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Nuclear Operations

February 13, 1996
NRC-96-0007

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

References:

1) Fermi 2
NRC Docket No. 50-341
NRC License No. NPF-43

2) NRC Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-related Power Operated Gate Valves," dated August 17, 1995

3) Detroit Edison letter to NRC, "Detroit Edison Initiatives on Pressure Locking and Thermal Binding of Gate Valves at Fermi 2," NRC-93-0127, dated October 13, 1993

4) Detroit Edison letter to NRC, "Status of Detroit Edison Initiatives on Pressure Locking and Thermal Binding of Gate Valves," NRC-94-0102, dated November 2, 1994

5) Detroit Edison letter to NRC, "Detroit Edison Response to NRC Generic Letter 95-07," NRC-95-0106, dated October 13, 1995

6) NRC letter to Detroit Edison, "60-Day Response to Generic Letter 95-07 (TAC No. M93463)," dated November 8, 1995

7) Detroit Edison letter to NRC, "Detroit Edison Supplemental Response to NRC Generic Letter 95-07," NRC-95-0128, dated November 15, 1995

Subject: Detroit Edison Response to NRC Generic Letter 95-07

This letter provides Detroit Edison's response to the requested 180-day actions as required by GL 95-07. This Generic Letter requests that licensees, within 180 days of the date of the letter, perform two actions:

1. Evaluate the operational configurations of safety-related power-operated (i.e., motor-operated, air-operated, and hydraulically-operated) gate valves in the plant to identify valves that are susceptible to pressure locking or thermal binding;

2. Perform further analyses as appropriate, and take needed corrective actions (or justify longer schedules), to ensure that the susceptible valves identified in 1 are capable of performing their intended safety function(s) under all modes of plant operation, including test configuration.

Tables 1 through 4 in the enclosure to this letter document the completion of these two actions.

Generic Letter 95-07 also requests licensees submit summary information describing the following:

I. 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;

II. The results of the susceptibility evaluation and the further analyses referred to in I above, including a listing of the susceptible valves;

III. 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.

Tables 1 through 4 in the enclosure to this letter provide information requested in number I above. Table 3 lists the valves identified as potentially susceptible to pressure locking (PL) and Table 4 lists the valves identified as potentially susceptible to thermal binding (TB). Tables 3 and 4 summarize the further evaluations and analyses for the identified potentially susceptible valves. Tables 5A and 5B of the enclosure list the valves which required further evaluation to determine corrective actions, if necessary, including the schedule for completion of any required modifications. Tables 5A and 5B also include a summary statement for each of the valves regarding their acceptability "as-is" until completion of the scheduled actions below.

Detroit Edison's previous letters (References 5 and 7) stated that an operability determination for two valves had been completed and documented by an Engineering Functional Analysis (EFA). The EFA actually had been completed and subsequently superseded by design calculations. This information was verbally provided by telephone call to the NRC Staff on November 30, 1995.

Detroit Edison believes its report is complete and accurate based on the present knowledge and experience with pressure locking and thermal binding of gate valves available to the industry. The evaluation results in the enclosure to this letter supersede the initial evaluation discussions in References 5 and 7. Detroit Edison recognizes, however, that industry issues regarding pressure locking or thermal binding phenomena may arise after the submittal of licensee reports for GL 95-07. Detroit Edison believes the current Fermi-2 procedures for reviewing new industry events and information are adequate to respond to any new information regarding these phenomena.

The following commitments are made in this letter:

1. Valve E1150F015B, Residual Heat Removal Division 2 Low Pressure Coolant Injection Isolation Valve, will be modified to provide bonnet pressure relief in the fifth refueling outage.

2. Valve E4150F006, High Pressure Coolant Injection Isolation Valve, will be modified to provide bonnet pressure relief in the fifth refueling outage.

3. Valve E5150F013, Reactor Core Isolation Valve, will be modified to provide bonnet pressure relief in the fifth refueling outage.

4. Valve E4150F007, HPCI Pump Discharge Outboard Isolation Valve, has been placed under administrative controls to require the system to be declared inoperable if this valve is left closed.

If you have any questions, please contact Ms. Mari Jaworsky at (313) 586-1427.

Sincerely,

Robert McKeon

Enclosure

cc: T. G. Colburn
M. J. Jordan
H. J. Miller
A. Vegel

I, ROBERT McKEON, do hereby affirm that the foregoing statements are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

Robert McKeon
ROBERT McKEON
Assistant Vice President and Manager,
Nuclear Operations

On this 13th day of February, 1996 before me personally appeared Robert McKeon, being first duly sworn and says that he executed the foregoing as his free act and deed.

Sharon K. Buckley
Notary Public

SHARON K. BUCKLEY
NOTARY PUBLIC - MONROE COUNTY, MICH.
MY COMMISSION EXPIRES 06-11-96

GENERIC LETTER 95-07
PRESSURE LOCKING AND THERMAL BINDING
EVALUATION

I. Summary

On August 17, 1995, the USNRC issued Generic Letter (GL) 95-07, which requested that utility licensees perform a review to identify power operated gate valves potentially subject to pressure locking or thermal binding. These reviews apply to all safety-related power operated gate valves. The licensees were requested to evaluate the potential susceptibility to one or both of these conditions that may inhibit the valve's open safety function. The licensees were further required to justify the operability of any valve determined to be susceptible and to take necessary actions as outlined by GL 95-07. These actions are outlined below.

II. Background

Detroit Edison first addressed gate valve pressure locking in response to Circular 77-05. Thermal binding was initially addressed, along with additional pressure locking reviews, in response to SOER 84-7. Detroit Edison initiated the current series of evaluations of pressure locking and thermal binding in 1993. The evaluations identified a number of susceptible valves for which capability calculations were performed. These calculations resulted in the identification of several valves that had limited capacity. Testing of these valves was performed during RFO4 to verify actual motor-operator capacity. The corrective action taken was to perform modifications on three valves to vent their bonnets. Prior to issuance of GL 95-07, two additional valves were also scheduled for modification during the next Fermi-2 refueling outage.

In accordance with GL 95-07, Detroit Edison has completed a detailed re-evaluation of safety-related power operated valves to identify and correct susceptible valves. This re-evaluation confirmed the scope of valves under a structured program with more detailed susceptibility criteria.

III. Evaluation

Detroit Edison has evaluated all safety-related power-operated gate valves (Table 1) for susceptibility to pressure locking and thermal binding. A total of

125 valves were included in this review. Section IV of this enclosure and Tables 2, 3, and 4 summarize the results of this evaluation.

Table 2 lists one hundred (100) valves excluded from susceptibility to pressure locking and thermal binding based on a system lineup and safety function review. Valves listed in Table 2 do not have an active open safety function during any modes of plant operation. Therefore, these valves have been excluded based on function and as otherwise noted in Table 2, and thus, do not require further GL 95-07 evaluation. Twenty-five (25) valves did require further review.

Tables 3 and 4 provide the summary evaluation results for the remaining 25 potentially susceptible valves. Table 3 summarizes the results for the 9 valves identified as being potentially susceptible to pressure locking and Table 4 summarizes the results for the 25 valves potentially susceptible to thermal binding.

Detroit Edison has also analyzed, taken corrective action and scheduled future actions, if necessary, as requested by GL 95-07 to ensure that susceptible valves are capable of performing their intended safety functions.

IV. Results

Detroit Edison identified 125 safety-related power operated gate valves for the GL 95-07 review. The Fermi-2 safety related power-operated gate valve list prepared by Detroit Edison for GL 95-07 was developed by:

- A review of the Fermi-2 database for safety-related and Technical Specification related gate valves;
- Review of the Fermi 2 database reports for power-operated gate valves;
- Comparison with past Fermi-2 reviews (e.g. SOER 84-7);
- Comparison with the IST Program data tables;
- Comparison with the GL 89-10 response report;
- Performing a review against system process and instrumentation diagrams (P&ID's), including currently posted design change documents (DCD's); and
- A review of vendor drawings for each valve, including posted DCD's.

These reviews provided the basis for the 125 valves subject to GL 95-07 review (Table 1).

Of these 125 valves, only 25 have a design basis safety function to move from closed to open. These functional requirements were also reviewed and cross checked by use of the Fermi-2 licensing and design basis documents, and the Fermi-2 system operating, surveillance, and abnormal operating procedures. Table 2 summarizes the valves excluded based on function and summarizes the basis for exclusion. The remaining 25 valves were evaluated to determine susceptibility to pressure locking and/or thermal binding with the results summarized in Tables 3 and 4.

Four valves are found to be susceptible to pressure locking (Table 5A), including two previously scheduled for modifications. Three are normally closed injection valves that were evaluated to verify capability under the worst case pressure lock conditions. Calculations supporting continued valve operability have been prepared, and long-term corrective modifications to provide bonnet pressure relief are scheduled for the fifth refueling outage in the Fall 1996. The fourth valve is normally aligned open, and administrative controls have been added to ensure that the system is declared inoperable when the valve is left closed.

One valve was found to be susceptible to thermal binding due to stem expansion (Table 5B). A calculation demonstrated the negligible effect of this thermal transient on MOV pullout thrusts. Therefore, no corrective modification or further corrective action is needed to maintain this valve operable.

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
B2100F433	Main Steam Isolation Valve - Leak Control System (MSIV-LCS) Isolation	SOLID WEDGE
B2100F434	MSIV-LCS Isolation	SOLID WEDGE
B2100F437	MSIV-LCS Isolation	SOLID WEDGE
B2100F438	MSIV-LCS Isolation	SOLID WEDGE
B2103F016	Main Steam Drain Line Primary Containment (PC) Isolation	SOLID WEDGE
B2103F019	Main Steam Drain Line PC Isolation	SOLID WEDGE
B3105F023A	Reactor Recirculation Pump Suction Isolation	FLEX WEDGE
B3105F023B	Reactor Recirculation Pump Suction Isolation	FLEX WEDGE
B3105F031A	Reactor Recirculation Pump Discharge Isolation	FLEX WEDGE
B3105F031B	Reactor Recirculation Pump Discharge Isolation	FLEX WEDGE
E1150F003A	Residual Heat Removal (RHR) Heat Exchanger Outlet Isolation	SOLID WEDGE
E1150F003B	RHR Heat Exchanger Outlet Isolation	SOLID WEDGE
E1150F004A	RHR Pump A Supply from Suppression Pool PC Isolation	SOLID WEDGE
E1150F004B	RHR Pump B Supply from Suppression Pool PC Isolation	SOLID WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
E1150F004C	RHR Pump C Supply from Suppression Pool PC Isolation	SOLID WEDGE
E1150F004D	RHR Pump D Supply from Suppression Pool PC Isolation	SOLID WEDGE
E1150F006A	RHR Shutdown Cooling Suction to RHR Pump A Isolation	SOLID WEDGE
E1150F006B	RHR Shutdown Cooling Suction to RHR Pump B Isolation	SOLID WEDGE
E1150F006C	RHR Shutdown Cooling Suction to RHR Pump C Isolation	SOLID WEDGE
E1150F006D	RHR Shutdown Cooling Suction to RHR Pump D Isolation	SOLID WEDGE
E1150F007A	RHR Pump Minimum Flow Line PC Isolation	SOLID WEDGE
E1150F007B	RHR Pump Minimum Flow Line PC Isolation	SOLID WEDGE
E1150F008	RHR Shutdown Cooling Supply PC Isolation	FLEX WEDGE
E1150F009	RHR Shutdown Cooling Supply PC Isolation	FLEX WEDGE
E1150F010	RHR Crosstie Header Isolation	SOLID WEDGE
E1150F015A	RHR/LPCI Return to Recirculation A PC Inboard Isolation Valve	FLEX WEDGE
E1150F015B	RHR/LPCI Return to Recirculation B PC Inboard Isolation Valve	FLEX WEDGE
E1150F021A	RHR Containment Spray PC Inboard Isolation	SOLID WEDGE
E1150F021B	RHR Containment Spray PC Inboard Isolation	SOLID WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
E1150F022	RHR Head Spray Isolation Valve	FLEX WEDGE
E1150F026B	RHR Warm-up Line Isolation Valve	SOLID WEDGE
E1150F028A	RHR Suppression Pool Return Isolation	SOLID WEDGE
E1150F028B	RHR Suppression Pool Return Isolation	SOLID WEDGE
E1150F047A	RHR Heat Exchanger Inlet Isolation	SOLID WEDGE
E1150F047B	RHR Heat Exchanger Inlet Isolation	SOLID WEDGE
E1150F073	RHR Service Water Cross Tie Isolation	SOLID WEDGE
E1150F075	RHR Service Water Cross Tie Isolation	SOLID WEDGE
E1150F603A	RHR Service Water (DIV 1) Cooling Tower Bypass	SOLID WEDGE
E1150F603B	RHR Service Water (DIV 2) Cooling Tower Bypass	SOLID WEDGE
E1150F604A	RHR (DIV 1) Cooling Tower 1A Isolation	SOLID WEDGE
E1150F604B	RHR (DIV 2) Cooling Tower 2A Isolation	SOLID WEDGE
E1150F605A	RHR (DIV 1) Cooling Tower 1B Isolation	SOLID WEDGE
E1150F605B	RHR (DIV 2) Cooling Tower 2B Isolation	SOLID WEDGE
E1150F608	RHR Shutdown Cooling Supply PC Isolation	FLEX WEDGE
E1150F611A	RHR (DIV 1) LPCI Mode Bypass	FLEX WEDGE
E1150F611B	RHR (DIV 2) LPCI Mode Bypass	FLEX WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
E2150F004A	Low-Pressure Core Spray (LPCS) Outboard Isolation	FLEX WEDGE
E2150F004B	LPCS Outboard Isolation	FLEX WEDGE
E2150F005A	LPCS (PC) Outboard Isolation	FLEX WEDGE
E2150F005B	LPCS (PC) Outboard Isolation	FLEX WEDGE
E2150F031A	LPCS Pump Minimum Flow PC Isolation	SOLID WEDGE
E2150F031B	LPCS Pump Minimum Flow PC Isolation	SOLID WEDGE
E2150F036A	LPCS Torus Suction Line Isolation	SOLID WEDGE
E2150F036B	LPCS Torus Suction Line Isolation	SOLID WEDGE
E4150F00l	High Pressure Coolant Injection (HPCI) Turbine Steam Admission	FLEX WEDGE
E4150F002	HPCI Steam Line PC Isolation	FLEX WEDGE
E4150F003	HPCI Steam Line PC Isolation	FLEX WEDGE
E4150F004	HPCI Booster Pump Suction from Condensate Storage Tank Isolation	SOLID WEDGE
E4150F006	HPCI Pump Discharge to Feedwater Line Isolation	FLEX WEDGE
E4150F007	HPCI Pump Discharge Isolation	FLEX WEDGE
E4150F041	HPCI Torus Suction Line Isolation	SOLID WEDGE
E4150F042	HPCI Torus Suction Line Isolation	SOLID WEDGE
E4150F075	HPCI Turbine Exhaust to Torus Vacuum Breaker PC Isolation	SOLID WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
E4150F079	HPCI Turbine Exhaust to Torus Vacuum Breaker PC Isolation	SOLID WEDGE
E5150F007	Reactor Core Isolation Cooling (RCIC) Steam Line PC Isolation	FLEX WEDGE
E5150F008	RCIC Steam Line PC Isolation	FLEX WEDGE
E5150F010	RCIC Pump Supply from Condensate Storage Tank Isolation	SOLID WEDGE
E5150F012	RCIC Pump Discharge Isolation	FLEX WEDGE
E5150F013	RCIC Discharge to Feedwater Line Isolation	FLEX WEDGE
E5150F029	RCIC Torus Suction Line Isolation	SOLID WEDGE
E5150F031	RCIC Torus Suction Line Isolation	SOLID WEDGE
E5150F062	RCIC Turbine Exhaust to Torus Vacuum Breaker PC Isolation	SOLID WEDGE
E5150F084	RCIC Turbine Exhaust to Torus Vacuum Breaker PC Isolation	SOLID WEDGE
G1100F003	Drywell Floor Drains Sump Pumps Outboard PC Isolation	SOLID WEDGE
G1100F019	Drywell Equipment Drains Sump Pumps Outboard PC Isolation	SOLID WEDGE
G1154F018	Drywell Equipment Drains Sump Pumps Inboard PC Isolation	SOLID WEDGE
G1154F600	Drywell Floor Drain - Drain Collector Tank Inboard Containment Isolation	SOLID WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
G3352F001	Reactor Water Cleanup (RWCU) PC Isolation	FLEX WEDGE
G3352F004	RWCU PC Isolation	FLEX WEDGE
G3352F100	RWCU from Reactor Recirculation Loop A Isolation	FLEX WEDGE
G3352F101	RWCU from Reactor Vessel Bottom Head Isolation	FLEX WEDGE
G3352F106	RWCU from Reactor Recirculation Loop B Isolation	FLEX WEDGE
G3352F119	RWCU Pumps Supply Isolation	FLEX WEDGE
G5100F600	Torus Water Management System (TWMS) Torus Drain PC Isolation	SOLID WEDGE
G5100F601	TWMS Torus Drain PC Isolation	SOLID WEDGE
G5100F602	TWMS Torus Drain PC Isolation	SOLID WEDGE
G5100F603	TWMS Torus Drain PC Isolation	SOLID WEDGE
G5100F604	TWMS to RHR Test Line PC Isolation	SOLID WEDGE
G5100F605	TWMS to RHR Test Line PC Isolation	FLEX WEDGE
G5100F606	TWMS to LPCS Test Line PC Isolation	SOLID WEDGE
G5100F607	TWMS to LPCS Test Line PC Isolation	FLEX WEDGE
N1100F607	Main Steam Third Isolation	FLEX WEDGE
N1100F608	Main Steam Third Isolation	FLEX WEDGE
N1100F609	Main Steam Third Isolation	FLEX WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
N1100F610	Main Steam Third Isolation	FLEX WEDGE
P4400F601A	EECW Division 1 Supply to RBCCW Isolation	SOLID WEDGE
P4400F601B	EECW Division 2 Supply to RBCCW Isolation	SOLID WEDGE
P4400F602A	EECW Makeup Tank Isolation (Division 1)	SOLID WEDGE
P4400F602B	EECW Makeup Tank Isolation (Division 2)	SOLID WEDGE
P4400F603A	EECW Division 1 Return from RBCCW Isolation	SOLID WEDGE
P4400F603B	EECW Division 2 Return from RBCCW Isolation	SOLID WEDGE
P4400F606A	EECW Drywell Supply Outboard PC Isolation (Division 1)	SOLID WEDGE
P4400F606B	EECW Drywell Supply Outboard PC Isolation (Division 2)	SOLID WEDGE
P4400F607A	EECW Drywell Return PC Isolation (Division 1)	SOLID WEDGE
P4400F607B	EECW Drywell Return PC Isolation (Division 2)	SOLID WEDGE
P4400F608	EECW Division 2 Supply to Drywell Sump Heat Exchanger Isolation	SOLID WEDGE
P4400F615	EECW Drywell Return PC Isolation (Division 2)	SOLID WEDGE
P4400F616	EECW Drywell Return PC Isolation (Division 1)	SOLID WEDGE
P5000F402	Station Air to Control Air Isolation	SOLID WEDGE
P5000F440	Station Air to Division 1 Control Air Isolation	SOLID WEDGE
P5000F441	Station Air to Division 2 Control Air Isolation	SOLID WEDGE
R3000F601	EDG 13 Fuel Tank Inboard Drain Isolation	SOLID WEDGE

Table 1 - Scope of Evaluation

Valve Number	Function	Disc Type
R3000F602	EDG 13 Fuel Tank Outboard Drain Isolation	SOLID WEDGE
R3000F603	EDG 14 Fuel Tank Inboard Drain Isolation	SOLID WEDGE
R3000F604	EDG 14 Fuel Tank Outboard Drain Isolation	SOLID WEDGE
R3000F605	EDG 11 Fuel Tank Inboard Drain Isolation	SOLID WEDGE
R3000F606	EDG 11 Fuel Tank Outboard Drain Isolation	SOLID WEDGE
R3000F607	EDG 12 Fuel Tank Inboard Drain Isolation	SOLID WEDGE
R3000F608	EDG 12 Fuel Tank Outboard Drain Isolation	SOLID WEDGE
T4100F600	RBHVAC Main Steam Supply Header Isolation	FLEX WEDGE
T4100F601	RBHVAC Main Steam Supply Header Isolation	FLEX WEDGE
B2103F021	Main Steam Drain Line Continuous Drain to Condenser Bypass Line Isolation	SOLID WEDGE
G3352F220	RWCU PC Isolatior.	FLEX WEDGE
G4153F004	Fuel Pool Cooling & Cleanup Skimmer Surge Tank Drain	SOLID WEDGE
N2103F00l	Standby Feedwater to Reactor Pressure Vessel Isolation	FLEX WEDGE

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
B2103F016	Main Steam Drain Line Primary Containment (PC) Isolation	C	No	No	No	The drain line isolation valves are closed during startup at low reactor pressure to assure primary containment (PC) isolation and are not required to re-open for any safe shutdown function.
B2103F019	Main Steam Drain Line PC Isolation	C	No	No	No	The drain line isolation valves are closed during startup at low reactor pressure to assure primary containment (PC) isolation and are not required to re-open for any safe shutdown function.
B2103F021	Main Steam Drain Line Continuous Drain to Condenser Bypass Line Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
B3105F023A	Reactor Recirculation Pump Suction Isolation	O	No	No	No	The pump suction valves are normally open and are closed only to enable maintenance on the reactor recirculation loops when the reactor is shut down. They perform a passive safety function as part of the reactor coolant pressure boundary but they serve no active safety function.
B3105F023B	Reactor Recirculation Pump Suction Isolation	O	No	No	No	The pump suction valves are normally open and are closed only to enable maintenance on the reactor recirculation loops when the reactor is shut down. They perform a passive safety function as part of the reactor coolant pressure boundary but they serve no active safety function.
B3105F031A	Reactor Recirculation Pump Discharge Isolation	O	No	No	No	The recirc. pump discharge valves are normally open and have only a close safety function. Re-opening is not required for any safety function.
B3105F031B	Reactor Recirculation Pump Discharge Isolation	O	No	No	No	The recirc. pump discharge valves are normally open and have only a close safety function. Re-opening is not required for any safety function.
E1150F003A	Residual Heat Removal (RHR) Heat Exchanger Outlet Isolation	O	No	No	Yes	Valves are excluded from thermal binding as they are partially open in all modes of RHR. Solid wedge valves are excluded from pressure locking concern.
E1150F003B	RHR Heat Exchanger Outlet Isolation	O	No	No	Yes	Valves are excluded from thermal binding as they are partially open in all modes of RHR. Solid wedge valves are excluded from pressure locking concern.
E1150F006A	RHR Shutdown Cooling Suction to RHR Pump A Isolation	C	No	No	No	This valve is normally closed during plant operation and has no open safety function. The valve is opened only to provide a flow path from the reactor vessel (via Recirc. Loop B) to the RHR pumps for the SDC mode.
E1150F006B	RHR Shutdown Cooling Suction to RHR Pump B Isolation	C	No	No	No	This valve is normally closed during plant operation and has no open safety function. The valve is opened only to provide a flow path from the reactor vessel (via Recirc. Loop B) to the RHR pumps for the SDC mode.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
E1150F006C	RHR Shutdown Cooling Suction to RHR Pump C Isolation	C	No	No	No	This valve is normally closed during plant operation and has no open safety function. The valve is opened only to provide a flow path from the reactor vessel (via Recirc. Loop B) to the RHR pumps for the SDC mode.
E1150F006D	RHR Shutdown Cooling Suction to RHR Pump D Isolation	C	No	No	No	This valve is normally closed during plant operation and has no open safety function. The valve is opened only to provide a flow path from the reactor vessel (via Recirc. Loop B) to the RHR pumps for the SDC mode.
E1150F007A	RHR Pump Minimum Flow Line PC Isolation	O	No	No	No	This valve is excluded from further evaluations because it does not perform an active safety function to go to the open position. For any postulated accident it only closes after the necessary flow has been established through the RHR system and would not require subsequent re-opening once closed, as frequent reinitiation of RHR system operation following a postulated LOCA is not expected.
E1150F007B	RHR Pump Minimum Flow Line PC Isolation	O	No	No	No	This valve is excluded from further evaluations because it does not perform an active safety function to go to the open position. For any postulated accident it only closes after the necessary flow has been established through the RHR system and would not require subsequent re-opening once closed, as frequent reinitiation of RHR system operation following a postulated LOCA is not expected.
E1150F008	RHR Shutdown Cooling Supply PC Isolation	C	No	No	No	This normally closed valve is required for SDC mode only and has no active safety related function to open.
E1150F009	RHR Shutdown Cooling Supply PC Isolation	C	No	No	No	This normally closed valve is required for SDC mode only and has no active safety related function to open.
E1150F010	RHR Crosstie Header Isolation	O	No	No	No	This valve is aligned open during all modes of plant operation, with the exception of being closed as a pressure boundary during RHR Division 2 maintenance in a refueling outage. Inservice testing is performed only with the plant in Cold Shutdown. Otherwise, closure of this valve is strictly controlled by the Technical Specifications since it is part of the required LPCI flow path. Keylock-switch control logic prevents inadvertent operation of the valve in the control room.
E1150F021A	RHR Containment Spray PC Inboard Isolation	C	No	No	No	This valve is normally closed. It performs an active safety function to terminate containment spray, if initiated, and to provide containment isolation. Solid wedge valves are excluded from pressure locking concern.
E1150F021B	RHR Containment Spray PC Inboard Isolation	C	No	No	No	This valve is normally closed. It performs an active safety function to terminate containment spray, if initiated, and to provide containment isolation. Solid wedge valves are excluded from pressure locking concern.
E1150F022	RHR Head Spray Isolation Valve	C	No	No	No	No safety function - abandoned in place.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
E1150F026B	RHR Warm-up Line Isolation Valve	C	No	No	No	The valve is normally closed and remains closed in all RHR operating modes. The valve is opened only as a portion of the warm up flow path prior to initiating SDC mode. It performs an active safety function only to close for primary containment isolation.
E1150F047A	RHR Heat Exchanger Inlet Isolation	O	No	No	No	This valve is normally open and passive in response to activating RHR in any of its safety-related or non safety-related modes.
E1150F047B	RHR Heat Exchanger Inlet Isolation	O	No	No	No	This valve is normally open and passive in response to activating RHR in any of its safety-related or non safety-related modes.
E1150F073	RHR Service Water Cross Tie Isolation	C	No	No	No	It is normally closed and remains closed during plant operation. The valves do not serve any function for the safety-related modes of RHR or the RHR service water system. The cross tie was incorporated into the Fermi 2 design to provide a means of containment flooding during the long-term response to a DBA-LOCA and does not serve any safe shutdown function.
E1150F075	RHR Service Water Cross Tie Isolation	C	No	No	No	It is normally closed and remains closed during plant operation. The valves do not serve any unction for the safety-related modes of RHR or the RHR service water system. The cross tie was incorporated into the Fermi 2 design to provide a means of containment flooding during the long-term response to a DBA-LOCA and does not serve any safe shutdown function.
E1150F603A	RHR Service Water (DIV 1) Cooling Tower Bypass	C	Yes	No	No	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F603B	RHR Service Water (DIV 2) Cooling Tower Bypass	C	Yes	No	No	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F604A	RHR (DIV 1) Cooling Tower 1 A Isolation	O	No	No	Yes	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F604B	RHR (DIV 2) Cooling Tower 2B Isolation	O	No	No	Yes	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F605A	RHR (DIV 1) Cooling Tower 1B Isolation	O	No	No	Yes	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F605B	RHR (DIV 2) Cooling Tower 2B Isolation	O	No	No	Yes	In a service water system; temperatures maintained below 100°F. This is not a thermal binding concern. Solid wedge valves are excluded from pressure locking concern.
E1150F608	RHR Shutdown Cooling Supply PC Isolation	C	No	No	No	This valve is normally closed during power operation. It is not part of the RHR emergency makeup or containment cooling functions required to respond to design basis accidents. The valves are opened only to provide a flow path from the reactor vessel (via Recirc. Loop B) to the RHR pumps for the SDC mode.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
E1150F611A	RHR (DIV 1) LPCI Mode Bypass	C	No	No	No	This valve is normally closed and is designed to open to support SDC Mode of operation of RHR and to close whenever SDC Mode of operation of RHR is terminated. It has no open safety function.
E1150F611B	RHR (DIV 2) LPCI Mode Bypass	C	No	No	No	This valve is normally closed and is designed to open to support SDC Mode of operation of RHR and to close whenever SDC Mode of operation of RHR is terminated. It has no open safety function.
E2150F004A	Low-Pressure Core Spray (LPCS) Outboard Isolation	O	No	No	No	This valve is normally open during plant operation. Although it is normally open, it receives a signal to open automatically in the event of drywell high pressure or reactor low water level.
E2150F004B	LPCS Outboard Isolation	O	No	No	No	This valve is normally open during plant operation. Although it is normally open, it receives a signal to open automatically in the event of drywell high pressure or reactor low water level.
E2150F031A	LPCS Pump Minimum Flow PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it performs no active safety-related function to open. It has an active safety-related function to close to prevent diversion of Core Spray injection flow. For any postulated accident it only closes after the necessary flow has been established through LPCS and is not required to re-open once closed, as frequent reinitiation of LPCS operation following a postulated LOCA is not expected.
E2150F031B	LPCS Pump Minimum Flow (PC) Isolation	O	No	No	No	This valve is excluded from further evaluation because it performs no active safety-related function to open. It has an active safety-related function to close to prevent diversion of Core Spray injection flow. For any postulated accident it only closes after the necessary flow has been established through LPCS and is not required to re-open once closed, as frequent reinitiation of LPCS operation following a postulated LOCA is not expected.
E2150F036A	LPCS Torus Suction Line Isolation	O	No	No	No	This valve is excluded from further evaluation because it has no active safety-related function to open. This valve would only be closed following an accident to provide primary containment isolation in the event of a failure of Division I core spray. Therefore, it would not be required to reopen.
E2150F036B	LPCS Torus Suction Line Isolation	O	No	No	No	This valve is excluded from further evaluation because it has no active safety-related function to open. This valve would only be closed following an accident to provide primary containment isolation in the event of a failure of Division I core spray. Therefore, it would not be required to reopen.
E4150F002	HPCI Steam Line PC Isolation	O	No	No	No	This valve is excluded form further evaluation because it has no active safety-related function to open. It closes automatically in response to a primary containment Group 6 isolation signal initiated by high area temperature, high steam line flow, high turbine exhaust diaphragm pressure, or low HPCI steam supply pressure. Each of these conditions is indicative of a steam supply line break which would result in a loss of HPCI. Therefore, E4150F002 would not be required to reopen.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
E4150F004	HPCI Booster Pump Suction	O	No	No	No	This valve is excluded from further evaluation because it does not perform a safety-related function to open. This valve has an active safety function to close when system suction is transferred from the CST to the suppression pool due to low CST level or high suppression pool level, but is not subsequently reopened.
E4150F075	HPCI Turbine Exhaust to Torus Vacuum Breaker PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
E4150F079	HPCI Turbine Exhaust to Torus Vacuum Breaker PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety related function to open. It receives an automatic Group 7 closure signal due to high drywell pressure concurrent with low HPCI steam supply pressure. Low HPCI steam supply pressure will trip the HPCI turbine and prevent automatic restart. This valve has no active safety-related function to open.
E5150F007	Reactor Core Isolation Cooling (RCIC) Steam Line PC Isolation	O	No	Yes	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
E5150F008	RCIC Steam Line PC Isolation	O	No	Yes	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
E5150F010	RCIC Pump Supply from Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
E5150F012	RCIC Pump Discharge Isolation	O	No	Yes	No	This valve is excluded from further evaluation because it is under administrative controls that prohibit shutting the valve during operation. The valve is de-energized because of an undersized motor operator that may not open (if closed) under some dynamic conditions (Ref. 23.206, Rev. 48, Page 6). See Tables 3 & 4-Special Note.
E5150F062	RCIC Turbine Exhaust to Torus Vacuum Breaker PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open. The only safety function of this valve is to close and remain closed to provide PC isolation.
E5150F084	RCIC Turbine Exhaust to Torus Vacuum Breaker PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open. The only safety function of this valve is to close and remain closed to provide PC isolation.
G1100F003	Drywell Floor Drains Sump Pumps Outboard PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open. The only safety function of this valve is to close and remain closed to provide PC isolation.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active* Open Safety Function* 4A	4B	4C	Comment
G100F019	Drywell Equipment Drains Sump	O	No	No	No	This valve is excluded from further evaluation because it does not perform a safety-related function to open. The only safety Pumps Outboard (PC) Isolation function of this valve is to close and remain closed to provide PC Isolation.
G1154F018	Drywell Equipment Drains Sump	O	No	No	No	This valve is excluded from further evaluation because it does not perform a safety-related function to open. The only safety Pumps Inboard (PC) Isolation function of this valve is to close and remain closed to provide PC isolation.
G1154F600	Drywell Floor Drain - Drain Collector Tank Inboard Containment Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform a safety-related function to open. The only safety function of this valve is to close and remain closed to provide PC isolation.
G3352F001	Reactor Water Cleanup (RWCU) PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F004	RWCU PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F100	RWCU from Reactor Recirculation Loop A Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F101	RWCU from Reactor Vessel Bottom Head Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F106	RWCU from Reactor Recirculation Loop B Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F119	RWCU Pumps Supply Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G3352F220	RWCU PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G4153F004	Fuel Pool Cooling & Cleanup Skimmer Surge Tank Drain	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F600	Torus Water Management System (TWMS) Torus Drain PC Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F601	TWMS Torus Drain PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
G5100F602	TWMS Torus Drain PC Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F603	TWMS Torus Drain PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F604	TWMS to RHR Test Line PC Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F605	TWMS to RHR Test Line PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F606	TWMS to LPCS Test Line PC Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
G5100F607	TWMS to LPCS Test Line PC Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
N1100F607	Main Steam Third Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
N1100F608	Main Steam Third Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
N1100F609	Main Steam Third Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
N1100F610	Main Steam Third Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
N2103F001	Standby Feedwater to Reactor Pressure Vessel Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F601A	EECW Division 1 Supply to RBCCW Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F601B	EECW Division 2 Supply to RBCCW Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F603A	EECW Division 1 Return from RBCCW Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
P4400F603B	EECW Division 2 Return from RBCCW Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F606A	EECW Drywell Supply Outboard PC Isolation (Division 1)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F606B	EECW Drywell Supply Outboard PC Isolation (Division 2)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F607A	EECW Drywell Return PC Isolation (Division 1)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F607B	EECW Drywell Return PC Isolation (Division 2)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F608	EECW Division 2 Supply to Drywell Sump Heat Exchanger Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F615	EECW Drywell Return PC Isolation (Division 2)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P4400F616	EECW Drywell Return PC Isolation (Division 1)	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P5000F402	Station Air to Control Air Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P5000F440	Station Air to Division 1 Control Air Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
P5000F441	Station Air to Division 2 Control Air Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F601	EDG 13 Fuel Tank Inboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F602	EDG 13 Fuel Tank Outboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F603	EDG 14 Fuel Tank Inboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.

Table 2 - Excluded Based on Functional Review

Valve Number	Valve Name	Normal Position	Active Open Safety Function* 4A	4B	4C	Comment
R3000F604	EDG 14 Fuel Tank Outboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F605	EDG 11 Fuel Tank Inboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F606	EDG 11 Fuel Tank Outboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F607	EDG 12 Fuel Tank Inboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
R3000F608	EDG 12 Fuel Tank Outboard Drain Isolation	C	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
T4100F600	RBHVAC Main Steam Supply Header Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.
T4100F601	RBHVAC Main Steam Supply Header Isolation	O	No	No	No	This valve is excluded from further evaluation because it does not perform an active safety-related function to open.

NOTES:

* The Fermi 2 GL 95-07 Response Program uses a series of questions to determine applicability of the PL/TB concerns to each valve reviewed. Questions 4A, 4B, and 4C are bulk exclusion questions used to determine the conditions from which a valve may be excluded based on YES (applicable condition) or NO (not applicable condition) answers to three possible situations:

If the valve is:

4A - normally closed, does the safety function per the licensed design basis (including Technical Specifications, Updated Final Safety Analysis Report or Design Basis Document) for the valve require it to open?
4B - normally open, is there a safety function requirement to go closed and then re-open prior to cold shutdown, or event termination?
4C - To remain in the OPEN position for its safety function, is it closed and reopened by other than Technical Specifications surveillance procedure?

A YES answer requires further review to determine whether the valve is susceptible to either pressure locking or thermal binding. The comment column provides additional basis for excluding valves.

Table 3 - Valves Evaluated for Pressure Locking

Valve Number	Disc Type	Potential Pressure Locking	Exclusion Basis	Calculation	Hardpiped or Drilled Holed?	Other Resolution
E1150F015A	FLEX WEDGE	No	Valve is hardpiped. Hardpiped vent resolves the pressure locking concern; no further evaluation was required.	No	Yes	
E1150F015B	FLEX WEDGE	Yes	Valve is susceptible to pressure locking due to rapid depressurization.	Yes	No	Calculations show that there is sufficient capability to open the valve under pressure locking conditions. A design modification is planned to provide for bonnet pressure relief during the fifth refueling outage.
E2150F005A	FLEX WEDGE	No	Valve is hardpiped. Hardpiped vent resolves the pressure locking concern; no further evaluation was required.	No	Yes	

Table 3 - Valves Evaluated for Pressure Locking

Valve Number	Disc Type	Potential Pressure Locking	Exclusion Basis	Calculation	Hardpiped or Drilled Hole?	Other Resolution
E2150F005B	FLEX WEDGE	No	Valve is hardpiped. Hardpiped vent resolves the pressure locking concern; no further evaluation was required	No	Yes	
E4150F001	FLEX WEDGE	No	No, this valve is in a steam application and the orientation is such that the steam will not condense in the bonnet. Pressure locking does not occur unless there is a non-compressible fluid in the bonnet.	No	No	

Table 3 - Valves Evaluated for Pressure Locking

Valve Number	Disc Type	Potential Pressure Locking	Exclusion Basis	Calculation	Hardpiped or Drilled Hole?	Other Resolution
E4150F003	FLEX WEDGE	No	No, this valve is in a steam application and the orientation in such that the steam will not condense in the bonnet. Pressure locking does not occur unless there is a non-compressible fluid in the bonnet.	No	No	
E4150F006	FLEX WEDGE	Yes	This valve has the potential for pressure locking due to rapid depressurization.	Yes	No	Calculations show there is sufficient capability to open the valve under pressure locking conditions. A design modification is planned to provide bonnet pressure relief during the fifth refueling outage.

Table 3 - Valves Evaluated for Pressure Locking

Valve Number	Disc Type	Potential Pressure Locking	Exclusion Basis	Calculation	Hardpiped or Drilled Hole?	Other Resolution
E4150F007	FLEX WEDGE	Yes	This valve is normally open and not required to serve an active safety function. It is susceptible to pressure locking if left closed (e.g., pressure isolation due to primary system leakage past valve E41F50F006).	No	No	This valve has been placed under administrative controls to require the system be declared inoperable when the valve is left closed.
E5150F013	FLEX WEDGE	Yes	This valve is susceptible to pressure locking due to rapid depressurization.	Yes	No	Calculations show there is sufficient capability to open the valve under pressure locking conditions. A design modification is planned to provide bonnet pressure relief during the fifth refueling outage.

Special Note:

E5150F012, FLEX WEDGE - This valve is susceptible to pressure locking if left closed. No action is required, however, because this valve was previously determined (during Bulletin 85-03) to have an undersized motor-operator. It was modified to be de-energized in the OPEN position, and procedure changes were made to declare RCIC inoperable if the valve is energized and closed.

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
B2100F433	SOLID WEDGE	No	This Leakage Control System (LCS) outboard boundary valve is cycled during a quarterly surveillance. The valve may be at operating steam line temperature if the inboard boundary valve were to leak. Valve insulation will prevent cooling prior to opening this valve for LCS initiation (approximately one hour after an in-containment LOCA).	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
B2100F434	SOLID WEDGE	No	This LCS inboard boundary valve is closed during cold shutdown at ambient temperature conditions. It is expected to open at a temperature higher than the temperature at which it was closed. Therefore, thermal binding is not a concern.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
B2100F437	SOLID WEDGE	No	This LCS inboard boundary valve is closed during cold shutdown at ambient temperature conditions. It is expected to open at a temperature higher than the temperature at which it was closed. Therefore, thermal binding is not a concern.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
B2100F438	SOLID WEDGE	No	This LCS outboard boundary valve is cycled during a quarterly surveillance. The valve may be approximately operating steam line temperature if the inboard boundary valve were to leak. Valve insulation will prevent cooling prior to opening this valve for LCS initiation (approximately one hour after an in-containment LOCA).	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E1150F004A	SOLID WEDGE	No	This valve is only exposed to normal ambient temperature conditions which are not considered sufficient to cause thermal binding.	No	No	
E1150F004B	SOLID WEDGE	No	This valve is only exposed to normal ambient temperature conditions which are not considered sufficient to cause thermal binding.	No	No	
E1150F004C	SOLID WEDGE	No	This valve is only exposed to normal ambient temperature conditions which are not considered sufficient to cause thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E1150F004D	SOLID WEDGE	No	This valve is only exposed to normal ambient temperature conditions which are not considered sufficient to cause thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E1150F015A	FLEX WEDGE	No	MOV may be closed with temperatures as high as 175^{0}F (nominally 140^{0}F) and reopened at temperatures as low as 90^{0}F. The actuator is a Limitorque SB-style, and the stem compensator spring-pack mitigates the effect of stem expansion and contraction. Therefore, this temperature differential is not expected to result in thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E1150F015B	FLEX WEDGE	No	MOV may be closed with temperatures as high as 175^{0}F (nominally 140^{0}F) and reopened at temperatures as low as 90^{0}F. The actuator is a Limitorque SB-style, and the stem compensator spring-pack mitigates the effect of stem expansion. Therefore, this temperature differential is not expected to result in thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E1150F028A	SOLID WEDGE	No	Closing temperatures are lower or the same as the opening temperatures. Thermal binding is not a concern.	No	No	
E1150F028B	SOLID WEDGE	No	Closing temperatures are lower or the same as the opening temperatures. Thermal binding is not a concern.	No	No	
E2150F005A	FLEX WEDGE	No	This valve is closed under ambient temperature conditions and is opened at either ambient or warm conditions. This is not a thermal binding concern.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E2150F005B	FLEX WEDGE	No	This valve is closed under ambient temperature conditions and is opened at either ambient or warm conditions. This is not a thermal binding concern.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E4150F001	FLEX WEDGE	Yes	There is a steam warm-up bypass line upstream of the valve which prevents thermal gradients across the disk and opening under cold conditions. However, the valve stem may cool off during a system surveillance when opened for HPCI turbine operation, and then heat up upon closure. Therefore this is a potential thermal binding candidate.	No	No	Use analytical methods to quantify thermal binding effects due to stem growth. Confirmed stem growth not sufficient to cause valve lockup due to thermal binding.

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E4150F003	FLEX WEDGE	No	Valve has an SBD actuator which will allow for growth of the stem upon closure into hot fluid. Additionally, there is a steam warm-up bypass line which prevents thermal gradients across the disk during system standby mode. Therefore, the valve does not have to open for performing its safety function from a cold condition.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E4150F006	FLEX WEDGE	No	Valve is expected to close at a temperature less than or equal to the temperature the valve will open at. It is also insulated such that FW temperature will equalize across the valve discs. Therefore, thermal binding is not a concern.	No	No	
E4150F007	FLEX WEDGE	No	Maximum temperature the valve will experience is 105^{0}F. This is not sufficient to cause thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E4150F041	SOLID WEDGE	No	Valve temperatures are between 65^0 F and 139^0 F. Valve closes at a temperature lower than what is expected during opening. This is not a thermal binding concern.	No	No	
E4150F042	SOLID WEDGE	No	Valve temperatures are between 65^0F and 205^0F. Valve closes at a temperature lower than what is expected during opening. This is not a thermal binding concern.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Resolution
E51500F013	FLEX WEDGE	No	Valve is expected to close at a temperature less than or equal to the temperature the valve will open at. It is also insulated such that FW temperature will equalize across the valve discs. Therefore, thermal binding is not a concern	No	No	
E5150F029	SOLID WEDGE	No	The valve temperatures vary from 65^{0}F to 131^{0}F. This is not a sufficient enough temperature differential to cause thermal binding.	No	No	

Table 4 - Valves Evaluated for Thermal Binding

Valve Number	Disc Type	Potential Thermal Binding	Exclusion Basis	Calculation	Cycled Per Operating Procedure?	Other Resolution
E5150F031	SOLID WEDGE	No	Valve will close with a lower temperature than it will see during opening. Therefore, this is not a thermal binding concern.	No	No	
P4400F602A	SOLID WEDGE	No	Valve temperatures range from 65°F to 122°F. This is not a sufficient temperature differential to cause thermal binding.	No	No	
P4400F602B	SOLID WEDGE	No	Valve temperatures range from 65°F to 122°F. This is not a sufficient temperature differential to cause thermal binding.	No	No	

Special Note:

E5150F012, FLEX WEDGE; does not experience a sufficient temperature differential to cause a thermal binding concern. Maximum temperature is 131°F. However, RCIC system is considered inoperable when this valve is closed.

Table 5A – Pressure Locking

Detroit Edison has completed modifications to vent the bonnets for the valves E1150F015A and E2150F005A & B, which had previously been determined to be susceptible to pressure locking. The following valves were also determined to be susceptible to pressure locking.

Valve No./Title	Issue	Resolution
E1150F015B RHR/LPCI Return to Recirc. B PC Inboard Isolation	Rapid reactor depressurization prior to open signal for LPCI injection	An interim operability calculation was prepared and a modification is planned to provide bonnet pressure relief in the fifth refueling outage.
E4150F006 HPCI Pump Discharge to Feedwater Line Isolation	Rapid feedwater line depressurization prior to open signal for HPCI injection	An interim operability calculation was prepared and a modification is planned to provide bonnet pressure relief in the fifth refueling outage.
E5150F013 RCIC Discharge to Feedwater Line Isolation	Rapid feedwater line depressurization prior to open signal for RCIC injection	An interim operability calculation was prepared and a modification is planned to provide bonnet pressure relief in the fifth refueling outage.
E4150F007 HPCI Pump Discharge Isolation Valve	Provides back-up pressure isolation from the RCS in the event the first pressure isolation valve leaks.	This valve has been placed under administrative controls to require the system be declared inoperable if this valve is left closed.

Table 5B – Thermal Binding

The following valve was determined to be susceptible thermal binding.

Valve No./Title	Issue	Resolution
E4150F001 HPCI Turbine Steam Admission Valve	Valve closure while hot could result in stem expansion	Performed calculation which demonstrates the added load due to stem expansion is still within available operator capability. No further administrative or modification corrective action is required.