TVA 10897 (ONE 6-86) **QA Record** ONE CALCULATIONS **ORIGINAL** ATT 5

TITLE: DOCUMENTATION OF DESIGN BASIS REVIEW, REQUIRED THRUST CALC AND VALVE & ACTUATOR CAPABILITY ASSESSMENT-1-FCV-72-002	PLANT/UNIT: SEQUOYAH / UNIT 1
PREPARING ORGANIZATION: SQN/NE/MNM	KEY NOUNS (Consult RIMS DESCRIPTORS LIST): DESIGN BASIS REVIEW, THRUST, VALVE & ACTUATOR CAPABILITY
BRANCH/PROJECT IDENTIFIERS: 1-FCV- 72-002 (CL89-10)	Each time these calculations are issued, preparers must ensure that the original (RO) RIMS accession number is filled in.
	Rev (for RIMS' use): 26 — RIMS accession number
	R0: 9212300034 — B87 921229 041
APPLICABLE DESIGN DOCUMENT(S): DS-M18.2.21, DS-M18.2.22	R _
	R _
SAR SECTION(S): / UNID SYSTEM(S):	R _

Revision 0	R1	R2	R3
ECN No. (or indicate Not Applicable): DCN-M06642-A	NA		
Prepared: J. Constantine 11/20/92			
Checked: Robert Poole	R. Poole		
Reviewed: W. E. Potter			
Approved: W. E. Potter for			
Date: 24 NOV 92	3/8/94		
List all pages added by this revision.	see cover log		
List all pages deleted by this revision.	see cover log		
List all pages changed by this revision.	see cover log		

Use form TVA 10834 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

THIS CALCULATION WILL ADDRESS THE REQUIREMENTS SPECIFIED IN NRC GENERIC LETTER 89-10 "SAFETY RELATED MOTOR-OPERATED VALVE TESTING AND SURVEILLANCE" FOR VALVE 1-FCV-72-002. A DESIGN BASIS REVIEW WILL BE PERFORMED AND THE REQUIRED THRUST WILL BE DETERMINED. ALSO, A CAPABILITY ASSESSMENT OF THE VALVE AND VALVE ACTUATOR WILL BE PERFORMED.

Calculation Revision:
Entire calculation ☒
Select pages ☐

R1

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☐ No ☒

THIS CALCULATION CONTAINS NO SPECIAL REQUIREMENTS OR LIMITING CONDITIONS.

A DESIGN BASIS REVIEW HAS BEEN PERFORMED AND THE REQUIRED THRUST/TORQUE HAS BEEN DETERMINED PER THE METHODOLOGY SPECIFIED IN MECHANICAL DESIGN STANDARDS DS-M18.2.21 & DS-M18.2.22. THIS METHODOLOGY ADDRESSES THE NEW REQUIREMENTS SPECIFIED IN NRC GENERIC LETTER 89-10. AS SUMMARIZED IN SECTION 6.0, THIS CALCULATION SHOWS THAT THE VALVE AND VALVE ACTUATOR ARE CAPABLE OF MEETING THE NEW THRUST/TORQUE REQUIREMENTS. THEREFORE, BASED ON THE RESULTS OF THIS CALCULATION MOV 1-FCV-72-002 IS ABLE TO PERFORM ITS DESIGN BASIS FUNCTION.

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy ☐

☒ Microfilm and return calculations to: CALCULATION STORAGE AREA, ERCW Address: DSK-1A-SQN

R1

cc: RIMS, SL 26 C-K

SECTION 6.0

ATTACHMENT F
Summary/Conclusions
(Valve Weak-Link Included)

MOV Tag Number 1-FCV-72-002

Required Thrust (DS-M18.2.21 Section 2.1.1)

Open 13090 lbs Close 4778 lbs (ACC)
12880 lbs (MISP) R1

Seismic Document Which Addresses Maximum Thrust Reference 20
Maximum Thrust Considered 20000 lbs

Required Torque (DS-M18.2.21 Section 2.1.2)

Open 234.0 ft-lbs Close 85.5 ft-lbs (ACC)
231.0 ft-lbs (MISP) R1

Motor Actuator Capability (DS-M18.2.21 Section 2.2)

Open: Thrust 14575 lbs Torque 260.9 ft-lbs

Closed: Thrust 20127 lbs Torque 360.3 ft-lbs R1

Valve Allowables (DS-M18.2.21 Section 2.3)

Open Disc Arm Thrust 49123 lbs (see Note 2)

Close Yoke Bolting Thrust 70757 lbs (see Note 2)

Thrust Band Open:

Min. N/A (see Note 1)
Max. 14575 lbs (see Note 1)

Thrust Band Closed:

Min. 4778 (see Note 3)
Max. 20000 lbs Total (see Note 3) R1

IS MOV ACCEPTABLE FOR THE APPLICATION? YES

If "NO", enter reference to design change document N/A

Comments: See Following Pages for Comments.

1) There is no torque switch in the open circuit, Ref.15

THIS PAGE REVISED BY REV.1

TVA 10897 (ONE 6-95) **QA Record** ONE CALCULATIONS **ORIGINAL** ATT 5

TITLE	PLANT/UNIT
DOCUMENTATION OF DESIGN BASIS REVIEW, REQUIRED THRUST CALC AND VALVE & ACTUATOR CAPABILITY ASSESSMENT-1-FCV-72-039	SEQUOYAH / UNIT 1
PREPARING ORGANIZATION: SQN/NE/MNM	KEY NOUNS (Consult RIMS DESCRIPTORS LIST): DESIGN BASIS REVIEW, THRUST, VALVE & ACTUATOR CAPABILITY
BRANCH/PROJECT IDENTIFIERS: 1-FCV- 72-039 (GL89-10)	Each time these calculations are issued, preparers must ensure that the original (R0) RIMS accession number is filled in.

Rev	(for RIMS' use)	RIMS accession number
R0	921230G0039 (26)	B87 921229 046
R _		
R _		
R _		

APPLICABLE DESIGN DOCUMENT(S): DS-M18.2.21; DS-M18.2.22

SAR SECTION(S): | UNID SYSTEM(S): 072

Revision 0	R1	R2	R3
ECN No. (or indicate Not Applicable): DCN M-08642	NA		
Prepared: G. Constantine 11/18/92	[illegible]		
Checked: Robert Poole	R. Poole		
Reviewed: [illegible]	[illegible]		
Approved: [illegible] for	[illegible] for [illegible]		
Date: 24 NOV 92	3/8/96		
List all pages added by this revision.	NA per log		
List all pages deleted by this revision.	NA per log		
List all pages changed by this revision.	NA per log		

Use form TVA 10534 if more space required

Safety-related? Yes ☒ No ☐

Statement of Problem

THIS CALCULATION WILL ADDRESS THE REQUIREMENTS SPECIFIED IN NRC GENERIC LETTER 89-10 "SAFETY RELATED MOTOR-OPERATED VALVE TESTING AND SURVEILLANCE" FOR VALVE 1-FCV- 72-039 . A DESIGN BASIS REVIEW WILL BE PERFORMED AND THE REQUIRED THRUST WILL BE DETERMINED. ALSO, A CAPABILITY ASSESSMENT OF THE VALVE AND VALVE ACTUATOR WILL BE PERFORMED.

Calculation Revisions:
Entire Calc ☒
Select Pages ☐

Abstract

These calculations contain an unverified assumption(s) that must be verified later. Yes ☐ No ☒

THIS CALCULATION CONTAINS NO SPECIAL REQUIREMENTS OR LIMITING CONDITIONS.

A DESIGN BASIS REVIEW HAS BEEN PERFORMED AND THE REQUIRED THRUST/TORQUE HAS BEEN DETERMINED PER THE METHODOLOGY SPECIFIED IN MECHANICAL DESIGN STANDARDS DS-M18.2.21 & DS-M18.2.22. THIS METHODOLOGY ADDRESSES THE NEW REQUIREMENTS SPECIFIED IN NRC GENERIC LETTER 89-10. AS SUMMARIZED IN SECTION 6.0, THIS CALCULATION SHOWS THAT THE VALVE AND VALVE ACTUATOR ARE CAPABLE OF MEETING THE NEW THRUST/TORQUE REQUIREMENTS. THEREFORE, BASED ON THE RESULTS OF THIS CALCULATION MOV 1-FCV-72-039 IS ABLE TO PERFORM ITS DESIGN BASIS FUNCTION.

☐ Microfilm and store calculations in RIMS Service Center. Microfilm and destroy. ☐

☒ Microfilm and return calculations to: CALCULATION STORAGE AREA, ERCW Address: DSK-1A-SQN

cc: RIMS, SL 26 C-K

R1 Prepared: [signature]

R1 Checked: [signature]

SECTION 6.0

ATTACHMENT F
Summary/Conclusions
(Valve Weak-Link Included)

MOV Tag Number 1-FCV-72-039

Required Thrust (DS-M18.2.21 Section 2 1.1)

Open 13090 lbs Close 4778 lbs (ACC)
12880 lbs (MISP)

Seismic Document Which Addresses Maximum Thrust Reference 20
Maximum Thrust Considered 20000 lbs

Required Torque (DS-M18.2.21 Section 2.1.2)

Open 234.0 ft-lbs Close 85.5 ft-lbs (ACC)
231.0 ft-lbs (MISP)

Motor Actuator Capability (DS-M18.2.21 Section 2.2)

Open: Thrust 14575 lbs Torque 260.9 ft-lbs

Closed: Thrust 20127 lbs Torque 360.3 ft-lbs

Valve Allowables (DS-M18.2.21 Section 2.3)

Open Disc Arm Thrust 49123 lbs (see Note 2)

Close Yoke Bolting Thrust 70757 lbs (see Note 2)

Thrust Band Open:

Min. N/A (see Note 1)
Max. 14575 lbs (see Note 1)

Thrust Band Closed:

Min. 4778 (see Note 3)
Max. 20000 lbs Total (see Note 3)

IS MOV ACCEPTABLE FOR THE APPLICATION? YES

If "NO", enter reference to design change document N/A

Comments: See Following Pages for Comments.

1) There is no torque switch in the open circuit, Ref.15

THIS PAGE REVISED BY REV.1

ATTACHMENT 6

LISTING OF VALVE SIZE,

MANUFACTURER, AND TYPE

ATTACHMENT 6

The valve size, manufacturer, and type are listed below for all gate valves in the Generic Letter 95-07 Program - SEQUOYAH

	MOV #	SIZE	MANUFACTURER	TYPE
	FCV-01-015	4"	WALWORTH	FWG
	FCV-01-016	4"	WALWORTH	FWG
U1	FCV-01-017	4"	ANCHOR DARLING	FWG
U2	FCV-01-017	4"	WALWORTH	FWG
	FCV-01-018	4"	WALWORTH	FWG
	FCV-03-033	16"	WALWORTH	FWG
	FCV-03-047	16"	WALWORTH	FWG
	FCV-03-087	16"	WALWORTH	FWG
	FCV-03-100	16"	WALWORTH	FWG
	FCV-03-116A	8"	WALWORTH	FWG
	FCV-03-116B	8"	WALWORTH	FWG
	FCV-03-126A	8"	WALWORTH	FWG
	FCV-03-126B	8"	WALWORTH	FWG
	FCV-03-136A	10"	WALWORTH	FWG
	FCV-03-136B	10"	WALWORTH	FWG
	FCV-03-179A	10"	WALWORTH	FWG
	FCV-03-179B	10"	WALWORTH	FWG
	FCV-26-240	4"	ANCHOR DARLING	FWG
	FCV-26-241	4"	ANCHOR DARLING	FWG
	FCV-26-242	4"	ANCHOR DARLING	FWG
	FCV-26-243	4"	ANCHOR DARLING	FWG
	FCV-26-244	4"	ANCHOR DARLING	FWG
	FCV-26-245	4"	ANCHOR DARLING	FWG
	FCV-62-061	4"	ANCHOR DARLING	FWG
	FCV-62-063	4"	ANCHOR DARLING	FWG
	FCV-62-090	3"	VELAN	FWG
	FCV-62-091	3"	VELAN	FWG
	FCV-62-132	4"	ANCHOR DARLING	FWG
	FCV-62-133	4"	ANCHOR DARLING	FWG
	FCV-62-135	8"	ANCHOR DARLING	FWG
	FCV-62-136	8"	ANCHOR DARLING	FWG
	FCV-62-138	3"	VELAN	FWG
	FCV-63-001	12"	CRANE	FWG
	FCV-63-005	8"	ANCHOR DARLING	FWG
	FCV-63-006	4"	ANCHOR DARLING	FWG
	FCV-63-007	4"	ANCHOR DARLING	FWG
	FCV-63-008	8"	ANCHOR DARLING	D/D
	FCV-63-011	8"	ANCHOR DARLING	D/D
	FCV-63-022	4"	ANCHOR DARLING	D/D
	FCV-63-025	4"	ANCHOR DARLING	D/D
	FCV-63-026	4"	ANCHOR DARLING	D/D
	FCV-63-039	4"	ANCHOR DARLING	D/D
	FCV-63-040	4"	ANCHOR DARLING	D/D
	FCV-63-047	6"	ANCHOR DARLING	FWG
	FCV-63-048	6"	ANCHOR DARLING	FWG
	FCV-63-067	10"	VELAN	FWG

ATTACHMENT 6

The valve size, manufacturer, and type are listed below for all gate valves in the Generic Letter 95-07 Program - SEQUOYAH

MOV #	SIZE	MANUFACTURER	TYPE
FCV-63-072	18"	ANCHOR DARLING	D/D
FCV-63-073	18"	ANCHOR DARLING	D/D
FCV-63-080	10"	VELAN	FWG
FCV-63-093	8"	VELAN	FWG
FCV-63-094	8"	VELAN	FWG
FCV-63-098	10"	VELAN	FWG
FCV-63-118	10"	VELAN	FWG
FCV-63-152	4"	VELAN	FWG
FCV-63-153	4"	VELAN	FWG
FCV-63-156	4"	VELAN	FWG
FCV-63-157	4"	VELAN	FWG
FCV-63-172	12"	VELAN	FWG
FCV-63-332	3"	VELAN	FWG
FCV-63-333	3"	VELAN	FWG
FCV-70-087	3"	WALWORTH	SWG
FCV-70-090	3"	WALWORTH	SWG
FCV-70-133	3"	WALWORTH	SWG
FCV-70-134	3"	WALWORTH	SWG
FCV-72-002	12"	ALOYCO	D/D
FCV-72-020	12"	ALOYCO	SWG
FCV-72-021	12"	ALOYCO	D/D
FCV-72-022	12"	ALOYCO	D/D
FCV-72-023	12"	ALOYCO	SWG
FCV-72-039	12"	ALOYCO	D/D
FCV-72-040	8"	ALOYCO	D/D
FCV-72-041	8"	ALOYCO	D/D
FCV-74-001	14"	COPES VULCAN	D/D
FCV-74-002	14"	COPES VULCAN	D/D
FCV-74-003	14"	ANCHOR DARLING	D/D
FCV-74-021	14"	ANCHOR DARLING	D/D
FCV-74-033	8"	ANCHOR DARLING	D/D
FCV-74-035	8"	ANCHOR DARLING	D/D

TENNESSEE VALLEY AUTHORITY

WATTS BAR NUCLEAR PLANT

GENERIC LETTER 95-07

"PRESSURE LOCKING AND THERMAL BINDING OF SAFETY-RELATED POWER-OPERATED GATE VALVES"

WATTS BAR NUCLEAR PLANT - GENERIC LETTER 95-07, "PRESSURE LOCKING AND THERMAL BINDING OF SAFETY RELATED POWER OPERATED GATE VALVES"

THE WATTS BAR 180 DAY SUPPLEMENTAL RESPONSE CONSISTS OF ATTACHMENTS 1 - 3, AS FOLLOWS:

ATTACHMENT 1 - VALVE CATEGORIZATION CRITERIA FOR PRESSURE LOCKING AND THERMAL BINDING (WESTINGHOUSE OWNER'S GROUP CRITERIA)

ATTACHMENT 2 - WATTS BAR EVALUATION MATRIX

ATTACHMENT 3 - WATTS BAR EVALUATION MATRIX NOTES

ATTACHMENT 1

WESTINGHOUSE OWNERS GROUP

VALVE CATEGORIZATION CRITERIA FOR PRESSURE LOCKING AND THERMAL BINDING

SUBCOMMITTEE TASK TEAM MEETING
JANUARY 5 1996

VALVE CATEGORIZATION CRITERIA FOR PRESSURE LOCKING AND THERMAL BINDING

INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES	
STEP	CRITERIA QUESTIONS
1. Valve Applicability	(a) Is the valve a safety related Power Operated Gate Valve ? (b) Does the valve have a licensing commitment? If NO to BOTH, then the valve is considered not applicable.
2. Function	(a) Does the valve have a safety-related function to OPEN? If YES, i) Is it normally or occasionally closed during normal or safety related operations? If NO, then valve is considered not applicable. If NO, then the valve is considered not applicable.
3. Component Design for Pressure Locking	(a) Is the valve a solid wedge gate valve? If YES, then the valve is considered not applicable for PRESSURE LOCKING.
4. Component Design for Thermal Binding	(a) Is the valve a double disk gate valve? (b) Is the valve a parallel disk gate valve? If YES to ANY, then the valve is considered not applicable for THERMAL BINDING.
ALL REMAINING POTENTIALLY SUSCEPTIBLE VALVES TO BE SUBMITTED TO NRC	

SUBCOMMITTEE TASK TEAM MEETING
JANUARY 5 1996

COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES	
STEP	CRITERIA QUESTIONS
5. Pressure Locking	(a) Does the valve have a design feature that mitigates Pressure Locking (i.e., hole in disk, bonnet bypass line, bonnet pressure relief, active packing leakoff line, etc.)? If YES, then the valve is considered not susceptible to PRESSURE LOCKING.
6. Thermal Binding	(a) None exists.

SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES	
STEP	CRITERIA QUESTIONS
7A. Pressure Locking (Hydraulic Effects)	(a) Is the valve normally or occasionally exposed to high pressure fluid and is the attached piping potentially depressurized prior to valve actuation? (b) Is the valve, which is not normally exposed to high pressure fluid, potentially subjected to high pressure fluid due to leakage from a high pressure source and is the attached piping potentially depressurized prior to valve actuation? If NO to ALL, then valve is considered not susceptible to PRESSURE LOCKING due to HYDRAULIC EFFECTS.
7B. Pressure Locking (Thermal Effects)	(a) Is the valve stem oriented in a horizontal or below horizontal configuration as to trap steam condensate in the bonnet when closed? (b) Does the valve, which is not normally or occasionally exposed to hot fluid, potentially experience body temperature changes from fluid temperature conditions in the attached piping? (c) Does the valve, which is not normally exposed to high temperature conditions, potentially experience hot temperature conditions (e.g., high energy line break)? (d) Can the valve see a temperature increase greater than normal ambient swings? If NO to ALL, then the valve is considered not susceptible to PRESSURE LOCKING due to THERMAL EFFECTS?

SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES (CONTINUED)	
STEP	CRITERIA QUESTIONS
8A. Thermal Binding (Wedge Effect)	(a) Is the valve closed hot (T > 200°F - see notes below) followed by a significant cooldown and then required to open? (b) Is the hot valve (T > 200°F - see notes below) required to close while the system/valve is cooling down (i.e., subject valve closure terminates cooling) and required to open after the valve has cooled down? (c) Can a significant temperature gradient develop across the valve after it is closed and is the valve then required to be opened? If NO to ALL, then the valve is considered not susceptible to THERMAL BINDING due the WEDGE EFFECT.
8B. Thermal Binding (Stem Effect)	(a) Is the valve closed hot (T > 200°F - see notes below), with no subsequent cooldown, then required to open? (b) Is the hot valve (T > 200°F - see notes below) required to close while the system/valve is being cooled down and signaled to open before the valve cools down (i.e., $\Delta T <$ see Notes below)? If NO to ALL, then the valve is considered not susceptible to THERMAL BINDING due to the STEM EFFECT.

Note: For purposes of Thermal Binding, the threshold system temperature below which thermal binding won't occur is 200°F (Ref. WOG Letter WOG 95-387). A significant ΔT or temperature gradient above the threshold temperature is defined as (Ref. WOG Letter WOG 95-387):

$\Delta T > 50°F$ for solid wedge gate valves
$\Delta T > 100°F$ for flexible wedge gate valves

SUBCOMMITTEE TASK TEAM MEETING
JANUARY 5 1996
APPENDIX

EVALUATION CRITERIA TO ELIMINATE REMAINING VALVES	
EFFECT	EVALUATION QUESTIONS
1. Pressure Locking	(a) Does the valve inservice testing conditions bound the postulated thermal and hydraulic Pressure Locking conditions? (b) Is the actuator sized for maximum expected unseating thrust due to COMBINED* thermal and hydraulic Pressure Locking conditions**? If YES to EITHER, then the valve is considered not susceptible to PRESSURE LOCKING.
2A. Thermal Binding (Wedge Effect)	(a) Does a procedure exist that requires cycling the valve at a cooling ΔT interval of approximately (Ref. WOG Letter WOG 95-387): 100°F for Flex Wedge Valves 50°F for Solid Wedge Valves If YES, then the valve is considered not susceptible to THERMAL BINDING due to the WEDGE EFFECT?
2B. Thermal Binding (Stem Effect)	(a) Does the valve actuator have a compensating spring for stem growth? If YES, then the valve is considered not susceptible to THERMAL BINDING due to the STEM EFFECT?
2C. Thermal Binding (General)	(a) Is the actuator sized for unseating thrust which takes into account differential thermal contraction of valve disk and body as well as the stem growth? (b) Does the valve inservice testing conditions bound the postulated Thermal Binding conditions? If YES to ANY, then the valve is considered not susceptible to THERMAL BINDING?

* Additional load due to "Thermal Binding, Stem Effect", may also need to be included.

** Hydraulic pressure locking $\Delta P/\Delta T = .23$ psi/°F (Ref. WOG Letter WOG 95-387) for a $\Delta T \leq 70$°F.

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept -ible to PL.	No Crit	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-1-15 / 4" SG 1 Steam Supply to TD AFW Pump	Y	Y	Y	N Note 1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-1-16 / 4" SG 4 Steam Supply to TD AFW Pump	Y	Y	Y	Y	N	N	N	N	—	**Y Calc Note 53**	N	N Note 54	N Note 54	N Note 54	N Note 54	N Note 54	N Note 54	N Note 54	N Note 54	N Note 54
1-FCV-1-17 / 4" Steam Hdr to TD AFW Pump	Y	Y	Y	N Note 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-1-18 / 4" Steam Hdr to TD AFW Pump	Y	Y	Y	N Note 2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-3-33 / 16" SG 1 MFW Isol Valve	Y	Y	N Note 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-3-47 / 16" SG 2 MFW Isol Valve	Y	Y	N Note 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-3-87 / 16" SG 3 MFW Isol Valve	Y	Y	N Note 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-3-100 / 16" SG 4 MFW Isol Valve	Y	Y	N Note 3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept-ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-3-116A / 4" ERCW Hdr A to AFW Pmp 1A-A Suction	Y	Y	Y	Y	Y Note 4	N	N	—	—	—	—	—	—	—	—	N Note 5	N Note 5	N Note 5	N Note 5	N Note 5
1-FCV-3-116B / 4" ERCW Hdr A to AFW Pmp 1A-A Suction	Y	Y	Y	Y	Y Note 4	N	N	—	—	—	—	—	—	—	—	N Note 5	N Note 5	N Note 5	N Note 5	N Note 5
1-FCV-3-126A / 4" ERCW Hdr B to AFW Pmp 1A-A Suction	Y	Y	Y	Y	Y Note 4	N	N	—	—	—	—	—	—	—	—	N Note 5	N Note 5	N Note 5	N Note 5	N Note 5
1-FCV-3-126B / 4" ERCW Hdr B to AFW Pmp 1A-A Suction	Y	Y	Y	Y	Y Note 4	N	N	—	—	—	—	—	—	—	—	N Note 5	N Note 5	N Note 5	N Note 5	N Note 5
1-FCV-3-136A / 6" ERCW Hdr A to TD AFW Pmp Suction	Y	Y	Y	Y	N	N	N	N	—	N Note 6	N Note 6	N Note 7	N Note 7	N Note 7	N Note 7	N Note 8	N Note 8	N Note 8	N Note 8	N Note 8
1-FCV-3-136B / 6" ERCW Hdr A to TD AFW Pmp Suction	Y	Y	Y	Y	N	N	N	N	—	N Note 6	N Note 6	N Note 7	N Note 7	N Note 7	N Note 7	N Note 8	N Note 8	N Note 8	N Note 8	N Note 8
1-FCV-3-179A / 6" ERCW Hdr B to TD AFW Pmp Suction	Y	Y	Y	Y	N	N	N	N	—	N Note 6	N Note 6	N Note 7	N Note 7	N Note 7	N Note 7	N Note 8	N Note 8	N Note 8	N Note 8	N Note 8

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscapt -ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-3-179B / 6" ERCW Hdr B to TD AFW Pmp Suction	Y	Y	Y	Y	N	N	N	N	—	N Note 6	N Note 6	N Note 7	N Note 7	N Note 7	N Note 7	N Note 8	N Note 8	N Note 8	N Note 8	N Note 8
1-FCV-26-240 / 4" React Bldg FP Stcpipe Isol	Y	N	N Note 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-26-241 / 4" React Bldg Annulus FP Standpipe Isol	Y	N	N Note 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-26-242 / 4" React Bldg Annulus FP Standpipe Isol	Y	N	N Note 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-26-243 / 4" RCP Sprinkler Hdr Isol	Y	Y	N Note 9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-26-244 / 4" Annul Cable Tray Area Sprinkler Hdr Isol	Y	N	N Note 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-26-245 / 4" Annul Cable Tray Area Sprinkler Hdr Isol	Y	N	N Note 10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept -ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-62-61 / 4" CVCS Seal Water Return Hdr Isol.	Y	Y	N Note 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-62-63 / 4" CVCS Seal Water Return Hdr Isol.	Y	Y	N Note 11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-62-90 / 3" CVCS Charging Hdr Isol.	Y	Y	N Note 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-62-91 / 3" CVCS Charging Hdr Isol.	Y	Y	N Note 12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-LCV-62-132 / 4" VCT Outlet Isol.	Y	Y	N Note 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-LCV-62-133 / 4" VCT Outlet Isol.	Y	Y	N Note 13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-LCV-62-135 / 8" RWST/ CVCS Supply Hdr Isol.	Y	Y	Y	Y	N	N	N	N	—	N Note 14	**Y CALC Note 55**	N Note 15	N Note 15	N Note 15	N Note 15	N Note 16	N Note 16	N Note 16	N Note 16	N Note 16
1-LCV-62-136 / 8" RWST/ CVCS Supply Hdr Isol.	Y	Y	Y	Y	N	N	N	N	—	N Note 14	**Y CALC Note 55**	N Note 15	N Note 15	N Note 15	N Note 15	N Note 16	N Note 16	N Note 16	N Note 16	N Note 16

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept -ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TP due to the Stem Effect.	
1-FCV-63-1 / 14" RWST to RHR Suct Isol.	Y	Y	Y	N Note 17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-5 / 8" RWST to SIP Suct Isol.	Y	Y	Y	N Note 18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-6 / 4" RHR HX A Outlet to SIP Suct.	Y	Y	Y	Y	N	N	N	N	—	N	**Y Calc Note 56**	N Note 51	N Note 51	N Note 51	N Note 51	N Note 19	N Note 19	N Note 19	N Note 19	N Note 19
1-FCV-63-7 / 4" RHR HX A Outlet to SIP Suct.	Y	Y	Y	Y	N	N	N	N	—	N	**Y Calc Note 56**	N Note 51	N Note 51	N Note 51	N Note 51	N Note 19	N Note 19	N Note 19	N Note 19	N Note 19
1-FCV-63-8 / 8" RHR Pmp 1A to CCP & SIP Suct. Isol.	Y	Y	Y	Y	N	N	N	Y Note 20	—	—	—	—	—	—	—	N Note 21	N Note 21	N Note 21	N Note 21	N Note 21
1-FCV-63-11 / 8" RHR Pmp 1B to SIP 1B Suct Isol.	Y	Y	Y	Y	N	N	N	Y Note 20	—	—	—	—	—	—	—	N Note 21	N Note 21	N Note 21	N Note 21	N Note 21
1-FCV-63-25 / 4" SIS High Press Inj Isol.	Y	Y	Y	Y	N	N	N	N	—	**Y Calc Note 57**	N	N Note 22	N Note 22	N Note 22	N Note 22	N Note 23	N Note 23	N Note 23	N Note 23	N Note 23

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TS.		If YES, the vlv is not susceptible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-63-26 / 4" SIS High Press Inj Isol	Y	Y	Y	Y	N	N	N	N	—	**Y Calc Note 57**	N	N Note 22	N Note 22	N Note 22	N Note 22	N Note 23	N Note 23	N Note 23	N Note 23	N Note 23
1-FCV-63-47 / 6" SIP 1A Suct Isol	Y	Y	Y	N Note 24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-48 / 6" SIP 1B Suct Isol	Y	Y	Y	N Note 24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-72 / 18" Cont Sump to RHRP 1A Isol	Y	Y	Y	Y	N	N	N	Y Note 25	—	—	—	—	—	—	—	N Note 26	N Note 26	N Note 26	N Note 26	N Note 26
1-FCV-63-73 / 18" Cont Sump to RHRP 1B Isol	Y	Y	Y	Y	N	N	N	Y Note 25	—	—	—	—	—	—	—	N Note 26	N Note 26	N Note 26	N Note 26	N Note 26
1-FCV-63-93 / 8" RHR to CL 2 & 3 Inj Isol	Y	Y	Y	N Note 27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-94 / 8" RHR to CL 1 & 4 Inj Isol	Y	Y	Y	N Note 27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-152 / 4" SIP 1A CL Inj Isol	Y	Y	Y	N Note 28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not susceptible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-63-153 / 4" SIP 1B CL Inj Isol	Y	Y	Y	N Note 28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-63-156 / 4" SIP 1A to HL 1 & 3 Inj. Isol	Y	Y	Y	Y	N	N	N	Y Note 29	—	—	—	—	—	—	—	N Note 30	N Note 30	N Note 30	N Note 30	N Note 30
1-FCV-63-157 / 4" SIP 1A to HL 2 & 4 Inj. Isol	Y	Y	Y	Y	N	N	N	Y Note 29	—	—	—	—	—	—	—	N Note 30	N Note 30	N Note 30	N Note 30	N Note 30
1-FCV-63-172 / 12" RHR to HL 1 & 3 Inj Isol	Y	Y	Y	Y	N	N	N	Y Note 31	—	—	—	—	—	—	—	N Note 32	N Note 32	N Note 32	N Note 32	N Note 32
1-FCV-68-332 / 3" Press PORV Block Valve	Y	Y	Y	Y	N	N	N	N	—	N Note 52	N Note 52	N Note 33	N Note 33	N Note 33	N Note 33	N Note 34	N Note 34	N Note 34	N Note 34	N Note 34
1-FCV-68-333 / 3" Press PORV Block Valve	Y	Y	Y	Y	N	N	N	N	—	N Note 52	N Note 52	N Note 33	N Note 33	N Note 33	N Note 33	N Note 34	N Note 34	N Note 34	N Note 34	N Note 34
1-FCV 70-87 / 3" RCP Thermal Barrier CCS Return	Y	Y	N Note 35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable. (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept-ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-70-90 / 3" RCP Thermal Barrier CCS Return	Y	Y	N Note 35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-70-133 / 3" RCP Thermal Barrier CCS Supply	Y	Y	N Note 35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-70-134 / 3" RCP Thermal Barrier CCS Supply	Y	Y	N Note 35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-70-183 / 3" Sample HX CCS Outlet	Y	Y	N Note 36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-70-215 / 3" Sample HX CCS Inlet	Y	Y	N Note 36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-72-2 / 10" Cntmt Spray Hdr B Isol	Y	Y	Y	Y	N	N	N	N	—	**Y Calc Note 37**	N	N Note 38	N Note 38	N Note 38	N Note 38	N Note 39	N Note 39	N Note 39	N Note 39	N Note 39
1-FCV-72-21 / 12" RWST to Cntmt Spray Pmp 1B Suct	Y	Y	Y	N Note 40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable		If NO to Either, then the valve is not applicable (See General Note 3)		If Yes, then the valve is NA for PL.	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept -tble to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-72-22 / 12" RWST to Cntmt Spray Pmp 1A Suct	Y	Y	Y	N Note 40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-72-39 / 10" Cntmt Spray Hdr A Isol	Y	Y	Y	Y	N	N	N	N	—	**Y Calc Note 37**	N	N Note 38	N Note 38	N Note 38	N Note 38	N Note 39	N Note 39	N Note 39	N Note 39	N Note 39
1-FCV-72-40 / 8" RHR Spray Hdr A Isol	Y	Y	Y	Y	N	N	N	Y Note 41	—	—	—	—	—	—	—	N Note 42	N Note 42	N Note 42	N Note 42	N Note 42
1-FCV-72-41 / 8" RHR Spray Hdr B Isol	Y	Y	Y	Y	N	N	N	Y Note 41	—	—	—	—	—	—	—	N Note 42	N Note 42	N Note 42	N Note 42	N Note 42
1-FCV-72-44 / 12" Cntmt Sump to CS Pmp 1A Suct	Y	Y	Y	Y	N	N	N	Y Note 43	—	—	—	—	—	—	—	N Note 44	N Note 44	N Note 44	N Note 44	N Note 44
1-FCV-72-45 / 12" Cntmt Sump to CS Pmp 1B Suct	Y	Y	Y	Y	N	N	N	Y Note 43	—	—	—	—	—	—	—	N Note 44	N Note 44	N Note 44	N Note 44	N Note 44
1-FCV-74-1 / 14" HL #4 to RHR Suct	Y	Y	Y	Y	N	N	N	Y Note 45	—	—	—	—	—	—	—	N Note 46	N Note 46	N Note 46	N Note 46	N Note 46
1-FCV-74-2 / 14" HL #4 to RHR Suct	Y	Y	Y	Y	N	N	N	Y Note 45	—	—	—	—	—	—	—	N Note 46	N Note 46	N Note 46	N Note 46	N Note 46

ATTACHMENT 2
WATTS BAR PLTB EVALUATION MATRIX
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

	INITIAL SCREENING TO ELIMINATE ALL NON-APPLICABLE VALVES							COMPONENT LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES		SYSTEM LEVEL SCREENING TO ELIMINATE NON-SUSCEPTIBLE VALVES										
	1.a	1.b	2.a	2.a.i	3.a	4.a	4.b	5.a	6.0	7A.a	7A.b	7B.a	7B.b	7B.c	7B.d	8A.a	8A.b	8A.c	8B.a	8B.b
VALVE UNID/SIZE FUNCTION	If NO to Both, then the valve is not applicable.		If NO to Either, then the valve is not applicable (See General Note 3)		If Yes, then the valve is NA for Pt	If YES to ANY, then the valve is considered NA for TB.		If YES, the vlv is not suscept -ible to PL.	No Crit.	If NO to ALL, then the valve is not susceptible to PL due to Hydraulic Effects.		If NO to ALL, then the valve is not susceptible to PL due to Thermal Effects.				If NO to All, then the valve is not susceptible to TB due to the Wedge Effect.			If No to ALL, then the valve is not susceptible to TB due to the Stem Effect.	
1-FCV-74-3 / 14" RHR Pmp 1A Suction	Y	Y	Y	N Note 47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-74-8 / 10" HL #4 to RHR Suct.-74-2 Bypass	Y	Y	Y	Y	N	N	N	Y Note 45	—	—	—	—	—	—	—	N Note 46	N Note 46	N Note 46	N Note 46	N Note 46
1-FCV-74-9 / 10" HL #4 to RHR Suct.-74-1 Bypass	Y	Y	Y	Y	N	N	N	Y Note 45	—	—	—	—	—	—	—	N Note 46	N Note 46	N Note 46	N Note 46	N Note 46
1-FCV-74-21 / 14" RHR Pmp 1B Suction	Y	Y	Y	N Note 47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1-FCV-74-33 / 8" RHR HX 1A Outlet Crosstie	Y	Y	Y	Y	N	N	N	Y Note 48	—	—	—	—	—	—	—	N Note 49	N Note 49	N Note 49	N Note 49	N Note 49
1-FCV-74-35 / 8" RHR HX 1B Outlet Crosstie	Y	Y	Y	Y	N	N	N	Y Note 48	—	—	—	—	—	—	—	N Note 49	N Note 49	N Note 49	N Note 49	N Note 49

ATTACHMENT 3
WATTS BAR PLTB EVALUATION MATRIX NOTES
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

GENERAL NOTES

1. All valves within the scope of the NRC GL 95-07 evaluation have discs of the flexible wedge design, except as follows. 1-FCV-3-116A, -116B, -126A, & -126B are solid wedge gate valves per drawings 1-47A8910-03-05, -06, -07, & -08 respectively. 1-FCV-70-133, -134, & -183 are solid wedge gate valves per vendor valve drawing SA-2117-3 Rev. 1, contract 83015.

2. All valves within the scope of the NRC GL 95-07 evaluation are manufactured by Westinghouse with the following exceptions:
   (a) 1-FCV-1-15, -1-16, -1-17, & -1-18, -3-33, -3-47, -3-87, -3-100, -3-116A, -3-116B, -3-126A, -3-126B, -3-136A, -3-136B, -3-179A, -3-179B, 70-87, -70-90, -70-133, -70-134, & -70-183 are manufactured by Walworth.
   (b) 1-FCV-26-240, -26-241, -26-242, -26-243, -26-244, & -26-245 are manufactured by Anchor Darling.
   (c) 1-FCV-70-215 is manufactured by Borg Warner.

3. The criteria question for entry 2.a of the Evaluation Matrix is "Does the valve have a safety-related function to OPEN?" A "Yes" response is also entered at 2.a for valves having a safety function position of [already] OPEN at initiation of accident.
   For any valve having a required safety position of [already] OPEN at accident initiation, a "No" response is entered at 2.a.i when closure is only required for performance of surveillance testing and the surveillance instruction ensures that the applicable Tech Spec LCO will be followed while the valve is closed.

EVALUATION SPECIFIC NOTES

1. 1-FCV-1-15 is normally open (NO). Its safety position at initiation of an accident is open to supply steam from steam generator no. 1 to the turbine driven auxiliary feedwater pump (TDAFW), and its only active valve stroke is to close in the event of a main steam line break from steam generator number 1. The only time 1-FCV-1-15 is positioned closed during normal operation is to perform ASME, Section XI stroke testing. Surveillance Instruction 1-SI-1-901, Appendix E ensures that Tech Spec LCO 3.7.5 will be followed while 1-FCV-1-15 is closed and that the valve will be returned to its as-found position. No further evaluation or action is required for 1-FCV-1-15. This approach satisfies the scope requirements of NRC GL 95-07 as presented at the October 24,1995 Region II Public Workshop on GL 95-07.

2. 1-FCV-1-17 & -18 are NO. Their safety position at initiation of an accident is open to supply steam from steam generator no. 1 to the TDAFW, and their only active valve stroke is to close in the event of a steam supply line break downstream of the subject valves. The only time 1-FCV-1-17 & -18 are positioned closed is during performance of ASME, Section XI stroke testing. Because this testing completely isolates the TDAFW from its steam source, the test is only performed during cold shutdown conditions in accordance with Alternative Frequency Justification AF-02 described in Attachment 1 of SSP-8.06. Since the subject valves are NO and they are not closed in modes when the steam supply is required for accident mitigation no further evaluation or action is required.

3. 1-FCV-3-33, -47, -87, & -100 are normally open, but have no accident mitigation function in the open position. They close immediately upon receipt of a feedwater isolation signal to isolate the non-safety grade normal feedwater flowpath. Therefore no further evaluation or action is required for 1-FCV-3-33, -47, -87, & -100.

4. 1-FCV-3-116A, -116B, -126A, & -126B are solid wedge gate valves per drawings 1-47A8910-03-05, -06, -07, & -08 respectively such that these valves are not susceptible to pressure locking.

5. The maximum system operating temperature that valves 1-FCV-3-116A, -116B, -126A, & -126B ever experience is 120 °F per operating mode calculation HCG-HHC-091886. The maximum environmental temperature in the vicinity of the valves is 120 °F for a RHR line break per environmental temperature drawings 47E235-52 R4, -53 R4, -54 R3, & -55 R4. Since the normal environmental temperature is 80 °F, and a ΔT of

50 °F is required to produce thermal binding in solid wedge valves, the subject valves are not susceptible to thermal binding. I.E., (80 + 50 = 130 °F) > 120 °F. Therefore no further evaluation or action is required for 1-FCV-3-116A, -116B, -126A, & -126B with respect to thermal binding.

6. The maximum expected operating pressure on either the upstream or downstream side of valves 1-FCV-3-136A,-136B, -179A, & -179B is 35 psig per the applicable Generic Letter 89-10 calculations. The source of pressurization for this piping is either the condensate storage tank or the ERCW return headers. Pressure locking is not a concern at these low operating pressures. Note that the 89-10 calculations have demonstrated the capability of these valves to open against the maximum expected differential pressure. These calculations will ensure the subject valves will open with the maximum upstream or downstream pressure trapped in the bonnet. Even if the piping connected to these valves were to break and become depressurized prior to valve actuation, this would constitute the single failure and the associated valve would not be required to open anyway.
Therefore, no further evaluation or action is required for 1-FCV-3-136A,-136B, -179A, & -179B for pressure locking due to hydraulic effects.

7. Pressure locking due to entrapment of steam condensate in the bonnet of valves 1-FCV-3-136A, -136B, -179A, & -179B can not occur since the valves are not contained in steam systems. Pressure locking due to exposure to hot fluid in the attached piping is also not credible because the flowpath through the valves can only be supplied from the condensate storage tank or the ERCW return headers. The maximum operating temperature for this piping is 120 °F per operating mode calculation HCG-HHC-091886 R3 - well below the temperature range which can produce pressure locking. The only time the subject valves are exposed to greater than normal ambient temperature swings is after a steam supply line break inside the TDAFW pump rooms. If this high energy line break (HELB) were to occur, there would be no requirement to open ERCW return header valves 1-FCV-3-136A, -136B, -179A, & -179B because no other design basis accident which would require the TDAFW is required to be postulated concurrent with this HELB. Therefore, no further evaluation or action is required for 1-FCV-3-136A, -136B, -179A, & -179B for pressure locking due to thermal effects.

8. The maximum post-accident temperature inside the TDAFW pump rooms is 126 °F per environmental data drawing 47E235-68 R4. Since the normal environmental temperature is 80 °F, and a ΔT of 100 °F is required to produce thermal binding in flex wedge valves, the subject valves are not susceptible to thermal binding. I.E., (80+ 100= 180 °F) > 126 °F. The 215 °F environmental temperature associated with the HELB of a steam supply line break inside the TDAFW pump room does not require consideration because no other design basis accidents are required to be postulated concurrent with this HELB. Therefore no further evaluation or action is required for 1-FCV-3-136A, -136B, -179A, & -179B with respect to thermal binding.

9. 1-FCV-26-240 & -243 are containment isolation valves that have a safety related function to close only. These valves have no safety related function to open. Their normal position, whether open or closed, prior to an accident is not a safety concern. Therefore, no further pressure locking or thermal binding evaluation is required for 1-FCV-26-240 & -243 within the scope of NRC GL 95-07.

10. 1-FCV-26-241, -242, -244, &-245 no longer have a safety-related function to close per Table 9.9 of system description N3-26-4002, as revised by DCN M-36871-A. Therefore these valves are no longer within the scope of NRC GL 95-07.

11. 1-FCV-62-61 & 63 are containment isolation valves that have a safety related function to close only. These valves have no safety related function to open for design basis accident mitigation purposes. Therefore, no further pressure locking or thermal binding evaluation is required for 1-FCV-61 & -63 within the scope of NRC GL 95-07.

12. 1-FCV-62-90 & -91 are the normal charging header isolation valves that have a safety related function to close upon receipt of a safety injection signal. These valves have no safety related function to open for design basis

accident mitigation purposes. Therefore, no further pressure locking or thermal binding evaluation is required for 1-FCV-90 & -91 within the scope of NRC GL 95-07.

13. 1-LCV-62-132 & -133 are the volume control tank outlet isolation valves that have a safety related function to close upon receipt of a safety injection signal. These valves have no safety related function to open for design basis accident mitigation purposes. Therefore, no further pressure locking or thermal binding evaluation is required for 1-LCV-132 & -133 within the scope of NRC GL 95-07.

14. 1-LCV-62-135 & -136 open upon receipt of a safety injection signal to realign the suction of the centrifugal charging pumps from the volume control tank (VCT) to the refueling water storage tank (RWST). Per the applicable GL 89-10 calculations, EPM-DCB-082592 R4 and EPM-DCB-082692 R4, the maximum pressure on the VCT side of these valves is 80/84 psig and the maximum pressure on the RWST side is 26/29 psig for 1-LCV-62-135 & -136 respectively. These pressures are well below that which would be expected to produce pressure locking. However, it should be noted that postulation of a passive pipe failure just prior to the safety injection signal would be required to trap either the 80/84 or 26/29 psig pressure in the bonnet. This failure is not required to be postulated in the injection mode following a safety injection per the single failure criteria (Ref: WB-DC-40-64 R2). Therefore, no further evaluation for pressure locking due to hydraulic effects is required.

15. The valve stems for 1-LCV-62-135 & -136 are oriented vertical and the potential to trap steam condensate in the bonnet does not exist. The centrifugal charging pump (CCP) suction piping can experience temperature fluctuations between the 127 °F VCT temperature and the 80 °F normal environmental temperature as the CCP suction flowpath potentially alternates between the VCT and the boric acid transfer pumps. However 1-LCV-62-135 & -136 are physically separated from the CCP suction piping by approximately 27 ft of 8-inch pipe containing stagnant water. This length of stagnant piping isolates the valves from system temperature fluctuations that could lead to thermally induced pressure locking. Based on environmental data drawings 47E235-66 R4 & -67 R3 the maximum temperature due to applicable high energy line breaks (AFW, CVCS, & RHR) is 110 °F. The HELB line break temperature is only 6 °F greater than the maximum normal environmental temperature. This 6 °F temperature increase is insignificant and less severe than normal ambient temperature swings. Therefore, no further evaluation for pressure locking due to thermal effects is required.

16. The temperature swings discussed in note 15 for 1-LCV-62-135 & -136 will result in a ΔT of less than 100 °F for these flex wedge valves. Therefore no further evaluation is required with respect to thermal binding.

17. 1-FCV-63-1 is normally open (NO). Its safety position at initiation of an accident is open to supply suction to the RHR pumps from the RWST, and its only active valve stroke is to close during the swapover process from the RWST to the containment sump. The only time 1-FCV-63-1 is positioned closed during normal operation is to perform ASME, Section XI stroke testing. Because this testing completely isolates both trains of RHR from the RWST, the test is only performed during cold shutdown conditions in accordance with Alternative Frequency Justification AF-19 described in Attachment 1 of SSP-8.06. Since the subject valve is NO and is not closed in modes when RHR injection from RWST is required for accident mitigation, no further evaluation or action is required.
Note that the Safety Injection System Description N3-63-4001 R5, section 5.1 explains that RHR pump injection from the RWST is not required for mitigation of a Mode 4 LOCA. The RHR pumps are only required to supply a suction source for the high pressure injection pumps (in the piggyback alignment) following a Mode 4 LOCA. This approach eliminates the need to demonstrate that FCV-63-1 can open following a Mode 4 LOCA should normal RHR system operating pressure become trapped in the bonnet.

18. 1-FCV-63-5 is normally open (NO). Its safety position at initiation of an accident is open to supply suction to the Safety Injection Pumps (SIPs) from the RWST, and its only active valve stroke is to close during the swapover process from the RWST to the containment sump. The only time 1-FCV-63-5 is positioned closed during normal operation is to perform ASME, Section XI stroke testing. Because this testing completely isolates both trains of SIPs from the RWST, the test is only performed during cold shutdown conditions in

accordance with Alternative Frequency Justification AF-19 described in Attachment 1 of SSP-8.06. Since the subject valve is NO and is not closed in modes when SIP injection from RWST is required for accident mitigation, no further evaluation or action is required.

19. 1-FCV-63-6, & -7 are closed cold. The possibility does exist for these valves to be heated by the post-LOCA or post-HELB environment in the pipe chase, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

20. A hole has been drilled in the upstream disc of 1-FCV-63-8 and -11 to eliminate the possibility for pressure locking. Ref. N3-63-4001 R5, section 3.2.5.3

21. 1-FCV-63-8, &-11 are closed cold. The possibility does exist for these valves to be heated by the post-LOCA or post-HELB environment in the pipe chase, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding

22. 1-FCV-62-25 & -26 open immediately upon receipt of a safety injection signal such that the valves do not have time to heat up from the surrounding environment. Therefore, no further consideration for PL due to thermal effects is required.

23. 1-FCV-63-25 & -26 are closed cold. No system or plant operating condition exists in which they could be closed hot and then cooled down.

24. 1-FCV-63-47 & -48 are normally open (NO). Their safety position at initiation of an accident is open to supply suction to the Safety Injection Pumps (SIPs) from the RWST, and their only active valve stroke is to close in the event of a single SIP train failure. The only time 1-FCV-63-47 & -48 are positioned closed during normal operation is to perform ASME, Section XI stroke testing. Surveillance Instructions 1-SI-63-902-A, App C and -902-B, App B ensure that Tech Spec LCO 3.5.2 will be followed while 1-FCV-63-47 & -48 are closed and that the valves will be returned to their as-found position. No further evaluation or action is required for 1-FCV-63-47 & -48. This approach satisfies the scope requirements of NRC GL 95-07 as presented at the October 24,1995 Region II Public Workshop on GL 95-07.

25. An external bypass has been installed on the bonnets for 1-FCV-63-72 & -73 to eliminate the possibility for pressure locking. Ref. N3-63-4001 R5, section 3.2.4.8.

26. 1-FCV-63-72, & -73 are closed cold. The possibility does exist for these valves to be heated on the upstream side by the in-rushing water from the containment sump following a LOCA, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

27. 1-FCV-63-93 & -94 are normally open (NO). Their safety position at initiation of an accident is open to provide a flowpath from the RHR pumps to the cold legs, and their only active valve stroke is to close during the transition from cold leg to hot leg recirculation. The only time 1-FCV-63-93 & -94 are positioned closed is for normal RHR system operation during normal modes 4,5, or 6 or to perform ASME, Section XI stroke testing. Because closure of either valve isolates the low safety injection flowpath to two of the four cold legs, the Sect XI test is only performed during cold shutdown conditions in accordance with Alternative Frequency Justification AF-26 described in Attachment 1 of SSP-8.06. Since the subject valves are NO and are not closed in modes when RHR cold leg injection is required for accident mitigation, no further evaluation or action is required. Note that the Safety Injection System Description N3-63-4001, section 5.1 explains that RHR pump injection from the RWST is not required for mitigation of a Mode 4 LOCA. The RHR pumps are only required to supply the suction source for the high pressure injection pumps (in the piggyback alignment) following a Mode 4 LOCA. This approach eliminates the need to demonstrate that FCV-63-93 & -94 can open following a Mode 4 LOCA should normal RHR system operating pressure become trapped in these valve's bonnets.

ATTACHMENT 3
WATTS BAR PLTB EVALUATION MATRIX NOTES
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

28. 1-FCV-63-152 & -153 are normally open (NO). Their safety position at initiation of an accident is open to provide a flowpath from the SIPs to the cold legs, and their only active valve stroke is to close during the transition from cold leg to hot leg recirculation. The only time 1-FCV-63-152 & -153 are positioned closed during normal operation is to perform ASME, Section XI stroke testing. Surveillance Instructions 1-SI-63-902-A, App F and -902-B, App D ensure that Tech Spec LCO 3.5.2 will be followed while 1-FCV-63-152 & -153 are closed and that the valves will be returned to their as-found position. No further evaluation or action is required for 1-FCV-63-152 & -153. This approach satisfies the scope requirements of NRC GL 95-07 as presented at the October 24,1995 Region II Public Workshop on GL 95-07.

29. A hole has been drilled in the downstream disc of 1 FCV-63-156 and -157 to eliminate the possibility for pressure locking. Ref. N3-63-4001 R5, section 3.2.2.7

30. 1-FCV-63-156, & -157 are closed cold. The possibility does exist for these valves to be heated by the post-LOCA environment in the pipe chase prior to the transition from cold to hot leg recirculation during which the valves are required to be opened, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

31. An external bypass has been installed on the bonnets for 1-FCV-63-172 to eliminate the possibility for pressure locking. Ref. N3-63-4001 R5, section 3.2.4.10.

32. 1-FCV-63-172 is closed cold. The possibility does exist for the valve to be heated by the post-LOCA environment in the pipe chase prior to the transition from cold to hot leg recirculation during which the valve is required to be opened, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

33. The safety function of 1-FCV-68-332 & -333 is to close if one of the pressurizer PORVs leak. A PORV which may have been closed at normal operating pressurizer temperature may require reopening prior to entry into Mode 4 for the Cold Overpressure Mitigation System (COMS). This will subject the valve to a hot-to-cold ΔT which must be addressed relative to thermal binding (See Note 34), but a hot-to-cold ΔT will not produce pressure locking conditions in the valve bonnet.

34. Paragraph 3.2.6.1 of System Description N3-68-4001 contains the requirement that if a upstream block valve is used to isolate the PORV in the event of leakage, then the block valve shall be stroked open/closed at pressurizer temperatures of 550 °F and 450 °F during reactor cooldown to Mode 4. These actions will assure that the upstream block valve remains operable for COMS, if necessary, and thermal binding does not occur. Note that the open/close valve strokes at 550 °F and 450 °F assure that the valves are not susceptible to thermal binding by preventing them from experiencing temperature gradients of > 100 °F. Westinghouse Owners Group work in the area of thermal binding has demonstrated that flex wedge gate valves are not susceptible to thermal binding unless they are subjected to a thermal gradient of >100 °F.

35. 1-FCV-70-87, -90, -133, & -134 are containment isolation valves that have a safety related function to close only. These valves have no safety related function to open for design basis accident mitigation purposes. Therefore, no further pressure locking or thermal binding evaluation is required for these valves within the scope of NRC GL 95-07.

36. 1-FCV-70-183, & -215 have a safety related function to close to isolate the non-safety related sample heat exchanger piping from the safety related portions of the component cooling system. These valves have no safety related function to open for design basis accident mitigation purposes. Therefore, no further pressure locking or thermal binding evaluation is required for these valves within the scope of NRC GL 95-07.

37. The highest pressure that 1-FCV-72-2 & -39 could ever be exposed to is the dead head pressure from a containment spray (CS) pump. This could only occur if the CS pump is inadvertently started for surveillance testing without first opening the isolation valve (72-503 or -504) in the full flow test header to the RWST. If this

scenario were to occur and then a LOCA or MSLB were to subsequently occur, the CS pump would start after receipt of the "Hi-Hi" containment pressure signal. After 3-5 seconds the CS pump would come up to dead head conditions, thereby duplicating the test scenario, and allow the valve to open. However to address the fact that the pump receives the start signal at the same time the valves receive the open signal, a pressure locking evaluation for 1-FCV-72-2 & -39 using the Commonwealth Edison Model has been performed. The evaluation addresses CS pump deadhead pressure trapped in the bonnet at the time these valves are required to open upon receipt of a Hi-Hi Containment Pressure signal. The evaluation demonstrates that the capability of the valve actuator exceeds the thrust required to unseat the valve with an available margin of greater than 20 %. Therefore, no modification are required.

38. The environmental temperature in the El 676 pipe chase where 1-FCV-72-2 & -39 are located rises to a maximum of 115 °F following a LOCA or HELB inside containment. As noted on environmental drawing 47E235-56 R4, the 115 °F temperature occurs as a result of internally generated heat loads from equipment operating in the pipe chase rather than heat transmission from containment. A LOCA or inside containment HELB having a severity which, in the long term, results in a pipe chase temperature increase will initiate start of the CS system, in the short term. I.E., a LOCA or HELB inside containment will initiate the "Hi-Hi" containment pressure signal and open 1-FCV-72-2 & -39 before the pipe chase environmental temperature begins to rise. Note also that the environmental temperature in the pipe chase can rise to 215 °F after a RHR line break and to 180 °F after a CVCS line break. However, a LOCA or inside containment HELB which would require CS system operation does not have to be postulated concurrent with the RHR and CVCS HELBs inside the Auxiliary Building.
Therefore, no further evaluation or action is required for 1-FCV-72-2 & -39 for pressure locking due to thermal effects.

39. 1-FCV-72-2 & -39 are closed cold. As explained in note 38, these valves will be opened before they experience any form of temperature transient. Therefore, no further evaluation with respect to thermal binding is required for these valves.

40. 1-FCV-72-21 & -22 are normally open (NO). Their safety position at initiation of an accident is open to supply suction to the CS Pumps from the RWST, and their only active valve stroke is to close during the swapover process from the RWST to the containment sump. The only time 1-FCV-72-21 & -22 are positioned closed during normal operation is to perform ASME, Section XI stroke testing. Surveillance Instructions 1-SI-72-902-A, App A and -902-B, App A ensure that Tech Spec LCO 3.6.6 will be followed while 1-FCV-72-21 & -22 are closed and that the valves will be returned to their as-found position. No further evaluation or action is required for 1-FCV-72-21 & -22. This approach satisfies the scope requirements of NRC GL 95-07 as presented at the October 24,1995 Region II Public Workshop on GL 95-07.

41. A bonnet bypass has been added to 1-FCV-72-40 & -41 to eliminate the possibility for pressure locking. Ref. N3-72-4001 R5, section 3.2.3.1.2.

42. 1-FCV-72-40 & -41 are closed cold. The possibility does exist for these valves to be heated by the post-LOCA environment in the pipe chase or the containment sump water (150 °F max) that flows through the Tee connected immediately below these valves, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

43. An external bypass has been installed on the bonnets for 1-FCV-72-44 & -45 to eliminate the possibility for pressure locking. Ref. N3-72-4001 R5, section 3.2.3.1.4.

44. 1-FCV-72-44 & -45 are closed cold. The possibility does exist for these valves to be heated on the upstream side by the in-rushing water from the containment sump following a LOCA, but temperature transients from cold to hot have not been identified as a cause for gate valve thermal binding.

ATTACHMENT 3
WATTS BAR PLTB EVALUATION MATRIX NOTES
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

45. A hole has been drilled in the upstream disc of 1-FCV-74-1, -2, -8, & -9 to eliminate the possibility for pressure locking. Ref. N3-74-4001 R4, sections 3.2.3.1.1 and 3.2.3.1.2.

46. 1-FCV-74-1, -2, -8, & -9 will be closed during plant startup when reactor coolant system (RCS) reaches 212 °F (Ref. General Operating Instruction GO-1). The valves remain closed during Modes 1, 2, & 3. The valves are then reopened at an RCS temperature of < 350 °F to initiate Mode 4 cooldown. Valve FCV-74-1 is the closest of the four valves to the RCS, but even it is located 16 feet from the RCS in a stagnant line. Conservatively assuming that 1-FCV-74-1, -2, -8, & -9 are in thermal equilibrium with the 350 °F RCS temperature, it can be seen that the valves were closed at 212 °F and then reopened at 350 °F. This is a cold-to-hot transient which does not produce thermal binding. Conversely assuming that the valves cool down to the 115 °F (Ref. 47E235-42 R7) normal average ambient temperature inside lower containment, then the valves would have been closed at 212 °F and then reopened at 115 °F. This results in a 97 °F ΔT transient between hot closure and cold opening. Westinghouse Owners Group work in the area of thermal binding has demonstrated that flex wedge gate valves are not susceptible to thermal binding unless they are subjected to a thermal gradient of >100 °F. Therefore, no further evaluation or action is required for 1-FCV-74-1, -2, -8, & -9 with respect to thermal binding.

47. 1-FCV-74-3 & -21 are normally open (NO). Their safety position at initiation of an accident is open to supply suction to the RHR Pumps from the RWST, and their only active valve stroke is to close during the swapover process from the RWST to the containment sump. The only time 1-FCV-74-3 & -21 are positioned closed during normal operation is to perform ASME, Section XI stroke testing. Section 3.0, "Precautions and Limitations", of Surveillance Instructions 1-SI-74-902-A & -902-B ensure that the appropriate Tech Spec LCOs will be followed while 1-FCV-74-3 & -21 are closed and that the valves will be returned to their as-found position. No further evaluation or action is required for 1-FCV-74-3 & -21. This approach satisfies the scope requirements of NRC GL 95-07 as presented at the October 24,1995 Region II Public Workshop on GL 95-07.

48. A hole has been drilled in the upstream disc of 1-FCV-74-33 & -35 to eliminate the possibility for pressure locking (ref. N3-74-4001 R4, section 3.2.3.1.7).

49. 1-FCV-74-33 & -35 are positioned open upon entry into Mode 3. This will assure the valves are in their safety position to mitigate an accident in Modes 1, 2, or 3. The valves are required to be open during the injection phase following a LOCA or MSLB to assure a flowpath to all four cold legs in the event of a single active RHR train failure. The valves are closed by operator action for cold leg recirculation to provide the separation required for passive failure protection. The maximum temperature at which the valves would be closed is the post LOCA RHR heat exchanger discharge temperature of 150 °F. 1-FCV-74-33 is opened to align RHRP A-A for hot leg recirculation. 1-FCV-74-35 is opened to align RHRP B-B for hot leg recirculation. Westinghouse Owners Group work in the area of thermal binding has demonstrated that flex wedge gate valves are not susceptible to thermal binding unless they are subjected to a thermal gradient of >100 °F. To produce a hot-to-cold thermal gradient of 100 °F, the post accident RHR heat exchanger discharge temperature would have to go down to 50 °F. Since the Component Cooling System does not have the capability to do this, a hot-to-cold thermal gradient of 100 °F is not possible and no further evaluation or action for thermal binding is required for 1-FCV-74-33 & -35.
Note that the Safety Injection System Description N3-63-4001, section 5.1 explains that RHR pump injection from the RWST is not required for mitigation of a Mode 4 LOCA. The RHR pumps are only required to supply the suction source for the high pressure injection pumps (in the piggyback alignment) following a Mode 4 LOCA. Based on this Mode 4 LOCA mitigation approach, the need to evaluate 1-FCV-74-33 & -35 for thermal binding during Mode 4 plant operating conditions is not necessary. However, the following evaluation of the valves for thermal binding during Mode 4 conditions is presented for completeness. 1-FCV-74-33 or -35 may require closure during Mode 4 to isolate an operating train while performing maintenance on the non-operating train. If closure of either of the valves becomes necessary during Mode 4, they are sufficiently isolated by stagnant piping (10 pipe diameters or more) that they would be closed at ambient temperature rather than the temperature of the operating RHR system and the ΔT necessary to produce thermal binding can not occur.

ATTACHMENT 3
WATTS BAR PLTB EVALUATION MATRIX NOTES
BASED ON THE WOG VALVE CATEGORIZATION CRITERIA

50. Not Used.

51. 1-FCV-63-6 & -7 are normally closed and are closed cold. Their safety function is to open during the post-LOCA swapover sequence between the RWST and the containment sump. Therefore, the potential to develop a hot-to-cold temperature gradient on these valves does not exist and no further consideration for thermal binding is required.

52. As explained in note 34, the potential exists to close 1-FCV-68-332 or -333 at the normal operating pressurizer temperature of 652.7 °F (Ref. Westinghouse Process Flow Diagram 1188E75, sheet 2, R2, contract 54114-1) and then reopen/close them at 550 °F and 450 °F. This could possibly result in saturated steam at 652.7 °F and 2235 psig becoming trapped in the bonnet. However, the bonnet would then be cooled by the surrounding environment which has a normal average operating temperature of 150 °F per drawing 47E235-42 R7. As the bonnet is being cooled by the surrounding environment, the pressurizer temperature is being reduced by a maximum of 100 °F/hour. This provides 1 hour for the bonnet, initially filled with steam, to give up its heat, condense out the steam and drop pressure below the next required open stroke at the saturation pressure associated with 550 °F. Since neither the valve or bonnet is insulated and no source of bonnet heating exists after the valve is closed, it is clear that the bonnet pressure will drop faster than the controlled pressure/temperature reduction of the pressurizer itself.

53. A pressure locking evaluation for 1-FCV-1-16 using the Commonwealth Edison Model has been performed for the condition in which a main feedwater line break for steam generator 1 drops the steam line pressure from steam generator 4. The evaluation demonstrates that the capability of the valve actuator exceeds the thrust required to unseat the valve such that no modification is required. However to achieve the WOG recommended 20 % margin, a modification will be implemented during a future outage to eliminate the possibility for trapping pressure in the bonnet.

54. 1-FCV-1-16 will not experience a hot-to-cold ΔT from hot closure at normal operating main steam line temperature versus its temperature when required to open for accident mitigation. However, the valve may experience a hot-to-cold temperature transient during surveillance testing if the testing is performed during shutdown conditions. Note that this is not a safety concern since the valve has no safety function once the valve is closed for shutdown.

55. 1-LCV-62-135 & -136 are not expected to experience bonnet pressures in excess of normal operating as explained in note 14. However a pressure locking evaluation using the Commonwealth Edison Model has been performed for the highly unlikely case of the setpoint pressure of the relief valve which protects the segment becoming trapped in the bonnet. The evaluation demonstrates that the capability of the valve actuator exceeds the thrust required to unseat the valve with an available margin of greater than the 20 %. Therefore, no modifications are required.

56 A pressure locking evaluation for 1-FCV-63-6 & -7 using the Commonwealth Edison Model has been performed. The evaluation addresses the case of the setpoint pressure of the relief valve which protects the segment becoming trapped in the bonnet. The evaluation demonstrates that the capability of the valve actuator exceeds the thrust required to unseat the valve with an available margin of greater than the 20 %. Therefore, no modifications are required.

57. A pressure locking evaluation for 1-FCV-63-25 & -26 using the Commonwealth Edison Model has been performed. The evaluation addresses the case of the setpoint pressure of the relief valve which protects the segment becoming trapped in the bonnet at the time these valves are required to open upon receipt of a safety injection signal. The evaluation demonstrates that the capability of the valve actuator exceeds the thrust required to unseat the valve with an available margin of greater than the 20 %. Therefore, no modifications are required.

ENCLOSURE 2

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY, SEQUOYAH, AND WATTS BAR NUCLEAR PLANTS

GENERIC LETTER 95-07, SUPPLEMENTAL RESPONSE
"PRESSURE LOCKING AND THERMAL BINDING OF SAFETY-RELATED
POWER-OPERATED GATE VALVES"

BROWNS FERRY COMMITMENT

BFN plant procedures for the High Pressure Coolant Injection (HPCI) system will be revised by July 1, 1996, to stroke each HPCI steam admission valve during cool down of the system following testing or following shutdown of the system.