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February 13, 1996

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: Beaver Valley Power Station, Unit No. 1 and No. 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
180-Day Response to Generic Letter 95-07

References:
1. "NRC Generic Letter 95-07: Pressure Locking and Thermal Binding of Safety-Related Power Operated Gate Valves," dated August 17, 1995.
2. DLC Submittal, "Sixty-Day Response to Generic Letter 95-07," dated October 16, 1995.
3. NRC Letter, "Pressure Locking and Thermal Binding Meeting," dated September 27, 1995.
4. NRC Letter, "Comments Regarding Duquesne Light Company's 60-Day Response to Generic Letter (GL) 95-07, "Pressure Locking and Thermal Binding of Safety Related Power-Operated Gate Valves," Beaver Valley Power Station, Units 1 and 2 (TAC Nos. M93429 and M93430)," dated November 3, 1995.
5. DLC Submittal, "Additional Information in Response to Generic Letter 95-07," dated November 15, 1995.

In response to Generic Letter (GL) 95-07, Duquesne Light Company (DLC) submitted its action plan (Reference 2) to evaluate power-operated gate valves for susceptibility to pressure locking and thermal binding. The action plan was in accordance with the request of the generic letter to complete the evaluations within 180 days of the date of the generic letter. At the time of the DLC submittal, efforts to accomplish the action plan were underway.

Based on DLC's submittal (Reference 2), the NRC staff determined that further information was required to ensure that DLC's previous evaluations had considered recent information and that the specified 90-day actions would be completed. In

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response to the request (Reference 4), DLC notified the NRC that the 90-day actions had been completed as clarified at the Region I Meeting announced by Reference 3.

This letter provides the 180-Day Response as specified in GL 95-07.

If there are questions regarding this letter, please contact Roy K. Brosi, Manager, Nuclear Safety Department at (412) 393-5210.

Sincerely,

George S. Thomas
Vice President
Nuclear Planning and Development

c: Mr. L. W. Rossbach, Sr. Resident Inspector
Mr. T. T. Martin, NRC Region I Administrator
Mr. D. S. Brinkman, Sr. Project Manager

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF BEAVER)

Subject: Beaver Valley Power Station, Unit No. 1 and No. 2
BV-1 Docket No. 50-334, License No. DPR-66
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180-Day Response to Generic Letter 95-07

Before me, the undersigned notary public, in and for the County and Commonwealth aforesaid, this day personally appeared George S. Thomas, to me known, who being duly sworn according to law, deposes and says that he is Vice President, Nuclear Planning and Development of the Nuclear Power Division, Duquesne Light Company, he is duly authorized to execute and file the foregoing submittal on behalf of said Company, and the statements set forth in the submittal are true and correct to the best of his knowledge, information and belief.

George S. Thomas

Subscribed and sworn to before me
on this 15th day of February, 1996

Tracey A. Baczek
Notary Public

Notarial Seal
Tracey A. Baczek, Notary Public
Shippingport Boro, Beaver County
My Commission Expires Aug. 16, 1997
Member, Pennsylvania Association of Notaries

Attachment

180-Day Response to Generic Letter 95-07

for

Beaver Valley Power Station

Units No. 1 and No. 2

February 1996

Summary of Scope

Duquesne Light Company (DLC) personnel of the Beaver Valley Power Station (BVPS) have completed a susceptibility evaluation of valves within the scope of NRC Generic Letter 95-07: "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves" (POGVs).

A total of 68 BVPS Unit No. 1 air operated, hydro-pneumatic and motor-operated safety-related gate valves were reviewed and a total of 84 similar valves for BVPS Unit No. 2 were reviewed. A Pressure Locking and Thermal Binding Matrix for these valves is attached. Each POGV was reviewed for susceptibility to four distinct events: stem-effect thermal binding, wedge-effect thermal binding, hydraulic pressure locking and thermally induced pressure locking. The POGVs were evaluated for operation during normal and emergency plant operation, shutdown operation and test configurations. Because of the expanded scope of GL 95-07, previous work performed to evaluate pressure locking and thermal binding was not utilized to exclude valves from consideration.

Stem-effect thermal binding (TB) is defined as the additional load imposed upon a closed valve disc due to stem lengthening from internal or external heat sources. The lengthening of the stem pushes on the valve operator on one side and pushes on the valve wedge on the other. This load is expected to make it more difficult to open the affected valve. Wedge-effect thermal binding develops from the compressive force imposed upon a valve wedge from its own valve body due to differential thermal expansion/contraction of the materials of both the valve and wedge. Wedge-effect thermal binding makes it more difficult to open a closed gate valve due to the increased friction force imposed upon the wedge that the operator must overcome. Hydraulic pressure locking (PL) occurs when high pressure fluid leaks into the bonnet cavity of a closed gate valve and pressurizes it. If the high pressure fluid is unable to bleed out before the valve must open, it will be more difficult for the valve operator to open the valve as it now needs to pull the wedge against this additional pressure force. Thermally induced pressure locking occurs when a water filled bonnet cavity of a closed gate valve is heated by internal or external system heat sources which raises the pressure of the contained fluid. In a manner similar to hydraulic PL, the pressurized fluid imposes additional forces on the valve wedge making it more difficult for the valve operator to open the valve.

In order to determine the susceptibility of these valves to either PL or TB, a 3-page screening evaluation form was prepared for each valve. This screening methodology determined that 24 valves in Unit No. 1 and 36 valves in Unit No. 2 were potentially susceptible to the GL 95-07 concerns.

DLC participated with the Westinghouse Owners Group (WOG) to develop specific GL 95-07 PL and TB susceptibility criteria. This criteria was used to evaluate the potentially susceptible valves. A summary of this criteria follows.

- Wedge-effect thermal binding is not considered credible for valves with operating temperatures less than 200°F, or if the expected change in temperature is less than 100°F for flex-wedge POGVs or 50°F for solid-wedge POGVs.

- A parallel disc POGV is not considered susceptible to TB due to inherent design features.

- A solid wedge POGV is not considered susceptible to PL due to inherent design features.

- When thermally-induced pressure locking is analyzed, a pressure rise of 23 psi per °F will be assumed. This value is conservative for moderate temperature rises.

- POGVs susceptible to PL will bleed off the differential pressure between the pressurized bonnet and the valve body in 24 hours.

- A valve stem leak-off does not provide a bonnet relief path for PL, unless it has physical features which provide a controlled leak path.

- Check valves are assumed to leak pressure back to the POGV under review, even if there are as many as 3 or 4 check valves between the pressure source and the POGV.

- Pressurized fluid which leaks back from a high pressure source through closed valves or check valves are limited in pressure to applicable relief valve set points.

Nine (9) valves in Unit No. 1 and seventeen (17) valves in Unit No. 2 were found susceptible in varying degrees to at least one criteria of the GL 95-07 PL or TB phenomena. Of these valves, four (4) valves in Unit No. 1 and ten (10) valves in Unit No. 2 had previously been determined to be susceptible to some form of PL or TB in earlier technical evaluations for the BVPS Units, and appropriate resolutions, as indicated in the matrix, have been implemented.

The valves that were determined susceptible to at least one of the GL 95-07 PL or TB criteria, and the resolution of their susceptibility concerns, are described below.

BVPS Unit No. 1

- MOV-SI-867A, B, C, D

  These safety injection system (SIS) valves isolate the boron injection tank (BIT) from normal Unit operating systems. MOV-SI-867A & B isolate the BIT inlet from chemical and volume control system (CHS); MOV-SI-867C & D isolate the BIT outlet from the reactor coolant system (RCS). MOV-SI-867A & B were determined susceptible to hydraulic pressure locking during a previous evaluation in 1994 and have been modified through disc drilling to negate the PL susceptibility. MOV-SI-867C & D were determined susceptible to GL 95-07 pressure locking. The present operability of the C and D valves is assured by large thrust margins as shown by dynamic testing at 100% of design differential pressure. MOV-SI-867C & D valves will be modified similar to the 867A & B valves during Unit No. 1's eleventh refueling outage and twelfth refueling outage, respectively, to prevent potential future degradation.

- MOV-SI-860A, B

  These SIS valves open during the transition from SIS injection phase to SIS recirculation phase in order to provide a flowpath from the containment sump to the suction of the Low Head Safety Injection pumps. The valves were determined susceptible to hydraulic pressure locking during a previous evaluation, and determined potentially susceptible to thermal binding during the GL 95-07 evaluation. The hydraulic pressure locking concern was eliminated when the valves were confirmed to have an installed relief path between each valve's bonnet and its upstream pipe.

  A containment sump temperature analysis in 1995 determined that differential temperatures which could potentially be experienced by the valves are within the screening criteria values; hence thermal binding will not occur.

- MOV-RC-535, 536, 537

  These reactor coolant system valves can be used to isolate the power operated relief valves (PORVs) during normal plant operation to isolate a leak. The valves' safety function is to close, but it may be necessary to open them to restore an isolated PORV to service. The valves are susceptible to GL 95-07 thermal binding. PORV block valve TB susceptibility will be negated by revising existing valve operating procedures to require an additional opening and closing stroke (prior to declaring the block valve operable) whenever a block valve has been closed to isolate a leaking PORV. The procedure revision will be completed by April 30, 1996. This additional valve movement will occur after thermal stabilization, so that it will verify component operability and the absence of any GL 95-07 PL or TB phenomena. Note

- Hydrotest Boundary Valves

  Any closed power-operated flex-wedge gate valve used as a hydrotest pressure boundary is considered potentially susceptible to GL 95-07 hydraulic pressure locking. Therefore, in order to alleviate this potential concern, applicable hydrotest procedures will either confirm operability of such valves following any pressurized test or provide sufficient time for pressure bleed-off. The administrative guidelines which are used to prepare the hydrotest procedures will be revised by July 31, 1996, to include the appropriate instructions for procedure preparation.

BVPS Unit No. 2

- 2RHS-MOV701A, 701B, 702A, 702B

  These four residual heat removal valves provide redundant system isolation between the RCS loop A hot leg and the inlet to the residual heat removal system (RHS). The valves were determined susceptible to hydraulic pressure locking during a previous evaluation.

  During the Unit's construction phase, the RHS inlet valves had the upstream side of their flexible wedges drilled through to allow a bonnet relief path. The drilled wedges relieve hydraulic pressure locking.

- 2RHS-MOV720A, B

  These residual heat removal discharge valves provide system isolation between the two RHS loops and RCS loop B and C cold legs. The valves are susceptible to GL 95-07 hydraulic pressure locking.

  Evaluation of system operation requirements determined that sufficient time will elapse between the occurrence of the hypothetical pressurized bonnet and the necessity to stroke the valve so that GL 95-07 hydraulic pressure locking will bleed away. Therefore, the RHS discharge valves will not be modified.

- 2SIS-MOV867A , B, C, D

  These safety injection system valves provide redundant system isolation between the chemical and volume control system and the RCS during normal plant operation. 2SIS-MOV867A & B are system inlet isolation valves; 2SIS-MOV867C & D are system outlet isolation valves. Valves 867A & B were determined susceptible to hydraulic pressure locking during a previous evaluation. Valves 867C & D were determined susceptible to GL 95-07 pressure locking.

2SIS-MOV867A & B had the upstream side of their flexible wedges drilled through to allow a bonnet relief path during the Unit's construction phase. System outlet isolation valves 2SIS-MOV867C & D, while presently operable based on existing valve operator margins, will have their discs modified in a similar manner during Unit No. 2's sixth refueling outage, presently scheduled for the fall of 1996.

- 2SIS-MOV869A, B

  These safety injection system valves provide system isolation between the CHS and the RCS hot legs. The valves would be manually opened 14½ hours after a safety injection event to enable a transfer to hot leg recirculation. The valves were determined susceptible to hydraulic pressure locking during a previous evaluation.

  During the Unit's construction phase, these two SIS valves had the upstream side of their flexible wedges drilled through to allow a bonnet relief path. The drilled wedges relieve hydraulic pressure locking.

- 2SIS-MOV8889

  This safety injection system valve isolates the RCS hot legs from the low pressure SI system. The valve would be manually opened approximately 14 hours after an SI event to enable the recirculation spray system (RSS) pumps to inject directly into the RCS. The valve was determined susceptible to hydraulic pressure locking during a previous evaluation.

  During the Unit's construction phase, this SIS valve had the upstream side of its flexible wedge drilled through to allow a bonnet relief path. The drilled wedge relieves hydraulic pressure locking.

- 2SIS-MOV836

  This safety injection system valve is manually opened after the completion of the Unit's transfer from SIS injection phase to SIS recirculation phase to establish a redundant cold leg injection flowpath. The valve was found susceptible to hydraulic pressure locking during a previous evaluation.

  During the Unit's construction phase, this SIS valve had the upstream side of its flexible wedge drilled through to allow a bonnet relief path. The drilled wedge relieves hydraulic pressure locking.

- 2RCS-MOV535, 536, 537

  These reactor coolant system valves can be used to isolate the power operated relief valves (PORVs) during normal plant operation to isolate a leak. The valves' safety function is to close, but it may be necessary to open them to restore an isolated PORV to service. The heat tracing installed on and about these block valves can produce potential pressure locking or thermal binding conditions, depending upon the operational conditions at the time. Note that all these valves are presently open and operable.

  The potential for pressure locking occurs if a PORV block is isolated and its associated heat tracing is de-energized. Prior to re-opening the valves, normal operational procedures require the heat tracing to be re-energized. Since the valve bonnet could have become water filled while it was closed, the potential for pressure locking could be created. The fact that these valves are normally open and their primary safety function is to close and isolate the reactor coolant system suggests that it would not be prudent to attempt to mitigate potential pressure locking through establishment of vent paths. If a closed valve failed to reopen to restore its associated PORV to normal service, then it would be necessary to enter applicable Tech Spec action statements. The Tech Specs would require resolution of such an event within 72 hours. Because differential pressure in a valve's bonnet is expected to bleed off in 24 hours or less, the possibility of a pressure locked block valve interfering with normal plant operation is considered a low and acceptable risk.

  The potential for thermal binding occurs only in the case in which a PORV block valve is closed in response to a leaking PORV which is still useful and necessary as a vent path. In this case, the heat tracing is de-energized after the block valve is closed, and remains de-energized. Since the heat tracing is de-energized after the block valve is closed, the potential for wedge-effect thermal binding could be created. Therefore, procedures will be revised by April 30, 1996, to require an opening/closing stroke (prior to declaring the block valve operable) whenever a block valve has been closed to isolate a PORV. This stroke will occur after thermal stabilization, so that it will verify component operability and the absence of GL 95-07 thermal binding. In normal plant operating circumstances, the heat tracing is re-energized prior to re-opening a block valve. This action will return the valve to the same thermal state which existed when it was closed.

- Hydrotest Boundary Valves

  Any closed power-operated flex-wedge gate valve used as a hydrotest pressure boundary is considered potentially susceptible to GL 95-07 hydraulic pressure locking. Therefore, in order to alleviate this potential concern, applicable hydrotest procedures will confirm operability of such valves following any pressurized test, or provide sufficient time for pressure bleed-off. The administrative guidelines which are used to prepare the hydrotest procedures will be revised by July 31, 1996, to include the appropriate instructions for procedure preparation.

Pressure Locking and Thermal Binding Matrix

UNIT 1 VALVE IDENT.	VALVE TYPE	TYPE	FUNCTIONAL DESCRIPTION	STEM EFFECT THERMAL BINDING	WEDGE EFFECT THERMAL BINDING	HYDRAULIC PRESSURE LOCKING	THERMALLY INDUCED PRESSURE LOCKING	RESOLUTION
~~HYV-AS-101A~~	~~FLEX WEDGE~~	~~HYV~~	~~AUX STEAM ISOLATION~~					
~~HYV-AS-101B~~	~~FLEX WEDGE~~	~~HYV~~	~~AUX STEAM ISOLATION~~					
MOV-CH-115B	FLEX WEDGE	MOV	RWST TO CH PUMP SUCTION HDR					
MOV-CH-115C	FLEX WEDGE	MOV	VCT TO CH PUMP SUCTION HDR					
MOV-CH-115D	FLEX WEDGE	MOV	RWST TO CH PUMP SUCTION HDR					
MOV-CH-115E	FLEX WEDGE	MOV	VCT TO CH PUMP SUCTION HDR					
MOV-CH-289	FLEX WEDGE	MOV	CHARGING INLET ISOL			POTENTIALLY		Satisfactory by Evaluation
MOV-CH-310	FLEX WEDGE	MOV	REGEN HX DISCH ISOL		POTENTIALLY	POTENTIALLY		Satisfactory by Evaluation
MOV-CH-350	SPLIT WEDGE	MOV	EMER BORATION ISOL					
~~MOV-CH-370~~	~~FLEX WEDGE~~	~~MOV~~	~~RCP SW INLET HEADER ISOL~~					
~~MOV-CH-373~~	~~FLEX WEDGE~~	~~MOV~~	~~CH PUMP MINI-FLOW OUTLET ISOL~~					
MOV-CH-378	SPLIT WEDGE	MOV	RCP SW RETURN ISOL					
MOV-CH-381	SPLIT WEDGE	MOV	RCP SW RETURN ISOL					
MOV-MS-105	SOLID WEDGE	MOV	AUX FEED PUMP TURB STM SUPPLY	POTENTIALLY	POTENTIALLY			Satisfactory by Evaluation
MOV-QS-100A	SOLID WEDGE	MOV	QS-P-1A SUCTION ISOL					
MOV-QS-100B	SOLID WEDGE	MOV	QS-P-1B SUCTION ISOL					
MOV-QS-101A	SOLID WEDGE	MOV	QS-P-1A DISCH ISOL					
MOV-QS-101B	SOLID WEDGE	MOV	QS-P-1B DISCH ISOL					
MOV-QS-103A	FLEX WEDGE	MOV	QS-P-1A MINI-FLOW/CUTBACK					
MOV-QS-103B	FLEX WEDGE	MOV	QS-P-1B MINI-FLOW/CUTBACK					
MOV-RC-535	FLEX WEDGE	MOV	PORV PCV-RC-455C BLOCK		SUSCEPTIBLE			Procedure Change
MOV-RC-536	FLEX WEDGE	MOV	PORV PCV-RC-456 BLOCK		SUSCEPTIBLE			Procedure Change
MOV-RC-537	FLEX WEDGE	MOV	PORV PCV-RC-455D BLOCK		SUSCEPTIBLE			Procedure Change
MOV-RC-590	PARALLEL DISK	MOV	RCS LOOP A HOT LEG ISOL					
MOV-RC-591	PARALLEL DISK	MOV	RCS LOOP A COLD LEG ISOL					
MOV-RC-592	PARALLEL DISK	MOV	RCS LOOP B HOT LEG ISOL					
MOV-RC-593	PARALLEL DISK	MOV	RCS LOOP B COLD LEG ISOL					
MOV-RC-594	PARALLEL DISK	MOV	RCS LOOP C HOT LEG ISOL					
MOV-RC-595	PARALLEL DISK	MOV	RCS LOOP C COLD LEG ISOL					
MOV-RH-700	PARALLEL DISK	MOV	RH FROM RCS ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
MOV-RH-701	PARALLEL DISK	MOV	RH FROM RCS ISOL				POTENTIALLY	Satisfactory by Evaluation
MOV-RH-720A	PARALLEL DISK	MOV	RH RETURN TO RCS ISOL				POTENTIALLY	Satisfactory by Evaluation
MOV-RH-720B	PARALLEL DISK	MOV	RH RETURN TO RCS ISOL				POTENTIALLY	Satisfactory by Evaluation
MOV-RS-155A	SOLID WEDGE	MOV	OUTSIDE RS-P-1A SUCTION ISOL					
MOV-RS-155B	SOLID WEDGE	MOV	OUTSIDE RS-P-1B SUCTION ISOL					
MOV-RS-156A	SOLID WEDGE	MOV	OUTSIDE RS-P-1A DISCH ISOL					
MOV-RS-156B	SOLID WEDGE	MOV	OUTSIDE RS-P-1B DISCH ISOL					
MOV-RW-113A	SOLID WEDGE	MOV	EE-E-1A RW SUPPLY ISOL					
MOV-RW-113B	FLEX WEDGE	MOV	EE-E-1A RW SUPPLY ISOL					
MOV-RW-113C	FLEX WEDGE	MOV	EE-E-1B RW SUPPLY ISOL					
MOV-RW-113D1	FLEX WEDGE	MOV	EE-E-1B RW SUPPLY ISOL					
MOV-SI-836	FLEX WEDGE	MOV	RCL COLD LEG SUPPLY FROM CH PUMP			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
MOV-SI-860A	SPLIT WEDGE	MOV	SI-P-1A SUCTION ISOL		POTENTIALLY	SUSCEPTIBLE		TB-Sat. by Evaluation/PL-Bonnet vent
MOV-SI-860B	SPLIT WEDGE	MOV	SI-P-1B SUCTION ISOL		POTENTIALLY	SUSCEPTIBLE		TB-Sat. by Evaluation/PL-Bonnet vent
MOV-SI-862A	SPLIT WEDGE	MOV	SI-P-1A RWST SUCTION ISOL				POTENTIALLY	Satisfactory by Evaluation

NOTE: Shaded valves have "No Safety Related Function to Open".

UNIT 1 VALVE IDENT.	VALVE TYPE	TYPE	FUNCTIONAL DESCRIPTION	STEM EFFECT THERMAL BINDING	WEDGE EFFECT THERMAL BINDING	HYDRAULIC PRESSURE LOCKING	THERMALLY INDUCED PRESSURE LOCKING	RESOLUTION
MOV-SI-862B	SPLIT WEDGE	MOV	SI-P-1B RWST SUCTION ISOL				POTENTIALLY	Satisfactory by Evaluation
MOV-SI-863A	SOLID WEDGE	MOV	SI-P-1A TO CH PUMP SUCTION HDR					
MOV-SI-863B	SOLID WEDGE	MOV	SI-P-1B TO CH PUMP SUCTION HDR					
MOV-SI-864A	FLEX WEDGE	MOV	SI-P-1B INJ TO RCS COLD LEG			POTENTIALLY		Satisfactory by Evaluation
MOV-SI-864B	FLEX WEDGE	MOV	SI-P-1A INJ TO RCS COLD LEG			POTENTIALLY		Satisfactory by Evaluation
MOV-SI-865A	FLEX WEDGE	MOV	SI ACC 1A OUTLET TO RCS COLD LEG					
MOV-SI-865B	FLEX WEDGE	MOV	SI ACC 1B OUTLET TO RCS COLD LEG					
MOV-SI-865C	FLEX WEDGE	MOV	SI ACC 1C OUTLET TO RCS COLD LEG					
MOV-SI-867A	FLEX WEDGE	MOV	BORON INJ (SI-TK-2) INLET ISOL			SUSCEPTIBLE		Modified
MOV-SI-867B	FLEX WEDGE	MOV	BORON INJ (SI-TK-2) INLET ISOL			SUSCEPTIBLE		Modified
MOV-SI-867C	FLEX WEDGE	MOV	BORON INJ (SI-TK-2) INLET ISOL			SUSCEPTIBLE	SUSCEPTIBLE	To be Modified
MOV-SI-867D	FLEX WEDGE	MOV	BORON INJ (SI-TK-2) INLET ISOL			SUSCEPTIBLE	SUSCEPTIBLE	To be Modified
MOV-SI-869A	FLEX WEDGE	MOV	CH PUMP TO RCS HOT LEG ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
MOV-SI-869B	FLEX WEDGE	MOV	CH PUMP TO RCS HOT LEG ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
MOV-SI-890A	PARALLEL DISK	MOV	S PUMP INJ TO RCS HOT LEG					
MOV-SI-890B	PARALLEL DISK	MOV	S PUMP INJ TO RCS HOT LEG					
MOV-SI-890C	PARALLEL DISK	MOV	S PUMP INJ TO RCS HOT LEG			POTENTIALLY		Satisfactory by Evaluation
TV-BD-101A1	FLEX WEDGE	AIR	1A SG BLOWDOWN ISOLATION					
TV-BD-101A2	FLEX WEDGE	AIR	1A SG BLOWDOWN ISOLATION					
TV-BD-101B1	FLEX WEDGE	AIR	1B SG BLOWDOWN ISOLATION					
TV-BD-101B2	FLEX WEDGE	AIR	1B SG BLOWDOWN ISOLATION					
TV-BD-101C1	FLEX WEDGE	AIR	1C SG BLOWDOWN ISOLATION					
TV-BD-101C2	FLEX WEDGE	AIR	1C SG BLOWDOWN ISOLATION					

NOTE: Shaded valves have "No Safety Related Function to Open".

Pressure Locking and Thermal Binding Matrix

UNIT 2 VALVE IDENT.	VALVE TYPE	TYPE	FUNCTIONAL DESCRIPTION	STEM EFFECT THERMAL BINDING	WEDGE EFFECT THERMAL BINDING	HYDRAULIC PRESSURE LOCKING	THERMALLY INDUCED PRESSURE LOCKING	RESOLUTION
2CHS-LCV115B	FLEX WEDGE	MOV	2CHS*P21 HEADER SUPPLY FROM RWST				POTENTIALLY	Satisfactory by Evaluation
2CHS-LCV115C	FLEX WEDGE	MOV	2CHS*P21 HEADER SUPPLY FROM VCT			POTENTIALLY		Satisfactory by Evaluation
2CHS-LCV115D	FLEX WEDGE	MOV	2CHS*P21 HEADER SUPPLY FROM RWST				POTENTIALLY	Satisfactory by Evaluation
2CHS-LCV115E	FLEX WEDGE	MOV	2CHS*P21 HEADER SUPPLY FROM VCT			POTENTIALLY		Satisfactory by Evaluation
2CHS-MOV111	FLEX WEDGE	MOV	BRS TO VCT ISOLATION					
2CHS-MOV289	FLEX WEDGE	MOV	CHARGING LINE ISOLATION			POTENTIALLY		Satisfactory by Evaluation
2CHS-MOV310	FLEX WEDGE	MOV	CHARGING TO RCS ISOLATION		POTENTIALLY	POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV373	FLEX WEDGE	MOV	2CHS*P21A,B,C MINI-FLOW ISOLATION					
2CHS-MOV378	FLEX WEDGE	MOV	2RCS*P21 SEAL WATER HEADER ISOL					
2CHS-MOV381	FLEX WEDGE	MOV	2RCS*P21 SEAL WATER HEADER ISOL					
2CHS-MOV8130A	FLEX WEDGE	MOV	CHARGING PUMP SUCTION ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8130B	FLEX WEDGE	MOV	CHARGING PUMP SUCTION ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8131A	FLEX WEDGE	MOV	2CHS*P21 SUCTION HEADER ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8131B	FLEX WEDGE	MOV	2CHS*P21 SUCTION HEADER ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8132A	FLEX WEDGE	MOV	2CHS*P21 DISCHARGE HEADER ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8132B	FLEX WEDGE	MOV	2CHS*P21 DISCHARGE HEADER ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8133A	FLEX WEDGE	MOV	2CHS*P21 DISCHARGE HEADER ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2CHS-MOV8133B	FLEX WEDGE	MOV	2CHS*P21 DISCHARGE HEADER ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2FWS-HYV157A	FLEX WEDGE	HYV	21A SG FEEDWATER ISOL					
2FWS-HYV157B	FLEX WEDGE	HYV	21B SG FEEDWATER ISOL					
2FWS-HYV157C	FLEX WEDGE	HYV	21C SG FEEDWATER ISOL					
2QSS-MOV100A	FLEX WEDGE	MOV	QSS PUMP SUCTION ISOLATION					
2QSS-MOV100B	FLEX WEDGE	MOV	QSS PUMP SUCTION ISOLATION					
2QSS-MOV101A	FLEX WEDGE	MOV	QSS PUMP DISCHARGE ISOLATION					
2QSS-MOV101B	FLEX WEDGE	MOV	QSS PUMP DISCHARGE ISOLATION					
2QSS-MOV102A	FLEX WEDGE	MOV	QSS CHEM INJECTION PUMP ISOLATION					
2QSS-MOV102B	FLEX WEDGE	MOV	QSS CHEM INJECTION PUMP ISOLATION					
2RCS-MOV535	FLEX WEDGE	MOV	RCS PORV ISOLATION BLOCK		SUSCEPTIBLE		SUSCEPTIBLE	TB-Proc. change/PL-Sat. by Evaluation
2RCS-MOV536	FLEX WEDGE	MOV	RCS PORV ISOLATION BLOCK		SUSCEPTIBLE		SUSCEPTIBLE	TB-Proc. change/PL-Sat. by Evaluation
2RCS-MOV537	FLEX WEDGE	MOV	RCS PORV ISOLATION BLOCK		SUSCEPTIBLE		SUSCEPTIBLE	TB-Proc. change/PL-Sat. by Evaluation
2RCS-MOV590	PARALLEL DISK	MOV	RCS LOOP A HOT LEG ISOLATION					
2RCS-MOV591	PARALLEL DISK	MOV	RCS LOOP A COLD LEG ISOLATION					
2RCS-MOV592	PARALLEL DISK	MOV	RCS LOOP B HOT LEG ISOLATION					
2RCS-MOV593	PARALLEL DISK	MOV	RCS LOOP B COLD LEG ISOLATION					
2RCS-MOV594	PARALLEL DISK	MOV	RCS LOOP C HOT LEG ISOLATION					
2RCS-MOV595	PARALLEL DISK	MOV	RCS LOOP C COLD LEG ISOLATION					
2RHS-MOV701A	FLEX WEDGE	MOV	RHS PUMP SUPPLY ISOLATION			SUSCEPTIBLE		Modified
2RHS-MOV701B	FLEX WEDGE	MOV	RHS PUMP SUPPLY ISOLATION			SUSCEPTIBLE		Modified
2RHS-MOV702A	FLEX WEDGE	MOV	RHS PUMP SUPPLY ISOLATION			SUSCEPTIBLE		Modified
2RHS-MOV702B	FLEX WEDGE	MOV	RHS PUMP SUPPLY ISOLATION			SUSCEPTIBLE		Modified
2RHS-MOV720A	FLEX WEDGE	MOV	RHS TO SIS RETURN LINE ISOLATION			SUSCEPTIBLE		Procedures allow time for bleed-down.
2RHS-MOV720B	FLEX WEDGE	MOV	RHS TO SIS RETURN LINE ISOLATION			SUSCEPTIBLE		Procedures allow time for bleed-down.
2RSS-MOV154C	FLEX WEDGE	MOV	RSS PUMP MINI-FLOW ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2RSS-MOV154D	FLEX WEDGE	MOV	RSS PUMP MINI-FLOW ISOLATION				POTENTIALLY	Satisfactory by Evaluation
2RSS-MOV156A	FLEX WEDGE	MOV	RSS PUMP DISCHARGE ISOLATION					

NOTE: Shaded valves have "No Safety Related Function to Open".

UNIT 2 VALVE IDENT.	VALVE TYPE	TYPE	FUNCTIONAL DESCRIPTION	STEM EFFECT THERMAL BINDING	WEDGE EFFECT THERMAL BINDING	HYDRAULIC PRESSURE LOCKING	THERMALLY INDUCED PRESSURE LOCKING	RESOLUTION
2RSS-MOV156B	FLEX WEDGE	MOV	RSS PUMP DISCHARGE ISOLATION					
2RSS-MOV156C	FLEX WEDGE	MOV	RSS PUMP DISCHARGE ISOLATION					
2RSS-MOV156D	FLEX WEDGE	MOV	RSS PUMP DISCHARGE ISOLATION					
2SIS-MOV836	FLEX WEDGE	MOV	CHS TO RCS COLD LEG INJECTION ISOL			SUSCEPTIBLE		Modified
2SIS-MOV841	FLEX WEDGE	MOV	CHS TO RCS COLD LEG INJECTION ISOL			POTENTIALLY	POTENTIALLY	Satisfactory by Evaluation
2SIS-MOV863A	FLEX WEDGE	MOV	SIS PUMP DISCHARGE ISOLATION				POTENTIALLY	Satisfactory by Evalustion
2SIS-MOV863B	FLEX WEDGE	MOV	SIS PUMP DISCHARGE ISOLATION				POTENTIALLY	Satisfactory by Evalustion
2SIS-MOV865A	FLEX WEDGE	MOV	SIS ACCUMULATOR A DISCHARGE ISOLATIO					
2SIS-MOV865B	FLEX WEDGE	MOV	SIS ACCUMULATOR B DISCHARGE ISOLATIO					
2SIS-MOV865C	FLEX WEDGE	MOV	SIS ACCUMULATOR C DISCHARGE ISOLATIO					
2SIS-MOV867A	FLEX WEDGE	MOV	BORON INJECTION INLET ISOLATION			SUSCEPTIBLE		Modified
2SIS-MOV867B	FLEX WEDGE	MOV	BORON INJECTION INLET ISOLATION			SUSCEPTIBLE		Modified
2SIS-MOV867C	FLEX WEDGE	MOV	BORON INJECTION ISOLATION			SUSCEPTIBLE	SUSCEPTIBLE	To be Modified
2SIS-MOV867D	FLEX WEDGE	MOV	BORON INJECTION ISOLATION			SUSCEPTIBLE	SUSCEPTIBLE	To be Modified
2SIS-MOV869A	FLEX WEDGE	MOV	SIS TO RCS HOT LEG HEADER ISOLATION			SUSCEPTIBLE		Modified
2SIS-MOV869B	FLEX WEDGE	MOV	SIS TO RCS HOT LEG HEADER ISOLATION			SUSCEPTIBLE		Modified
2SIS-MOV8809A	FLEX WEDGE	MOV	SIS PUMP SUCTION ISOLATION					
2SIS-MOV8809B	FLEX WEDGE	MOV	SIS PUMP SUCTION ISOLATION					
2SIS-MOV8811A	FLEX WEDGE	MOV	RSS PUMP DISCH TO SIS PIPING ISOL					
2SIS-MOV8811B	FLEX WEDGE	MOV	RSS PUMP DISCH TO SIS PIPING ISOL					
2SIS-MOV8887A	FLEX WEDGE	MOV	SIS PUMP DISCH TO RCS HOT LEG ISOL					
2SIS-MOV8887B	FLEX WEDGE	MOV	SIS PUMP DISCH TO RCS HOT LEG ISOL					
2SIS-MOV8888A	FLEX WEDGE	MOV	SIS PUMP DISCHARGE ISOLATION					
2SIS-MOV8888B	FLEX WEDGE	MOV	SIS PUMP DISCHARGE ISOLATION					
2SIS-MOV8889	FLEX WEDGE	MOV	SIS PUMP DISCHARGE ISOLATION			SUSCEPTIBLE		Modified
2SIS-MOV8890A	FLEX WEDGE	MOV	SIS PUMP MINI-FLOW					
2SIS-MOV8890B	FLEX WEDGE	MOV	SIS PUMP MINI-FLOW					
2SWS-MOV104A	SOLID WEDGE	MOV	SWS SUPPLY TO RSS HX A ISOL					
2SWS-MOV104B	SOLID WEDGE	MOV	SWS SUPPLY TO RSS HX B ISOL					
2SWS-MOV104C	SOLID WEDGE	MOV	SWS SUPPLY TO RSS HX C ISOL					
2SWS-MOV104D	SOLID WEDGE	MOV	SWS SUPPLY TO RSS HX D ISOL					
2SWS-MOV105A	SOLID WEDGE	MOV	SWS DISCHARGE FROM RSS HX A ISOL					
2SWS-MOV105B	SOLID WEDGE	MOV	SWS DISCHARGE FROM RSS HX B ISOL					
2SWS-MOV105C	SOLID WEDGE	MOV	SWS DISCHARGE FROM RSS HX C ISOL					
2SWS-MOV105D	SOLID WEDGE	MOV	SWS DISCHARGE FROM RSS HX D ISOL					
2SWS-MOV113A	SOLID WEDGE	MOV	SWS SUPPLY TO D/G HX ISOLATION					
2SWS-MOV113B	SOLID WEDGE	MOV	SWS SUPPLY TO D/G HX ISOL					
2SWS-MOV113C	SOLID WEDGE	MOV	SWS SUPPLY TO D/G HX ISOL					
2SWS-MOV113D	SOLID WEDGE	MOV	SWS SUPPLY TO D/G HX ISOLATION					

NOTE: Shaded valves have "No Safety Related Function to Open".