are or are not susceptible to pressure locking or thermal binding.

PECO Energy Response to Item 1

Depth of Review

PECO Energy evaluated the operational configuration of safety-related power-operated gate valves at both Peach Bottom Atomic Power Station (PBAPS) and Limerick Generating Station (LGS) to identify valves that were susceptible to pressure locking or thermal binding. All modes of plant/system operation were considered, including test configurations. This susceptibility evaluation consisted of a comprehensive review of system and component configurations which included information from the following sources:

- Valve Assembly Drawings
- System Piping and Instrumentation Diagrams
- Piping Isometric Drawings
- Updated Final Safety Analysis Report (UFSAR)
- Plant Technical Specifications
- System Operating Procedures
- System Surveillance Test Procedures
- GL 89-10 Design Basis dP calculations
- Piping Specifications
- Environmental Conditions Specification (including normal, LOCA, HELB, and Appendix R conditions)
- ASME Section XI Inservice Testing Program documents
- System Process Diagrams
- System Design Baseline Documents
- Topical Design Baseline Documents

In addition to the above, PECO Energy performed an experience assessment review of pressure locking or thermal binding industry event information. This review included the following documents:

INPO SOER 84-7
NRC/AEOD Study AEOD/S92-07
NUREG/CP-0146
NUREG-1275, Volume 9
NRC Information Notice (IN) 95-14
NRC IN 95-18
NRC IN 95-30
LGS valve maintenance history
PBAPS valve maintenance history

Susceptibility Criteria

PECO Energy eliminated solid wedge valve types from susceptibility to pressure locking or thermally-induced pressure locking. It should be noted that the majority of low pressure gate valves at PBAPS are of the solid wedge design. Likewise, double-disc valve types were eliminated from thermal binding susceptibility. These wedge types were eliminated based on generally accepted industry knowledge and experience which indicate that they are not susceptible to their respective phenomena. Wedge design types were determined by reviewing valve manufacturer's assembly drawings.

Thermal Binding (TB)

PECO Energy performed an experience review of all documented industry TB (binding when a valve cools down after being closed at a high temperature) events. This review found no conclusive industry TB events involving system temperatures less than 200°F. Most TB events involved valves which were closed at a reactor coolant temperature of greater than 500°F and then failed to open after cooldown.

Based on this review, PECO Energy eliminated valves from TB susceptibility consideration if they were located in a system with a maximum operating temperature of 200°F or less. Most valves in this category experience maximum system temperatures of 150°F or less.

All other non-double-disc gate valves were considered potentially susceptible to TB provided the valves were closed hot and then required to open to perform their intended safety function. These valves were then further evaluated with some eliminated from further thermal binding susceptibility consideration if they did not experience a cooldown prior to opening, or when significant plant operating experience under the same or more challenging conditions verified valve capability.

Pressure Locking (PL)

Valves are considered potentially susceptible to PL (locking induced by system pressure transients) if their bonnet pressure is greater than both the upstream and downstream piping pressures when the valve is opened. Minor variations in pressures (e.g., pump suction source pressure variations) were not considered significant due to conservatism incorporated into actuator sizing criteria.

All non-solid wedge gate valves were considered potentially susceptible to PL provided the valves were required to open under those conditions to perform their intended safety function.

Thermally Induced Pressure Locking (TIPL)

Thermally Induced Pressure Locking (TIPL) is defined as pressure locking induced by a temperature increase in trapped bonnet fluid due to 1) heat transferred through the pipe/pipe fluid or, 2) heat transferred from the surrounding environment.

Non-solid wedge gate valves are considered potentially susceptible to TIPL if the valves are subjected to a significant temperature increase prior to opening. This assumes that the valves are required to open under those conditions to perform their intended safety function.

Significant temperature increases for the system include changes due to alternate system operating modes as well as any inter-system effects. Significant temperature increases for the valve environment include effects due to design basis LOCA, HELB, and Appendix R scenarios.

Normal ambient temperature variations and minor system fluid temperature changes due to daily/seasonal changes, HVAC operation, and system operation were not considered significant. The performance of LGS and PBAPS valves under these conditions has been verified through system and component surveillance testing.

PECO Energy performed an experience review of all documented industry pressure locking events. This review found no conclusive pressure locking events involving TIPL due to normal ambient temperature variations nor any due to normal minor system fluid temperature changes. All of the TIPL events involved large temperature increases (100 to 200 °F) due to heat conduction through the adjoining pipe. There were no events caused by ambient temperature variations of any magnitude. Based on this review, the above TIPL screening criteria is considered appropriate. Valves were eliminated from further TIPL susceptibility if the valve's requirement to open was early in the temperature transient. This would prevent the valve from experiencing any effect of the transient.

2. The results of the susceptibility evaluation and the further analyses referred to in 1 above, including a listing of the susceptible valves identified.

PECO Energy Response to Item 2

Susceptibility Evaluation Results

Using the above susceptibility criteria, our evaluation yielded potentially susceptible valves as indicated in Attachments 2 and 3 for PBAPS and LGS respectively. The information contained in the Attachments includes the tag number of the valve, its primary function, the associated phenomenon(a), the current disposition for the valve, and a schedule for corrective action where appropriate. Also included for valves with scheduled corrective actions is a summary description of the basis used to determine the valve's acceptable status in the interim.

3. The corrective actions, or other dispositioning, for the valves identified as susceptible to pressure locking or thermal binding, including: (a) equipment or procedural modifications completed and planned (including the completion schedule for such actions); and (b) justification for any determination that particular safety-related power-operated gate valves susceptible to pressure locking or thermal binding are acceptable as is.

PECO Energy Response to Item 3

In addition to the information provided in Attachments 2 and 3, PECO Energy initiated a process to revise appropriate design control procedures requiring that changes to the plant configuration be reviewed against the pressure locking and thermal binding phenomena.

ATTACHMENT 2

PBAPS VALVES SUSCEPTIBLE TO PRESSURE LOCKING OR THERMAL BINDING

<u>VALVE NUMBER</u>	<u>SYSTEM</u>	<u>FUNCTION</u>	<u>PHENOMENON(a)</u>	<u>DISPOSITION</u>	<u>CORRECTIVE ACTION SCHEDULE</u>
MO-2-10-025A	RHR	LPCI INJECTION	PL	MITIGATING MOD	COMPLETE
MO-2-10-025B	RHR	LPCI INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-2-14-012A	CS	CS INJECTION	PL	MITIGATING MOD	COMPLETE
MO-2-14-012B	CS	CS INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-2-13-021	RCIC	RCIC INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-2-23-019	HPCI	HPCI INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-3-10-025A	RHR	LPCI INJECTION	PL	MITIGATING MOD	COMPLETE
MO-3-10-025B	RHR	LPCI INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-3-14-012A	CS	CS INJECTION	PL	MITIGATING MOD	COMPLETE
MO-3-14-012B	CS	CS INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-3-13-021	RCIC	RCIC INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
MO-3-23-019	HPCI	HPCI INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE

LGS VALVES SUSCEPTIBLE TO PRESSURE LOCKING OR THERMAL BINDING

<u>VALVE NUMBER</u>	<u>SYSTEM</u>	<u>FUNCTION</u>	<u>PHENOMENON(a)</u>	<u>DISPOSITION</u>	<u>CORRECTIVE ACTION SCHEDULE</u>
HV-51-1F017A,B,C,D	RHR	LPCI INJECTION	PL	MITIGATING MOD	COMPLETE (1)
HV-52-1F005	CS	CS INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE (1)
HV-52-1F037	CS	CS INJECTION	PL	MITIGATING MOD	COMPLETE
HV-49-1F013	RCIC	RCIC INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE (1)
HV-55-1F006	HPCI	HPCI INJECTION TO CS	PL	MITIGATING MOD	COMPLETE (1)
HV-55-1F105	HPCI	HPCI INJECTION TO FW	PL, TIPL	MITIGATING MOD	COMPLETE (1)
HV-49-1F029	RCIC	RCIC SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	1R07 (2)(7)
HV-49-1F031	RCIC	RCIC SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	1R07 (2)(3)
HV-55-1F042	HPCI	HPCI SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	1R07 (2)(3)
HV-51-1F014A,B	RHR	RHR SW TO RHR HX	TIPL	MITIGATING MOD	1R07 (2)(6)
HV-51-1F016A,B	RHR	DRYWELL SPRAY OUTBOARD	PL	MITIGATING MOD	1R07 (2)(4)
HV-51-2F017A,B,C,D	RHR	LPCI INJECTION	PL	MITIGATING MOD	COMPLETE
HV-52-2F005	CS	CS INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
HV-52-2F037	CS	CS INJECTION	PL	MITIGATING MOD	COMPLETE
HV-49-2F013	RCIC	RCIC INJECTION	PL, TIPL	MITIGATING MOD	COMPLETE
HV-55-2F006	HPCI	HPCI INJECTION TO CS	PL	MITIGATING MOD	2R04 (4)
HV-55-2F105	HPCI	HPCI INJECTION TO FW	PL, TIPL	MITIGATING MOD	2R04 (4)(5)
HV-49-2F029	RCIC	RCIC SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	2R04 (2)(7)

LGS VALVES SUSCEPTIBLE TO PRESSURE LOCKING OR THERMAL BINDING

<u>VALVE NUMBER</u>	<u>SYSTEM</u>	<u>FUNCTION</u>	<u>PHENOMENON(a)</u>	<u>DISPOSITION</u>	<u>CORRECTIVE ACTION SCHEDULE</u>
HV-49-2F031	RCIC	RCIC SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	2R04 (2)(3)
HV-55-2F042	HPCI	HPCI SUPPRESSION PL SUCT	TIPL	MITIGATING MOD	2R04 (2)(3)
HV-51-2F014A,B	RHR SW	RHR SW TO RHR HX	TIPL	MITIGATING MOD	2R04 (2)(6)
HV-51-2F016A,B	RHR	DRYWELL SPRAY OUTBOARD	PL	MITIGATING MOD	2R04 (2)(4)

Notes for Attachment 3:

1R07 = Unit 1 Refueling Outage 7 (Scheduled for April 1998)

2R04 = Unit 2 Refueling Outage 4 (Scheduled for January 1997)

- (1) Includes valves being modified during Unit 1 Refuel Outage 6 (1R06) (Jan-Feb 1996).
- (2) Modification may not be performed if valves are determined to be not susceptible via further analysis.
- (3) Interim acceptability is based on a conservative analysis demonstrating that required leakage rate to prevent bonnet pressurization during room heat up is several orders of magnitude less than typically measured leak rates for this valve. In addition, this valve cannot be isolated for maintenance and therefore rarely receives in-body maintenance.
- (4) Determinations for interim acceptability under PL conditions have been prepared for these valves using current industry methods with reasonable inputs and assumptions regarding system, valve, and actuator parameters. These or similar determinations have been previously reviewed by the NRC.
- (5) Interim acceptability for this valve concerning TIPL was verified by satisfactory stroking at full power and maximum expected temperature. Verification of seat leakage via qualitative upstream temperature information provides added assurance that the valve is not susceptible to locking in its current condition.

ATTACHMENT 3 cont.

- (6) Interim acceptability is based on a conservative analysis demonstrating that required leakage rate to prevent bonnet pressurization during room heat up is several orders of magnitude less than typically measured leak rates for this type of valve. In addition, this valve is in raw water service and is an ASME XI IST Category B valve with no leakage requirement, and is not maintained to achieve leak tight performance.
- (7) Interim acceptability is based on a conservative analysis demonstrating that required leakage rate to prevent bonnet pressurization during room heat up is several orders of magnitude less than typically measured leak rates for this valve. In addition, this valve is an ASME XI IST Category B valve with no leakage requirement, and is not maintained to achieve leak tight performance.