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Docket Number 50-346

License Number NPF-3

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United States Nuclear Regulatory Commission
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Subject: Response to NRC Generic Letter 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power Operated Gate Valves"

Gentlemen:

In Generic Letter (GL) 95-07 (Log Number 4597), the Nuclear Regulatory Commission (NRC) requested that licensees evaluate the operational configurations of safety-related power-operated gate valves to identify valves that are susceptible to pressure locking and thermal binding. It was also requested that the results of this evaluation be provided to the NRC, along with any corrective actions taken for valves identified as being susceptible to pressure locking and thermal binding, within 180 days of the date of the GL. The purpose of this letter is to provide the requested information.

As was stated in Toledo Edison's (TE's) initial response to GL 95-07 (Serial Number 2330), evaluations of pressure locking and thermal binding for safety-related power-operated gate valves had previously been performed. The attachment to this letter provides a summary of the methodology used in the evaluations and tables of the valves included in the scope of the evaluations. A number of valves were identified as being potentially susceptible to pressure locking or thermal binding. However, more detailed evaluations indicate that these phenomena will not prevent the valves from performing their necessary safety functions. Modifications for some valves have been implemented or are planned in the near future to alleviate any valve reliability concerns, as is also detailed in the attachment to this letter.

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The pressure locking and thermal binding evaluations were reviewed by the NRC during an inspection of the Motor Operated Valve Program in December 1995. Although the inspection report has yet to be issued by the NRC, the inspectors did not indicate they had any concerns regarding the methodology or conclusions presented in TE's evaluations.

Should you have any questions or require additional information, please contact Mr. James L. Freels, Manager - Regulatory Affairs, at (419) 249-2366.

Very truly yours,

NKP/eld

cc: L. L. Gundrum, NRC Project Manager
H. J. Miller, Regional Administrator, NRC Region III
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Utility Radiological Safety Board

Enclosures

Docket Number 50-346
License Number NPF-3
Serial Number 2360
Enclosure

RESPONSE TO GENERIC LETTER 95-07

FOR

DAVIS-BESSE NUCLEAR POWER STATION

UNIT NUMBER 1

This letter is submitted pursuant to 10CFR50.54(f). Enclosed is Toledo Edison's response to Generic Letter 95-07, (Serial Number 2360) "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves".

By: _____
J. P. Stetz, Vice President - Nuclear

Sworn and subscribed before me this 13th day of February, 1996.

_____
Notary Public State of Ohio
Nora Lynn Flood - My Commission expires
September 3, 1997.

Evaluation of Pressure Locking and Thermal Binding of Power Operated Gate Valves at Davis-Besse Power Station

Each safety related power-operated gate valve at the Davis-Besse Nuclear Power Station (DBNPS) was evaluated for susceptibility to pressure locking and thermal binding in performing both safety-related and non-safety related functions. The goal was to determine whether the valve was susceptible under all operating conditions and to determine whether further actions were warranted if the valve was potentially susceptible.

If the valve has a solid wedge, it was not considered to be susceptible to pressure locking in the evaluation. Flexible wedge gate valves were evaluated for both pressure locking and thermal binding because both wedge types have experienced thermal binding failures in the industry. The evaluations considered all modes of operation, as well as for any functions performed during a High Energy Line Break (HELB), Large Break (LB) Loss of Coolant Accident (LOCA).

Pressure Locking

Table 1 includes only flexible wedge gate valves since they are the only ones which are susceptible to pressure locking as discussed in GL 95-07. The table provides a summary of whether further evaluation for susceptibility to pressure locking under GL 95-07 criteria was required. Further evaluation was required if the valve has a safety function to open and is either normally closed, or is closed for testing in the operating modes for which the safety function to open is required and a redundant train is not available (i.e., the tested train is inoperable).

Thermal Binding

Table 2 provides a summary of whether further evaluation for susceptibility to thermal binding under GL 95-07 criteria is required. Further evaluation is required only if the valve has a safety function to open and is either normally closed, or is closed for testing in the operating modes for which the safety function to open is required and a redundant train is not available.

Flexible wedge gate valves were not included in this table since the screening criteria for determining whether or not further evaluation was required is the same for both gate valve types. Thermal binding was evaluated for the flexible wedge gate valves listed in Table 1.

In both Tables 1 and 2, if the valve has no safety function to open, the "Normally Closed" and "Closed for Testing" columns are marked N/A because the valve does not meet the requirements for further evaluation. The valves for which susceptibility evaluations were required under GL 95-07 have a "Y" in the "Susceptible Per GL 95-07" column in the table. In addition, some valves were determined to be susceptible to pressure locking when performing non-safety related functions. These are noted in the table along with indication of whether a modification to the valve is planned or has been completed.

Following Tables 1 and 2 are the specific valve evaluations for pressure locking and thermal binding. Where valves have redundant functions in different trains, the same evaluation was used for the group of valves.

A number of modifications have previously been implemented at DBNPS to address pressure locking and thermal binding concerns. RC10, RC11, MU1A and MU2B were converted from solid wedge to flexible wedge gate valves to address thermal binding concerns. Flexible wedge gate valves FW779, FW780, and RC10 have been modified to address pressure locking concerns.

During the tenth refueling outage (10RFO), currently scheduled for the Spring of 1996, flexible wedge gate valves RC11, DH11 and DH12 will be modified to address pressure locking concerns. Valves DH63 and DH64 will similarly be modified during the following operating cycle.

It should be noted that these modifications were performed to address valve and plant reliability concerns. These modifications were not necessary to ensure that plant safety is maintained, as is described in this evaluation.

TABLE 1: GL 95-07 PRESSURE LOCKING EVALUATION SUMMARY

VALVE NUMBER	SAFETY FUNCTION TO OPEN	NORMALLY CLOSED	CLOSED FOR TESTING	EVALUATE FOR SUSCEPTIBILITY PER GL 95-07	SUSCEPTIBLE PER GL 95-07	SUSCEPTIBLE FOR OTHER FUNCTIONS	MODIFICATION PLANNED OR COMPLETED
AF599	Y	N	N	N	N	N	
AF608	Y	N	N	N	N	N	
AF3869	Y	Y	N/A	Y	N	N	
AF3870	Y	N	N	N	N	N	
AF3871	Y	Y	N/A	Y	N	N	
AF3872	Y	N	N	N	N	N	
CC1328	N	N/A	N/A	N	N	N	
CC1338	N	N/A	N/A	N	N	N	
CC1409	N	N/A	N/A	N	N	N	
CC1410	N	N/A	N/A	N	N	N	
CC1567A	N	N/A	N/A	N	N	N	
CC1567B	N	N/A	N/A	N	N	N	
CC2645	N	N/A	N/A	N	N	N	
CC2649	N	N/A	N/A	N	N	N	
CC5095	N	N/A	N/A	N	N	N	
CC5096	N	N/A	N/A	N	N	N	
CC5097	N	N/A	N/A	N	N	N	
CC5098	N	N/A	N/A	N	N	N	
CF1A	Y	N	N	N	N	N	
CF1B	Y	N	N	N	N	N	
CT4690	N	N/A	N/A	N	N	N	
DH1A	Y	N	N	N	N	N	
DH1B	Y	N	N	N	N	N	
DH11	Y	Y	N/A	Y	N	Y	10RFO
DH12	Y	Y	N/A	Y	N	Y	10RFO
DH63	Y	Y	N/A	Y	N	Y	CYCLE 11
DH64	Y	Y	N/A	Y	N	Y	CYCLE 11
DH830	Y	Y	N/A	Y	N	N	
DH831	Y	Y	N/A	Y	N	N	
DH1517	Y	Y	N/A	Y	N	N	
DH1518	Y	Y	N/A	Y	N	N	
DH2733	Y	N	N	N	N	N	

TABLE 1: GL 95-07 PRESSURE LOCKING EVALUATION SUMMARY

VALVE NUMBER	SAFETY FUNCTION TO OPEN	NORMALLY CLOSED	CLOSED FOR TESTING	EVALUATE FOR SUSCEPTIBILITY PER GL 95-07	SUSCEPTIBLE PER GL 95-07	SUSCEPTIBLE FOR OTHER FUNCTIONS	MODIFICATION PLANNED OR COMPLETED
DH2734	Y	N	N	N	N	N	
DR2012A	N	N/A	N/A	N	N	N	
DR2012B	N	N/A	N/A	N	N	N	
FW601	N	N/A	N/A	N	N	N	
FW612	N	N/A	N/A	N	N	N	
FW779	N	N/A	N/A	N	N	N	COMPLETE
FW780	N	N/A	N/A	N	N	N	COMPLETE
MS106	Y	Y	N/A	Y	N	N	
MS106A	Y	N	N	N	N	N	
MS107	Y	Y	N/A	Y	N	N	
MS107A	Y	N	N	N	N	N	
MS603	N	N/A	N/A	N	N	N	
MS611	N	N/A	N/A	N	N	N	
MU1A	N	N/A	N/A	N	N	N	
MU1B	N	N/A	N/A	N	N	N	
MU2B	N	N/A	N/A	N	N	N	
MU12A	N	N/A	N/A	N	N	N	
MU12B	N	N/A	N/A	N	N	N	
MU40	N	N/A	N/A	N	N	N	
MU6408	N	N/A	N/A	N	N	N	
MU6409	N	N/A	N/A	N	N	N	
MU6420	N	N/A	N/A	N	N	N	
MU6421	Y	Y	N/A	Y	N	N	
MU6422	Y	N	N	N	N	N	
RC10	N	N/A	N/A	N	N	Y	COMPLETE
RC11	N	N/A	N/A	N	N	Y	10 RFO
SW1379	Y	Y	N/A	Y	N	N	
SW1380	Y	Y	N/A	Y	N	N	
SW1381	Y	Y	N/A	Y	N	N	
SW5067	Y	Y	N/A	Y	N	N	
SW5068	Y	Y	N/A	Y	N	N	

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TABLE 2: GL 95-07 THERMAL BINDING SUMMARY

VALVE NUMBER	SAFETY FUNCTION TO OPEN	NORMALLY CLOSED	CLOSED FOR TESTING	EVALUATE FOR SUSCEPTIBILITY PER GL 95-07	SUSCEPTIBLE PER GL 95-07	SUSCEPTIBLE FOR OTHER FUNCTIONS	MODIFICATION PLANNED OR COMPLETED
CV624B	Y	N	N	N	N	N	
CV645B	Y	N	N	N	N	N	
CV2000B	Y	N	N	N	N	N	
CV2001B	Y	N	N	N	N	N	
CV2002B	Y	N	N	N	N	N	
CV2003B	Y	N	N	N	N	N	
DH7A	Y	N	N	N	N	N	
DH7B	Y	N	N	N	N	N	
DH9A	Y	Y	N/A	Y	N	N	
DH9B	Y	Y	N/A	Y	N	N	
DH2735	Y	Y	N/A	Y	N	N	
MU2A	N	N/A	N/A	N	N	N	
MU3	Y	N	N	N	N	N	
RC200	Y	Y	N/A	Y	N	N	
RC239A	Y	Y	N/A	Y	N	N	
RC239B	Y	Y	N/A	Y	N	N	
RC240A	N	N/A	N/A	N	N	N	
RC240B	N	N/A	N/A	N	N	N	
SW2927	Y	Y	N/A	Y	N	N	
SW2928	Y	Y	N/A	Y	N	N	

Valve: AF 3869 and AF 3871

Function: Auxiliary Feedwater Pump (AFP) to Alternate Steam Generator Stop Valve

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are not required to open in Modes 1 and 2.

Mode 3: These valves are not required to open in Mode 3.

Mode 4 and 5: These valves are not required to open in these Modes.

LBLOCA: These valves are not required to open for mitigation of this accident. Therefore, pressure locking is not of concern.

SBLOCA: These valves may be required to open during a SBLOCA. These valves are outside containment and would not experience any significant heat up due to the LOCA. There is no depressurization of the piping on either side of the valve which could cause a bonnet to pipe differential pressure. Therefore, pressure locking is not of concern.

HELB: These valves may be required to open to mitigate a HELB. Since these valves are located in the respective Auxiliary Feedwater Pump (AFP) rooms, the only HELB which could cause significant heating of the bonnet is a HELB in that AFP room. These valves are not required to open to mitigate breaks in the room where the valve is located. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are at Auxiliary Building ambient temperature, as is any water flowing through them. Consequently, no thermal binding is expected to occur.

Mode 3: The same conditions as in Modes 1 and 2 apply to Mode 3.

Mode 4 and 5: The Mode 1 and 2 conditions also apply to Mode 4 and 5.

LBLOCA: These valves would remain closed during a LBLOCA. Therefore, thermal binding is not of concern.

Valve: AF 3869 and AF 3871 (Continued):

SBLOCA: These valves may be opened during a SBLOCA. Water from the Condensate Storage Tanks would flow through them and would be at ambient temperature, so no valve heat up is expected. Therefore, no thermal binding will occur if the valves are subsequently closed.

HELB: These valves may be opened during a HELB, as described above. But as is the case with a SBLOCA, no valve heatup would be expected.

Valve: DH 11 and DH 12

Function: Reactor Coolant System (RCS) to Decay Heat Removal (DHR) System Isolation Valve

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are closed and deenergized in these Modes to isolate the RCS high pressure piping from the DHR System low pressure piping.

Mode 3: These valves are closed in this Mode prior to raising RCS pressure to prevent over pressurization of the DHR System during plant startup. There are no ambient heat sources to cause bonnet pressurization.

Mode 4 and 5: These valves are open and deenergized in these Modes.

LBLOCA: These valves may be used to provide a diverse method of preventing boron precipitation in certain LBLOCA scenarios. The rapid depressurization of the piping and the ambient temperature heatup could contribute to pressure locking of these valves. However, other methods of preventing boron precipitation are available such that the safety function is not compromised. Therefore, pressure locking is not of concern.

SBLOCA: These valves may be opened following a SBLOCA in order to establish long term core cooling. However, there are other methods available to accomplish this function. Therefore, pressure locking is not of concern.

HELB: These valves will be opened following a HELB for long term core cooling. If the HELB is in containment, the ambient temperature change could contribute to pressure locking. Containment temperature increases which occurred as a result of the HELB can be reduced to normal temperatures prior to opening these valves. Opening these valves is not a time critical function following a HELB inside containment. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are closed and deenergized in these Modes to prevent overpressurization of the DHR System piping.

Mode 3: These valves are closed and deenergized in this Mode to prevent overpressurization of the DHR System piping as described above.

Valve: DH 11 and DH 12 (Continued):

Mode 4 and 5: These valves will be closed at 280°F during plant startup. Cooldown from this temperature has not caused thermal binding.

LBLOCA: As was the case for the LBLOCA discussion for pressure locking, the post-accident safety function will not be lost due to failure of these valves to open. Therefore, thermal binding is not of concern.

SBLOCA: These valves may be opened during this accident as was the case for pressure locking.

HELB: These valves will be opened following a HELB. Thermal binding is not expected to occur due to ambient temperature increases caused by this accident.

Valve: DH 63 and DH 64

Function: Decay Heat Pump to High Pressure Injection (HPI) Pump Suction Isolation

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are normally maintained closed in these Modes.

Mode 3: The same conditions as for Modes 1 and 2 apply.

Mode 4 and 5: In these Modes, the DHR pumps are operating, but there will be no need to operate the HPI pumps in piggyback mode.

LBLOCA: Due to the rapid rate of RCS depressurization, the HPI pumps will not have to be operated in piggyback mode. Consequently, there is no need to open these valves. Therefore, pressure locking is not of concern.

SBLOCA: These valves are utilized to mitigate a SBLOCA. In this scenario, there is no bonnet pressurization source to cause pressure locking of these valves. Therefore, pressure locking is not concern.

HELB: A HELB in a Mechanical Penetration Room could cause pressure locking of the valves due to room heatup. These valves will not be required to operate during a HELB. In the unlikely event that all steam generator heat transfer is lost, emergency operating procedures require DH63 and DH64 be opened for piggyback operations. In the design basis analysis, the unaffected Once Through Steam Generator (OTSG) will continue to provide core cooling using Auxiliary Feedwater. There will be no loss of RCS inventory so that piggyback operation should not be necessary. Therefore, pressure locking is not a safety concern.

THERMAL BINDING

Mode 1 and 2: These valves are normally at ambient temperature.

Mode 3: These valves are normally at ambient temperature.

Valve: DH 63 and DH 64 (Continued):

Mode 4 and 5: These valves are normally at ambient temperature.

LBLOCA: These valves are not used in mitigating a LBLOCA. Therefore, thermal binding is not a concern.

SBLOCA: These valves are used to mitigate a SBLOCA. However, during normal plant operation these valves are not subjected to conditions that could cause thermal binding. Therefore, thermal binding is not of concern.

HELB: A HELB cannot create conditions for thermal binding for these valves. Therefore, thermal binding is not of concern.

Valve: DH 830 and DH 831

Function: Decay Heat Cooler Cross Connect

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are normally kept closed to maintain the separation of the DHR trains.

Mode 3: The conditions of Modes 1 and 2 are also applicable to this Mode.

Mode 4 and 5: These valves may be opened in these Modes to permit flexibility of operation of the DHR System. The Emergency Core Cooling System (ECCS) room coolers limit heatup of the room, preventing pressure locking.

LBLOCA: These valves would not normally be utilized in mitigating a LBLOCA. Consequently, pressure locking is not of concern. In the event one DHR pump fails, these valves may be utilized to cross connect the injection lines. There is no heat source to significantly heat the valve bonnets prior to the time they are needed, nor any way to cause a large bonnet to piping differential pressure.

SBLOCA: These valves are not required for mitigation of SBLOCA. They are desired for mitigation of a Core Flood Line SBLOCA. There are no heat sources which could pressurize the bonnet area in these scenarios and no significant depressurization could occur which could cause pressure locking. Consequently, pressure locking is not of concern.

HELB: These valves are not required to open for mitigation of any HELB. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are normally at ambient temperature.

Mode 3: These valves are normally at ambient temperature.

Valve: DH 830 and DH 831 (Continued):

Mode 4 and 5: These valves may be opened to permit flexibility of operation of the DHR System. Once they are open, they will not be closed until the normal Mode 5 operating temperatures are reached and no significant cooldown occurs.

LBLOCA: These valves are not normally used to mitigate a LBLOCA. However, if a failure occurs in a Low Pressure Injection train, the valves could be opened. During this scenario, no heatup of the valves will occur so thermal binding will not occur. If a valve inadvertently closed it would be reopened before significant cooldown and thermal binding occurred. Therefore, thermal binding is not of concern.

SBLOCA: The conditions of the LBLOCA would also apply to SBLOCAs. In the event of a Core Flood Line break these valves would be opened. During the recirculation phase of this scenario, inadvertent closure would be corrected before thermal binding could occur as was the case with a LBLOCA. Therefore, thermal binding is not of concern.

HELB: These valves are not utilized in the mitigation of a HELB. Therefore, thermal binding is not of concern.

Valve: DH 1517 and DH 1518

Function: Decay Heat Pump Suction from RCS

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are normally closed in these Modes.

Mode 3: These valves are normally closed in this Mode.

Mode 4 and 5: These valves may be opened in these Modes. Since these valves are normally isolated from high RCS pressure in Modes 1, 2 and 3 by two closed gate valves in series, there is no source of bonnet pressurization.

LBLOCA: These valves are not utilized to mitigate LBLOCAs. The boron dilution flowpath utilizes an alternate flowpath through the normally open, manual gate valves DH10 and DH26. This flowpath bypasses DH1517 and DH1518. Consequently, pressure locking is not of concern.

SBLOCA: These valves may be opened following a SBLOCA in order to establish long term core cooling. However, there are other methods available to accomplish this function. Therefore, pressure locking is not a concern.

HELB: These valves will be opened following a HELB to bring the plant to cold shutdown and establish long term decay heat removal. However, this is not a time critical function following a HELB. Any room heatup which occurred can be returned to normal prior to opening these valves. Therefore, any bonnet pressurization due to heatup is minimal. There is no other bonnet pressurization source. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are normally at ambient temperatures.

Mode 3: These valves are normally at ambient temperatures.

Valve: DH 1517 and DH 1518 (Continued):

Mode 4 and 5: These valves are opened to support long term decay heat removal. These valves will be closed at 280° F during plant startup. Cooldown from this temperature has not caused thermal binding. Therefore,so thermal binding is not of concern.

LBLOCA: These valves are not required to mitigate a LBLOCA. Therefore, thermal binding is not of concern.

SBLOCA: These valves may be utilized in the mitigation of a SBLOCA for long term core cooling. However, there are other methods available to accomplish this function. Plant experience shows that thermal binding is not a concern for these valves.

HELB: These valves would be used for long term core cooling following a HELB. The conditions of Mode 4 and 5 apply to this situation.

Valve: MS 106 and MS 107

Function: Main Steam to Auxiliary Feedwater (AFW) Turbine Isolation Valves

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: Normally, minimal differential pressure exists across the valve and it is kept closed during normal power operation. Any liquid which could pressurize the bonnet region would dry out due to the elevated temperature of the valve. Also, quarterly valve stroking performed for ASME requirements, ensure that the bonnet area is emptied of any condensate.

Mode 3: These valves are normally closed in Mode 3, with minimal differential pressure across them. The only way pressure locking could occur is if the bonnet area is completely filled with liquid. A bonnet which is only partially filled with liquid would only cause pressure locking if the connected piping rapidly depressurized, which does not occur except for accident conditions. The bonnet could be liquid filled following various plant activities such as a hydrostatic tests of the steam generators. However, plant startup procedures require these valves to be opened when Main Steam pressure is above 790 psig. This would drain any condensate out of the bonnet. Therefore, pressure locking due to heatup of a liquid filled bonnet would be identified prior to the plant starting power operation. During cooldown, no pressurization of the bonnet area will occur.

Mode 4 and 5: The valve is not required to open in these Modes of operation. Therefore, pressure locking is not of concern.

LBLOCA: For this accident, these valves' safety position is closed. Therefore, pressure locking is not of concern.

SBLOCA: These valves are located outside of containment. They will not experience any heatup from this accident, so pressure locking is not of concern from this aspect. During a SBLOCA, no significant depressurization of the piping on either side of the valve will occur. Therefore, pressure locking is not of concern.

Valve: MS 106 and MS 107 (Continued):

HELB: For accidents which could cause rapid depressurization of either side of this valve, the valve is required to stay closed. Due to the close proximity of MS106 and MS107 to the Main Steam (MS) piping and the small continuous flow of steam into the MS to AFW turbine piping via MS106A and MS107A, MS106 and MS107 will be near MS System temperature. A HELB in the vicinity of these valves will not result in significant heatup of the condensate which may remain in the MS106/MS107 bonnet prior to valve completing its safety function. Consequently, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves stay at a constant temperature due to the proximity to the MS System. Closing them does not result in significant cooldown. Therefore, thermal binding is not of concern.

Mode 3: The valves cooldown from Main Steam temperature to approximately 280°F. If the plant is being cooled using the Auxiliary Feedwater (AFW) System, this valve is already open. This valve receives an automatic opening signal for certain breaks. The Steam and Feedwater Rupture Control System (SFRCS) low pressure trip is bypassed before the steam generator pressure reaches 600 psig to permit normal cooldown. The need for opening this valve after SFRCS trip is bypassed is extremely low. Thermal binding is unlikely to have occurred prior to the bypassing of SFRCS. Consequently, thermal binding is not of concern.

Mode 4 and 5: These valves have no safety function in these Modes.

LBLOCA: These valves are not used to mitigate a LBLOCA. Therefore, thermal binding is not of concern.

SBLOCA: These valves would be opened before significant cooldown could occur. Also, alternate methods of core cooling are available to provide core cooling. Therefore, thermal binding is not of concern.

HELB: These valves will open, if required, before significant cooldown occurs. Once open the valves would stay open. Therefore, thermal binding is not of concern.

Valve: MU 6421

Function: Makeup Train to RCS Isolation Valve

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: MU6421 is normally closed and provides an alternate makeup flow path to the RCS. The bonnet of MU6421 will not be pressurized due to local heating or piping depressurization. Therefore, the valve would not be susceptible to pressure locking.

Mode 3: The same conditions as for Modes 1 and 2 apply to Mode 3.

Mode 4 and 5: The same conditions as for Modes 1 and 2 apply to Modes 4 and 5.

LBLOCA: This valve will remain closed during a LBLOCA for containment isolation. Therefore, pressure locking is not of concern.

SBLOCA: This makeup injection path may be utilized during a SBLOCA. However, this valve is located outside containment so that bonnet heating will not occur. During larger SBLOCAs, RCS pressure does not drop significantly so there is not significant bonnet to pipe differential pressure. Therefore, pressure locking is not of concern.

HELB: The bonnet of this valve could be potentially heated in some HELB scenarios. However, during a HELB outside containment, there is no loss of RCS inventory. HPI is credited for inventory makeup due to RCS contraction. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: This valve is near ambient temperature. If closed, no significant cooling of the valve will occur. Therefore, thermal binding is not of concern.

Valve: MU 6421 (Continued):

Mode 3: This valve is near ambient temperature. If closed, no significant cooling of the valve will occur. Therefore, thermal binding is not of concern.

Mode 4 and 5: This valve is near ambient temperature. If closed, no significant cooling of the valve will occur. Therefore, thermal binding is not of concern.

LBLOCA: This valve is not utilized in mitigating a LBLOCA. Therefore, thermal binding is not of concern.

SBLOCA: This valve is at ambient temperature prior to being opened. Once the valve is opened to mitigate a SBLOCA, it will stay open. In addition, it would stay near ambient temperature and no significant cooldown will occur. Therefore, thermal binding is not of concern.

HELB: This valve is at ambient temperature prior to being opened. Once the valve is opened, it would stay open in a HELB until RCS inventory is controlled. The valves would stay near ambient temperature so that no significant cooldown would occur as a result of closure. Therefore, thermal binding is not of concern.

Valves: SW 1379, SW 1380, and SW 1381

Function: Service Water (SW) Strainer Drain Isolation Valves

Normal Position: Open/Closed Safety Position: Open/Closed

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves cycle open to clean the service water strainers. While they are closed, there are no significant heat sources in their vicinity to cause bonnet pressurization, and if the piping depressurized to valve would not need to open. If the valve did become pressure locked, the pump would continue to supply the Service Water System, with a higher differential pressure across the strainer. Also, there is a redundant train of service water available to allow continued operation. Therefore, pressure locking is not of concern.

Mode 3: The same conditions as in Modes 1 and 2 exist for Mode 3.

Mode 4 and 5: The same conditions as in Modes 1 and 2 exist for Modes 4 and 5.

LBLOCA: The same conditions as in Modes 1 and 2 exist during a LBLOCA. Therefore, pressure locking is not of concern.

SBLOCA: The same conditions as for Modes 1 and 2 exist during a SBLOCA.

HELB: Calculated temperature rise due to the worst case HELB is very small. Therefore it is not expected that these valves would experience significant bonnet pressurization during HELBs. Therefore, pressure locking of these valves is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

Mode 3: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

Mode 4 and 5: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

Valves: SW 1379, SW 1380, and SW 1381 (Continued):

LBLOCA: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

SBLOCA: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

HELB: These valves are near ambient temperatures at all times. Therefore, under any of the conditions, closure would not result in significant cooldown. Therefore, thermal binding is not a concern.

Valves: SW 5067 and SW 5068

Function: Hydrogen Dilution Blower Inlet Isolation Valve

Normal Position: Closed Safety Position: Open

Disk Type: Flexible Wedge

PRESSURE LOCKING

Mode 1 and 2: These valves are not required to open in these Modes. Therefore, pressure locking is not of concern.

Mode 3: The same conditions as in Modes 1 and 2 apply. Therefore, pressure locking is not of concern.

Mode 4 and 5: The same conditions as in Modes 1 and 2 apply. Pressure locking is not of concern.

LBLOCA: These valves are opened based on containment conditions. The valves are located outside containment. By the time the system may be needed (about 17 days post LOCA), ambient conditions in the Auxiliary Building will have returned to normal so there is no net heatup of the bonnet area. There is no rapid depressurization of the piping to cause a large bonnet to piping differential pressure. Therefore, pressure locking is not of concern.

SBLOCA: The same conditions exist as during a LBLOCA. Pressure locking is not of concern.

HELB: These valves are not used as a result of a HELB, as no hydrogen release is expected. The valves will not be opened. Therefore, pressure locking is not of concern.

THERMAL BINDING

Mode 1 and 2: These valves are near ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

Mode 3: These valves are near ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

Mode 4 and 5: These valves are near ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

Valves: SW 5067 and SW 5068 (Continued):

LBLOCA: These valves are near ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

SBLOCA: These valves are near ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

HELB: These valves are near or below ambient temperatures. Opening and then closing the valves would not result in any significant temperature changes. Therefore, thermal binding is not of concern.

Valve: DH 9A and DH 9B

Function: Decay Heat Pump Suction from Emergency Sump

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Solid Wedge

THERMAL BINDING

Mode 1 and 2: These valves are closed cold and maintained closed in these Modes of operation. Therefore, thermal binding is not of concern.

Mode 3: These valves are closed cold and maintained closed in these Modes of operation. Therefore, thermal binding is not of concern.

Mode 4 and 5: These valves are closed cold and maintained closed in these Modes of operation. Therefore, thermal binding is not of concern.

LBLOCA: Per NUREG-1275, Volume 9, thermal binding is of concern during valve cooldown. These valves will heat up as water accumulates in the Emergency Sump. Therefore, thermal binding is not of concern.

SBLOCA: These valves will heat up as water accumulates in the Emergency Sump. Therefore, thermal binding is not of concern.

HELB: These valves remain closed for this accident, so thermal binding is not of concern.

Valve: DH 2735

Function: Inboard Auxiliary Pressurizer Spray Containment Isolation Valve

Normal Position: Closed Safety Position: Open/Open

Disk Type: Solid Wedge

THERMAL BINDING

Modes 1 and 2 Mode 3 Modes 4 and 5 LBLOCA SBLOCA HELB	This valve is closed cold and maintained closed during power operation. If required to open, ambient conditions would always be warmer than when the valve is closed. Once the valve is opened during shutdowns or accidents, it will remain open. Therefore, thermal binding is not of concern.

Valve: RC 200

Function: Pressurizer Vent Stop Valve

Normal Position: Closed Safety Position: Open/Close

Disk Type: Solid Wedge

THERMAL BINDING

Mode 1 and 2 / Mode 3: This valve is normally closed, but is routinely opened during operations. When open, the valve is heated to near RCS temperature. Once closed, significant cooldown occurs. The valve has not thermally bound even when exposed to conditions which would be similar to expected worst case service conditions. Therefore, thermal binding is not of concern.

Mode 4 and 5: This valve may be used to vent steam or nitrogen from the Pressurizer. Due to the temperatures of the fluid, the valve will not be significantly above ambient temperature. If closed, no significant cooldown will occur, so thermal binding is not a concern.

LBLOCA: This valve is not used to mitigate a LBLOCA. Therefore, thermal binding is not a concern.

SBLOCA: This valve may be used to depressurize the RCS in some scenarios. Use of this valve in a SBLOCA could result in heat up of the valve. Significant cooldown after closure could result in thermal binding. However, experience has shown that thermal binding is not a problem for these valves.

HELB: This valve is not used in mitigating a HELB.

Valve: RC 239A and RC 239B

Function: Pressurizer Sample Isolation Valve

Normal Position: Closed Safety Position: Open/Closed

Disk Type: Solid Wedge

THERMAL BINDING

Mode 1 and 2
Mode 3
Mode 4 and 5: These valves are normally closed, but are routinely opened during operations. When open, the valves are heated to near RCS temperature. Once closed, significant cooldown occurs. The valves have not thermally bound even when exposed to conditions which would be similar to expected worst case service conditions. Therefore, thermal binding is not of concern.

LBLOCA: These valves are not used to mitigate a LBLOCA. Therefore, thermal binding is not of concern.

SBLOCA: If opened to mitigate a SBLOCA, these valves would heat to near RCS temperature. Once closed, a significant cooldown could cause thermal binding. However, experience has shown that thermal binding is not a problem for these valves.

HELB: These valves could be used following a HELB. If opened, the valves would heat up to near RCS temperature. Reclosing the valves could result in significant cooldown, which could cause thermal binding. However, experience has shown that thermal binding is not a problem for these valves.

Valves: SW 2927 and SW 2928

Function: Control Room Emergency Condenser Outlet Isolation Valves

Normal Position: Closed Safety Position: Open

Disk Type: Solid Wedge

THERMAL BINDING

Mode 1 and 2: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.

Mode 3: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.

Mode 4 and 5: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.

LBLOCA: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.

SBLOCA: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.

HELB: These valves are near ambient temperature. Closure would not cause significant cooldown of the valves. Therefore, thermal binding is not of concern.