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SUBJECT: Forwards supplemental response to GL 95-07, "Pressure Locking & Thermal Binding of Safety-Related Power-Operated Gate Valves," to support NRC review.

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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Supplemental Response to Generic Letter 95-07,
Pressure Locking and Thermal Binding of
Safety-Related Power-Operated Gate Valves

By letter dated August 17, 1995, the NRC issued Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves," requesting licensees to perform, or confirm that they performed, (1) evaluations of operational configurations of safety related, power operated gate valves for susceptibility to pressure locking and thermal binding, and (2) further analyses, and any needed corrective actions, to ensure these valves are capable of performing their intended safety functions.

By letters L-96-024 dated February 9, 1996, and L-96-194 dated July 30, 1996, Florida Power and Light Company (FPL) provided its response to GL 95-07 for Turkey Point Units 3 and 4. As a result of NRC's review of FPL's response to GL 95-07 for Turkey Point Units 3 and 4, the NRC Staff requested additional information in order to complete the review. In accordance with the NRC request, attached is the supplemental information.

Should there be any questions concerning this response, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

A056 1/1

Attachment

OIH

cc: L. A. Reyes, Regional Administrator, Region II, USNRC
T. P. Johnson, Senior Resident Inspector, USNRC, Turkey Point Plant

**TURKEY POINTS UNITS 3 AND 4
SUPPLEMENTAL RESPONSE TO GENERIC LETTER 95-07,
"PRESSURE LOCKING AND THERMAL BINDING OF SAFETY RELATED POWER OPERATED GATE VALVES"**

1.0 Purpose and Scope

By letters L-96-024 dated February 9, 1996, and L-96-194 dated July 30, 1996, Florida Power and Light Company (FPL) provided its response to Generic Letter (GL) 95-07 for Turkey Point Units 3 and 4. This document provides supplemental information to FPL's response to GL 95-07 for Turkey Point Units 3 and 4. Pursuant to discussions with the NRC, supplemental information is provided for MOV-3/4-535 and -536, MOV-3/4-744A and -744B, MOV-3/4-862A and -862B, and MOV-3/4-863A and -863B.

2.0 Response

This response addresses specific pressure locking and thermal binding analyses for each set of valves identified above, as applicable.

2.1 Pressure Locking

1. MOV-3/4-535 and -536, Power Operated Relief Valves (PORV) Block Valves

This supplement provides the results of calculations demonstrating the capability of MOV-3/4-535 and -536 to overcome potential pressure locking forces.

As discussed in FPL letter L-96-024, the PORV block valves have a safety function to be open to provide overpressure protection to the reactor coolant system (RCS) during low temperature operation, in conjunction with the PORVs, but are not required to change position to perform this function. The valves are pre-staged open. Therefore, pressure locking is not a concern in providing overpressure protection to the RCS during low temperature operation. However, the capability to support the emergency operating procedures for steam generator tube rupture and to establish RCS feed and bleed conditions was evaluated.

A calculation was performed using the PRESLOK methodology developed by Commonwealth Edison and validated by the Westinghouse Owners Group. A safety factor of 1.2 was utilized with these results to ensure conservatism in the design. The calculation shows the

PORV block valves are capable of overcoming pressure locking forces including a safety factor of 1.2. Therefore, no further actions are required to address pressure locking for these valves. As requested by the NRC, the inputs used for the calculation are summarized in Table 1. Pressure inputs are provided for the steam generator tube rupture scenario which results in the highest potential pressure locking forces.

TABLE 1

Parameter	Value
Bonnet Pressure, SGTR	P_{bonnet} = 2235 psig
Upstream Pressure, SGTR	P_{up} = 1360 psig
Downstream Pressure, SGTR	P_{down} = 8 psig
Disk Thickness	t = 0.813 in
Seat Radius	a = 1.28 in
Hub Radius	b = 0.625 in
Seat Angle	θ = 5 deg
Poisson's Ratio	ν = 0.3
Modulus of Elasticity	E = 2.53×10^7 psi
Static Pullout Force	F_{po} = 10780 lbf
Coefficient of Friction between disk and seat (500°F to 600°F).	μ = 0.45
Stem Diameter	D_{stem} = 1.123 in
Hub Length	Hub length = 0.536 in
Actuator limit	19,600 lbf
Valve limit	19,735 lbf
Motor torque rating (derated for temperature)	7.9 ft- lbs
Actuator overall ratio	82.0
Pullout efficiency	0.40
Application factor	1.0
Undervoltage factor	0.7398
Stem factor (μ = 0.20)	0.0116

2. MOV-3/4-744A and -744B, Low Head Safety Injection Isolation Valves

This supplement provides additional information regarding the near-term capability of MOV-3/4-744A and -744B to overcome potential pressure locking forces, and confirms long-term plans to modify the valves to preclude pressure locking.

These valves are analyzed for pressure locking for the conditions when they are required to open in response to a safety injection signal to establish low head safety injection to the RCS. A calculation was performed using the PRESLOK methodology developed by Commonwealth Edison and validated by the Westinghouse Owner's Group. The calculation showed that the valves have the capability to overcome pressure locking forces to open. The available margin does not provide for a safety factor of 1.2 desired to ensure conservatism in the design. Therefore, a modification to the valves will be performed to vent the bonnet back to the RCS (high pressure) side of the valves. This precludes the possibility of pressure locking the valves. These modifications will be performed in the Unit 4 Cycle 17 (Fall 1997) outage and the Unit 3 Cycle 17 (Fall 1998) outage.

3. MOV-3/4-862A and -862B, Residual Heat Removal (RHR) Pump Refueling Water Storage Tank (RWST) Suction Isolation Valves

As stated in FPL letter L-96-024, these valves have no active function to open within the design basis. This supplement provides additional information regarding the requirement for these valves to be open as part of the flow path from the RWST to the RHR pump suction.

MOV 3/4-862 A/B are double disc gate valves which are considered potentially susceptible to pressure locking. These valves have no active design basis function to open, and are normally open during Modes 1, 2, and 3. Per the Turkey Point Units 3 and 4 Technical Specifications, the valves are required to be capable of being opened to provide a flowpath from the RWST to the RHR pump suction during Mode 4. This is a manual realignment. On plant start up, procedures for shifting RHR from an RCS cooldown line-up to an injection line-up in Mode 4 require the RHR system to be isolated from the RCS, cooled down, and then realigned for injection. The potential for pressure locking during this evolution was evaluated, since the valves would be closed with pressure in the bonnet when

the RHR system was cooled down and depressurized, creating the potential for pressure locking. Pressure locking is not expected since the cooldown cools the valve bonnet, which would also cause a bonnet pressure reduction. This reduces the potential for pressure locking. This alignment occurs on plant start up, or at least once per fuel cycle. No failure of the valves to perform this function has previously occurred. Local manual operation of the valve is provided for and possible to perform during this scenario. This demonstrates the capability of these valves to meet the Technical Specification requirement.

4. MOV-3/4-863A and -863B, SI/CS Recirculation Phase Suction Valves

This supplement provides a summary of procedural controls in place to preclude pressure locking of these valves in lieu of solely crediting bonnet pressure decay time on start up, and to address potential pressure locking following surveillance testing.

During plant startup, the valve bonnets could potentially be pressurized while the unit is heating up using the Reactor Coolant Pumps with the RHR system in service. When the RHR system is isolated from the RCS on plant start up, pressure may be trapped in the bonnet of the valves. To preclude potentially pressure locking the valves, the MOV-3/4-863A and -863B valves are cycled prior to realigning the RHR System for low head safety injection. This valve cycling is completed by procedure after the RHR system has been cooled down to less than 200°F and the RHR pumps have been secured. This ensures that the valves will support low head safety injection operability.

These valves are routinely exposed to RHR Pump discharge pressure during quarterly inservice testing which could pressurize the valve bonnet cavity. In the event that the valves were required to open for recirculation mode, an RHR pump would already be running on a safety injection signal applying pressure to one side of the valve disc. Any minor differential pressure due to the remaining pressure in the valve bonnets would not cause a potential pressure locking condition. Therefore, these valves remain operable during and after an RHR pump inservice test.

2.2 Thermal Binding

1. MOV-3/4-535 and -536, PORV Block Valves

This supplement provides a summary of procedural controls in place to preclude thermal binding of MOV-3/4-535 and -536 when the valves are closed to isolate PORV leakage.

If the PORV block valves are closed to address PORV leakage; and subsequently, the plant is cooled from normal operating temperature to an RCS temperature of 275°F to 285°F, the potential exists for thermal binding.

In order to align for cold over pressure protection per Technical Specification 3/4.9.3, the PORV block valves must be opened. Plant operating history has shown that the block valves have not previously thermally bound. However, to eliminate the possibility of thermal binding, procedure controls are in place. The block valves will be opened prior to the RCS being cooled to below hot standby conditions unless the PORVs or Block valves have been declared inoperable, or PORV leakage exceeds that allowed by Technical Specifications. This procedural control provides assurance that the PORVs that will be relied upon for OMS will be available during controlled plant cooldowns.

2. MOV-3/4-744A and -744B, Low Head Safety Injection Isolation Valves

This supplement provides a summary of procedural controls that are in place to preclude the potential for thermal binding of MOV-3/4-744A and -744B.

The low head safety injection isolation valves, MOV-3/4-744A and -744B valves could be closed at a temperature up to 350°F when securing from RHR system operation during plant start up. For scenarios where these valves are required to open, the temperature may be near normal containment ambient temperature creating the potential for thermal binding. Procedure controls are in place to require stroking the valve after the valve has cooled to eliminate any potential thermal binding. This is accomplished by opening and closing the valves during back leakage testing of downstream check valves. The MOV-3/4-744A and -744B valve cycling occurs prior to performing the low head safety injection flowpath alignment after RHR system cooldown to less than 200°F, and prior to plant heatup above

350°F when low head safety injection capability is required. Operating experience indicates that lines containing the valves are relatively cool. Additionally, several hours of delay due to time constraints in performing RHR system cooldown and testing activities allows additional ambient cooling prior to the final cycling of the valves.

3.0 Conclusions

This supplement provides the necessary information to establish the acceptability of specific Turkey Point Units 3 and 4 motor operated valves for pressure locking and thermal binding concerns. The potential for pressure locking is adequately addressed by the analyses, modifications, and procedural controls described herein for MOV-3/4-535 and -536, MOV-3/4-744A and -744B, and MOV-3/4-863A and -863B. Information regarding the operating conditions with respect to the potential for pressure locking of MOV-3/4-862A and -862B is also provided. Thermal binding for MOV-3/4-535 and -536, and MOV-3/4-744A and -744B are addressed by procedural controls. Long term upgrades for MOV-3/4-744A and -744B are also addressed.