



**ENTERGY**

Entergy Operations, Inc.  
River Bend Station  
5485 U.S. Highway 61  
P.O. Box 220  
St. Francisville, LA 70775  
Tel 504 336 6225  
Fax 504 635 5068

**James J. Fisicaro**  
Director  
Nuclear Safety

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U.S. Nuclear Regulatory Commission  
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Subject: River Bend Station - Unit 1  
Docket No. 50-458  
Revision of Station Blackout Documents

File No. ~~C9.3.~~ C9.23.2

RBG-42060  
RBF1-95-0230

Gentlemen:

The attached information is being provided as a result of requests from your staff made during the River Bend Station (RBS) Engineering and Technical Support Inspection (95-10). This inspection was conducted from March 20-24, April 3-7, and April 21, 1995.

Attachment 1 provides a revision summary for the RBS Station Blackout (SBO) Analysis previously submitted October 18, 1991. The current revision accounts for additional heat load in the prediction of the Reactor Core Isolation Cooling (RCIC) room maximum 4-hour temperature during station blackout. This revision assumes the loss of the RCIC pump turbine gland steam seal. The analysis concluded that the revised 4-hour room temperature and the current design are acceptable. In addition, the containment isolation valve exclusion analysis list, Tables F.1 and F.2, are provided as Attachment 2 and 3, respectively. These lists were inadvertently omitted from the original submittal. Attachment 4 describes a change recently made to the penetration exclusion criteria for selected penetrations.

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Revision of Station Blackout Documents

October 17, 1995

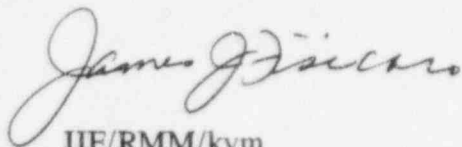
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If there are any questions concerning this issued please contact R. M. McAdams at (504) 336-6224.

Sincerely,



JJF/RMM/kvm  
attachments

cc: U.S. Nuclear Regulatory Commission, Region IV

NRC Sr. Resident Inspector

INPO Records Center

Mr. C.R. Oberg  
Public Utility Commission of Texas

LA Department of Environmental Quality  
Radiation Protection Division

**ATTACHMENT 1**

**Calculation Summary of Change**

**G13.18.12.4\*26 Rev. 0**

**“RCIC Room Heat Up Analysis”**

### Summary of Change:

#### **Calculation G13.18.12.4\*26 Rev. 0, "RCIC Room Heat Up Analysis"**

Calculation G13.18.12.4\*01, Revision 2 (SBO Analysis Auxiliary Building), was prepared as one of the support documents in the RBS evaluation for compliance with the Station Blackout (SBO) rule (10CFR50.63). It was later identified that this analysis had not considered the steam blow down from the RCIC gland seal steam load. As a result, calculation G13.18.12.4\*26, Revision 0 (RCIC Room Heat Up Analysis), was prepared to evaluate the failure of the RCIC gland steam seal compressor.

#### **CALCULATION METHOD:**

An auxiliary building model was used as input to GOTHIC-4.1a. GOTHIC (Generation of Thermal - Hydraulic Information for Containment) is a general purpose thermal-hydraulics computer program for design, licensing, safety and operating analyses of nuclear power plant Containment and for room heat-up calculations.

This model was created based on the compartment and room parameters used in previous SBO calculations. The heat sinks and walls were also modeled. The potential HPCS heat load is not modeled since there is not a direct path between the HPCS room and the RCIC room.

Multiple sensitivity cases were performed including a benchmark case identical to the RCIC room heat-up case of the previous calculation. The benchmark case did not include the steam leakage from the RCIC gland seal.

#### **MAJOR ASSUMPTIONS:**

1. It is assumed that the water-tight door between the RHR "C" room and the RCIC room is air tight and, as such, overestimates the pressure rise.
2. The steam leakage of 250 lbm/hr is taken from GE design documents for the gland seal system steam flow. The steam condition is assumed to be 1189 Btu/lbm. It is conservatively assumed that the steam leakage caused by the failure of a non-safety battery starts at time zero in the SBO event.
3. An initial temperature of 110°F was used based on a two year period (1993 - 1994) of actual plant data. The humidity is assumed to be 100%.
4. The two fire doors (A95/8 and A95/9) at elevation 95'9", are assumed to be open. These doors are fusible and close automatically at 225°F. The ambient temperature at these locations remains below 225°F as verified later in the calculation.

CONCLUSION:

The calculated maximum RCIC room temperature at 4-hours, with immediate failure of the gland seal compressor, is 178°F. This temperature is based on the observed two year maximum initial temperature in the RCIC room of 110°F. No credit for mitigating operator actions was assumed for this case.

Environmental qualification evaluations show that the limiting component's qualification temperature for the RCIC room during station blackout using the guidelines of NUMARC 87-00, Appendix F is 207°F. Environmental qualification reports indicate that these limiting components were tested to a temperature of 207°F for a period greater than 12 hours. Therefore, the results are acceptable.

\*A copy of this calculation is available on request.

**ATTACHMENT 2**

**TABLE F.1**

**ISOLATION OF RBS  
CONTAINMENT PENETRATIONS**

Table F 1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
10.3-1a	1KJB*Z1A	Main Steam Line	24" 1B21*AOVF022A 24" 1B21*AOVF028A	2	Inboard valve closes on loss of air.
		Main Steam Positive Leakage Control Sys	2" 1E33*MOVF008		
		Turbine Plant Miscellaneous Drains	1 1/2" 1B21*MOVF067A		
10.3-1a	1KJB*Z1B	Main Steam Line	24" 1B21*AOVF022B 24" 1B21*AOVF028B	2	Inboard valve closes on loss of air.
		Main Steam Positive Leakage Control Sys	2" 1E33*MOVF008		
		Turbine Plant Miscellaneous Drains	1 1/2" 1B21*MOVF067B		
10.3-1a	1KJB*Z1C	Main Steam Line	24" 1B21*AOVF022C 24" 1B21*AOVF028C	2	Inboard valve closes on loss of air.
		Main Steam Positive Leakage Control Sys	2" 1E33*MOVF008		
		Turbine Plant Miscellaneous Drains	1 1/2" 1B21*MOVF067C		
10.3-1a	1KJB*Z1D	Main Steam Line	24" 1B21*AOVF022D 24" 1B21*AOVF028D	2	Inboard valve closes on loss of air.
		Main Steam Positive Leakage Control Sys	2" 1E33*MOVF008		
		Turbine Plant Miscellaneous Drains	1 1/2" 1B21*MOVF067D		

Table F 1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
9.3-8b	1KJB*Z2	Turbine Plant Miscellaneous Drains	3" 1B21*MOV016 3" 1B21*MOV019	Not Excluded Not Excluded	Penetration is excluded via ACP-0050.
10.4-7b	1KJB*Z3A	Feedwater Line	20" 1FWS*MOV7A 20" 1B21*AOVF032A 20" 1B21*VF010A	3	Inboard valve is a check valve, therefore penetrator is isolated.
10.4-7b	1KJB*Z3B	Residual Heat Removal Return To Feedwater Feedwater Line	10" 1E12*MOV053A 20" 1FWS*MOV7B 20" 1B21*AOVF032B 20" 1B21*VF010B	3	Inboard valve is a check valve, therefore penetration is isolated.
5.4-15a	1KJB*Z4	Reactor Water Clean Up Discharge To Main Condenser	4" 1G33*MOV028 4" 1G33*MOV034 3/4" 1WCS*RV144	7 7	Large bore valves are normally closed failing as is; small bore valve is a relief valve.
5.4-15b	1KJB*Z5	Reactor Water Clean Up Backwash Discharge	2 1/2" 1WCS*MOV178 2 1/2" 1WCS*MOV172 3/4" 1WCS*RV154	5 5 5	All lines are < 3".
5.4-15a	1KJB*Z6	Reactor Water Clean Up Return To Feedwater	6" 1G33*MOV040 6" 1G33*MOV039	Not Excluded Not Excluded	
5.4-15a	1KJB*Z7	Reactor Water Clean Up Pump Suction	6" 1G33*MOV001 6" 1G33*MOV004	Not Excluded Not Excluded	
6.3-1	1KJB*Z8	High Pressure Core Spray Pump Suction From Suppression Pool	20" 1E22*MOV015	7	Outboard valve is a normally closed MOV failing as is.
6.3-1	1KJB*Z9	High Pressure Core	10" 1E22*MOV004	7	Inboard valve is a



Table F.1  
Isolation Of RBS Containment Penetrations

USAR FIGURE	PENETRATION <sup>(1)</sup> IDENTIFICATION	LINE IDENTIFICATION	VALVE <sup>(1)</sup> NO.	EXCLUSION CATEGORY <sup>(2)</sup>	COMMENTS <sup>(3)</sup>
		Spray To Reactor	10" 1E22*AOVF005	3	check valve and outboard valve is a normally closed MOV failing as is.
6.3-1	1KJB*Z11	HPCS Test Return	10" 1E22*MOV023	7	All valves are normally closed; MOVs fail as is; non-MOV's are check valves or small bore relief valves.
		High Pressure Core	4" 1E22*MOV012	7	
		Spray Pump Minimum	1" 1E22*RVF014		
		Flow Bypass And Thermal	1" 1E22*RVF035		
		Relief Discharge To	1" 1E22*RVF039		
		Suppression Pool			
		Suppression Pool Pump-	4" 1DFR*V181	3	
		Back Sys Return Line	4" 1DFR*V182	3	
			4" 1DFR*MOV146	7	
6.3-4	1KJB*Z12	Low Pressure Core Spray	20" 1E21*MOV001	8	MOV failing open is desirable for LPCS suction
		Pump Suction From			The suction piping from the suppression pool chamber is considered an extension of the primary containment.
		Suppression Pool			
6.3-4	1KJB*Z13	Low Pressure Core Spray	10" 1E21*MOV005	7	Inboard valve is an AOV
		To Reactor	10" 1W12*AOVF006	3	check valve; outboard valve is a normally closed MOV failing as is.
5.4-8	1KJB*Z15	RHR Steam Supply And	8" 1E51*MOV063	8,6	Large bore MOV's failing open is desirable for steam supply (USAR Section 6.2.4.3.2 Criterion 55). DC powered RCIC steam line isolation valve, E51*MOV045 will be closed in the event of RCIC failure per AOP-0050
		RCIC Steam Supply	3/4" 1E51*MOV076	8,6	
			8" 1E51*MOV064	8,6	
5.4-8	1KJB*Z16	RCIC Pump Suction	6" 1E51*MOV031	7	Outboard MOV is normally closed failing as is.
		From Suppression Pool			

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
5.4-8	1KJB*Z17	RCIC Turbine Exhaust To Suppression Pool	12" 1E51*MOV068 1 1/2" 1E51*MOV077	6	Large bore MOV is DC powered per SOP-0049, "125 VDC System", Attachment 1F; other MOV is small bore.
5.4-8	1KJB*Z18A	RCIC Pump Minimum Flow Bypass To Suppression Pool	2" 1E51*MOV019	5,7	Outboard small bore MOV is normally closed failing as is.
5.4-8	1KJB*Z18B	RCIC Turbine Exhaust Vacuum Breaker From Above Suppression Pool	1 1/2" 1E51*MOV078	5	Small bore valve.
5.4-8	1KJB*Z18C	RCIC Turbine Exhaust Vacuum Breaker From Above Suppression Pool	1 1/2" 1E51*MOV078	5	Small bore valve.
5.4-8	1KJB*Z19	RHR/RCIC Head Supply	6" 1E51*MOV013 6" 1E51*AOVF065 6" 1E51*AOVF066 4" 1E12*MOV023	7 3 3 7	Inboard and outboard lines are initially secure by check valves, and outboard lines past the check valve are normally closed MOV's failing as is.
5.4-12a	1KJB*Z20	RHR Shutdown Cooling Supply (Suction Isolation)	18" 1E12*MOV009 18" 1E12*MOV008 3/4" 1RHS*V240	7 7 3	Inboard and outboard MOV's are normally closed failing as is; inboard small bore valve is a check valve.

Table F.1

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<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
5.4-12a	1KJB*Z21A	LPCI A To Reactor	10" 1E12*MOV027A	7	Inboard MOV's are normally closed failing as is, therefore penetration is isolated.
			10" 1E12*MOV042A		
			10" 1E12*MOV037A		
			8" 1E12*F099A		
			4" 1E12*VF044A		
5.4-12b	1KJB*Z21B	LPCI Not Excluded To Reactor	10" 1E12*MOV027B	7	Inboard MOV's are normally closed failing as is, therefore penetration is isolated
			10" 1E12*MOV042B		
			10" 1E12*MOV037B		
			8" 1E12*F099B		
			4" 1E12*VF044B		
5.4-12c	1KJB*Z21C	LPCI "C" To Reactor	10" 1E12*MOV042C	7	Inboard valve is a check valve; outboard valve is a MOV normally closed failing as is.
			10" 1E12*AOVF041C	3	
5.4-12a	1KJB*Z23A	RHR Heat Exchanger "A" Vent And Relief Valve Discharges To Suppression Pool	2" 1E12*MOV073A	7	All valves are normally closed outboard valves; the MOV and SOV fails as is and the other valves are relief valves
			6" 1RHS*RV3A		
			6" 1E12*RVF055A		
			2" 1E12*RVF025A		
			1" 1E12*RVF017A		
			1" 1E12*RVF005		
			2" 1E21*RVF018		
			2" 1E21*RVF031		
			8" 1E12*RVF036		
5.4-12b	1KJB*Z23B	RHR Heat Exchanger "B" Vent And Relief Valve Discharges To Suppression Pool	2" 1E12*MOV073B	7	All valves are normally closed outboard valves; the MOV and SOV fails as is and the other valves are relief valves.
			6" 1RHS*RV3B		
			6" 1E12*RVF055B		
			2" 1E12*RVF025C		
			2" 1E12*RVF025B		
			1" 1E12*RVF030		
			1" 1E12*RVF101		
		1" 1E12*RVF017B			
		1" 1SSR*SOV139			

Table F.1

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<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
5.4-12a	1KJB*Z24A	RHR "A" And LPCS Test Returns And Minimum Flow Bypass And Heat Exchanger Dump To Suppression Pool	14" 1E12*MOVFO24A 4" 1E12*MOVFO11A 4" 1E12*MOVFO64A 10" 1E21*MOVFO12 4" 1E21*MOVFO11	7,8 7 5 7 8	MOVFO24 and Open MOV from LPCS minimum flow bypass is acceptable as suppression pool return (USAR Section 6.2.4.3.3 Criterion 56) and a flow restricting orifice in each mini-flow line is less than 1.6".
5.4-12b	1KJB*Z24B	RHR "B" Test Return, RHR Pump B Minimum Flow Bypass And  Heat Exchanger Dump To Suppression Pool	14" 1E12*MOVFO24B 4" 1E12*MOVFO11B 4" 1E12*MOVFO64B	7,8 7 5	A flow restricting orifice in each mini-flow line is <1.6" MOVFO24 is also acceptable due to it being a suppression pool return.
5.4-12c	1KJB*Z24C	RHR Return "C" Minimum Bypass Test Return to Suppression Pool	14" 1E12*MOVFO21 4" 1E12*MOVFO64C	7 5	A flow restricting orifice in each mini-flow line is less than 1.6".
5.4-12a	1KJB*Z25A	RHR Pump "A" Suction	20" 1E12*MOVFO04A	8	MOV is normally open failing as is, which is desirable for RHR. The suction piping from the suppression pool is considered an extension of primary containment

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
5.4-12b	1KJB*Z25B	RHR Pump "B" Suction From Suppression Pool	20" 1E12*MOV004B	8	MOV is normally open failing as is, which is desirable for RHR. The suction piping from the suppression pool is considered an extension of the primary containment.
5.4-12c	1KJB*Z25C	RHR Pump "C" Suction From Suppression Pool	20" 1E12*MOV105	8	MOV is normally open failing as is, which is desirable for RHR. The suction piping from the suppression pool is considered an extension of the primary containment.
9.1-23a	1KJB*Z26	Fuel Pool Cooling And Cleanup Discharge	12" 1SFC*MOV119 12" 1SFC*V101	3	Inboard valve is a check valve, therefore penetration is isolated.
9.1-23a	1KJB*Z27	Fuel Pool Cooling And Cleanup Suction Line	12" 1SFC*MOV120 12" 1SFC*MOV122 3/4" 1SFC*V350	7 7 3	All valves are normally closed; MOV's fail as is and small bore valve is a check valve.
9.1-23a	1KJB*Z28	Fuel Pool Purification Suction	8" 1SFC*MOV139 8" 1SFC*MOV121 3/4" 1SFC*V351	Not excluded Not excluded 5	
4.6-5a	1KJB*Z29	CRD Hydraulic System Supply	2" 1C11*MOV083 2" 1C11*VF122	5 5	All lines are < 3".
9.4-7b	1KJB*Z31	Containment And Drywell Purge And Containment Hydrogen Purge Supply Lines	36" 1HVR*AOV165 1" 1CPP*SOV140 36" 1HVR*AOV123	2 2 2	All valves fail closed on loss of power or air.

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
9.4-7b	1KJB*Z33	Containment And Drywell Purge And Containment Hydrogen Purge Outlet Lines	36" 1HVR*AOV128 3" 1CPP*MOV104 3" 1CPP*MOV105 36" 1HVR*AOV:66	2 7 7 2	AOV's fail closed and MOV's are normally closed failing as is.
9.3-7f	1KJB*Z35	Floor Drain Discharge	4" 1DFR*AOV102 4" 1DFR*AOV101 1/2" 1DFR*V180	2 2 3	AOV's fail closed on loss of air and small bore valve is a check valve.
9.3-7b	1KJB*Z38	Equipment Drain Discharge	4" 1DER*AOV127 4" 1DER*AOV126 1" 1DFR*V4	2 2 3	AOV's fail closed on loss of air and small bore valve is a check valve.
9.5-1c	1KJB*Z41	Fire Protection Header	6" 1FPW*MOV121 6" 1FPW*V263	3	Inboard valve is a check valve, therefore penetration is isolated.
N/A	1KJB*Z42	Spare	-	9	
N/A	1KJB*Z43	Spare	-	9	
9.3-2c	1KJB*Z44	Service Air Supply To Containment And Drywell	4" 1SAS*MOV102 4" 1SAS*V486	3	Inboard valve is a check valve, therefore penetration is isolated.
9.3-1c	1KJB*Z46	Instrument Air Supply To Containment And drywell	3" 1IAS*MOV106 3" 1IAS*V80	3	Inboard valve is a check valve, therefore penetration is isolated.
9.2-2a	1KJB*Z48	Reactor Plant Component Cooling Water Supply	10" 1CCP*MOV138 10" 1CCP*V118	4 3	Inboard valve is a check valve, and system is a non-radioactive closed loop.
9.2-2a	1KJB*Z49	Reactor Plant Component Cooling Water Return	10" 1CCP*MOV158 10" 1CCP*MOV159 3/4" 1CCP*V160	4 4 3	Non-radioactive closed loop system.

Table F.1

Isolation Of RBS Containment Penetrations

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9.2-1d	1KJB*Z52A	Service Water Supply	12" 1SWP*MOV507A 12" 1SWP*V174	3	Inboard valve is a check valve, therefore penetration is isolated.
9.2-1d	1KJB*Z52B	Service Water Supply	12" 1SWP*MOV507B 12" 1SWP*V175	3	Inboard valve is a check valve, therefore penetration is isolated.
9.2-1d	1KJB*Z53A	Service Water Return	12" 1SWP*MOV81A 10" 1SWP*MOV5A 6" 1SWP*MOV503A 1" 1SWP*SOV522A 1" 1SWP*SOV522C	8 8 7	Failing open valve lineup is considered acceptable for Service Water since leakage would flow inboard due to pressure differences.
9.2-1d	1KJB*Z53B	Service Water Return	6" 1SWP*MOV503B 12" 1SWP*MOV81B 10" 1SWP*MOV5B 1" 1SWP*SOV522B 1" 1SWP*SOV522D	7 8 8	Failing open valve lineup is considered acceptable for Service Water since leakage would flow inboard due to pressure differences.
N/A	1KJB*Z101	Spare	-	9	
10.3-1b	1KJB*Z102	Air Supply For Main Steam Safety And Relief Valve System	1 1/2" 1SVV*MOV1B 1 1/2" 1SVV*V9	5 3,5	Inboard valve is a check valve and all valves are <3".
10.3-1b	1KJB*Z103	Air Supply For Main Steam Safety And Relief Valve System	1 1/2" 1SVV*MOV1A 1 1/2" 1SVV*V31	5 3,5	Inboard valve is a check valve and all valves are <3".
N/A	1KJB*Z104	Spare	-	9	
N/A	1KJB*Z105	Spare	-	9	

Table F.1

Isolation Of RBS Containment Penetrations

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N/A	1KJB*Z106	Spare	-	9	
N/A	1KJB*Z113	Spare	-	9	
N/A	1KJB*Z114	Spare	-	9	
N/A	1KJB*Z115	Spare	-	9	
N/A	1KJB*Z116	Spare	-	9	
N/A	1KJB*Z121	Spare	-	9	
N/A	1KJB*Z122	Spare	-	9	
N/A	1KJB*Z125	Spare	-	9	
N/A	1KJB*Z126	Spare	-	9	
5.4-15a	1KJB*Z129	Reactor Water Clean Up Pump Discharge	4" 1G33*MOV054 4" 1G33*MOV053	Not Excluded Not Excluded	
9.2-8d	1KJB*Z131	Ventilation Chilled Water Return	8" 1HVN*MOV102 8" 1HVN*MOV128 3/4" 1HVN*V1316	8 8 3	Failing open valve line up is considered acceptable for Chilled Water since leakage would be inboard due to pressure differences.
9.2-8d	1KJB*Z132	Ventilation Chilled Water Supply	8" 1HVN*MOV127 8" 1HVN*V541	8 3	Inboard valve is a check valve isolating the penetration. MOV failing open is acceptable for Chilled Water since leakage would be inboard due to pressure differences.



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Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
9.2-21c	1KJB*Z134	Condensate Makeup Supply	4" 1CNS*MOV125 4" 1CNS*V86	3	Inboard valve is a check valve, therefore penetration is isolated.
N/A	1KJB*Z601A	Spare	-	9	
9.3-1b	1KJB*Z601B	Reactor Plant Sampling	1/2" 1SSR*SOV130 1/2" 1SSR*SOV131	5,2 5,2	All valves are small bore, normally closed, and fail closed.
N/A	1KJB*Z601C	Spare	-	9	
N/A	1KJB*Z601D	Spare	-	9	
6.2-73a	1KJB*Z601E	Containment And Drywell H2 Sample B Supply Line	3/4" 1CMS*SOV35D 3/4" 1CMS*SOV31B	5 5	All valves are small bore.
6.2-73a	1KJB*Z601F	Containment And Drywell H2 Sample B Return Line	3/4" 1CMS*SOV31D 3/4" 1CMS*SOV35B	5 5	All valves are small bore.
9.4-7a	1KJB*602A	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V8	5	Outboard valve is small bore.
9.4-7a	1KJB*602B	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V10	5	Outboard valve is small bore.
N/A	1KJB*Z602C	Spare	-	9	
6.7-1b	1KJB*Z602D	PVLCS Pressure Transmitter	3/4" 1LSV*V64	5	Outboard valve is small bore.

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
N/A	1KJB*Z602E	Spare	-	9	
9.4-7a	1KJB*Z602F	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V12	5	Outboard valve is small bore.
6.2-73c	1KJB*Z603A	Containment Leakage Monitoring Pressure Sensing Line	3/4" 1LMS*V14 3/4" 1LMS*V12	5 5	All valves are small bore.
N/A	1KJB*Z603B	Spare	-	9	
6.2-73c	1KJB*Z603C	Containment Leakage Monitoring Pressure Sensing Line	3/4" 1LMS*V7 3/4" 1LMS*V16	5,1 5,1	All valves are small bore and are locked closed.
N/A	1KJB*Z603D	Spare	-	9	
N/A	1KJB*Z603E	Spare	-	9	
N/A	1KJB*Z603F	Spare	-	9	
N/A	1KJB*Z604A	Spare	-	9	
N/A	1KJB*Z604B	Spare	-	9	
N/A	1KJB*Z604C	Spare	-	9	
N/A	1KJB*Z604D	Spare	-	9	
N/A	1KJB*Z604E	Spare	-	9	
N/A	1KJB*Z604F	Spare	-	9	

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
6.2-73b	1KJB*Z605A	Containment Atmosphere Monitoring Pressure Sensing Line	3/4" 1CMS*V2	5	Outboard valve is small bore.
6.2-73b	1KJB*Z605B	Containment Atmosphere Monitoring Pressure Sensing Line	3/4" 1CMS*V3	5	Outboard valve is small bore.
N/A	1KJB*Z605C	Spare	-	9	
N/A	1KJB*Z605D	Spare	-	9	
6.2-73b	1KJB*Z605E	Containment And Drywell H2 Sample A Supply Line	3/4" 1CMS*SOV35C 3/4" 1CMS*SOV31A	5 5	All valves are small bore.
6.2-73b	1KJB*Z605F	Containment And Drywell H2 Sample A Return Line	3/4" 1CMS*SOV31C 3/4" 1CMS*SOV35A	5 5	All valves are small bore.
9.4-7a	1KJB*Z606A	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V14	5	Outboard valve is small bore.
9.4-7a	1KJB*Z606B	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V16	5	Outboard valve is small bore.
6.2-73a	1KJB*Z606C	Containment Atmosphere Monitoring Pressure (B) Sensing Line	3/4" 1CMS*V16	5	Outboard valve is small bore.
6.2-73a	1KJB*Z606D	Containment Atmosphere Monitoring Pressure (B) Sensing Line	3/4" 1CMS*V15	5	Outboard valve is small bore.
6.7-1b	1KJB*Z606E	PVLCS Pressure	3/4" 1LSV*V65	5	Outboard valve is

Table F.1

Isolation Of RBS Containment Penetrations

<u>USAR FIGURE</u>	<u>PENETRATION<sup>(1)</sup> IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE<sup>(1)</sup> NO.</u>	<u>EXCLUSION CATEGORY<sup>(2)</sup></u>	<u>COMMENTS<sup>(3)</sup></u>
		Transmitter			small bore.
9.4-7a	1KJB*Z606F	Reactor Plant Ventilation Differential Pressure Cell	3/4" 1HVR*V18	5	Outboard valve is small bore.

Table F.1  
Isolation Of RBS Containment Penetrations

Notes:

- 1) Penetration and valve identification numbers from RBS USAR Table 6.2-40.
- 2) Exclusion categories 1 through 5 correspond to the NUMARC 87-00 categories.

These categories are:

- (1) valves normally locked closed during operation;
- (2) valves that fail closed on loss of AC power or air;
- (3) check valves;
- (4) valves in non-radioactive closed-loop systems not expected to be breached in a station blackout (with the exception of lines that communicate directly with the containment atmosphere);
- (5) all valves less than 3-inch nominal diameter.

Categories 6 through 9 are supplementary criteria which provide the evaluation of the penetrations containing valves not meeting one of the above five categories. These are:

- (6) at least one valve is DC-powered;
  - (7) at least one valve is normally closed, AC-powered, failing as is;
  - (8) valve(s) are normally open, AC-powered, failing as-is, and failure position is acceptable, if not desirable during SBO.
  - (9) spare penetration, assumed capped.
- 3) DC-operated valves are powered from the station batteries. All motor-operated valves remain in last position upon failure of power; all air-operated valves close on motive air failure or power failure at the solenoid valves.

**ATTACHMENT 3**

**TABLE F. 2**

**SBO CONTAINMENT PENETRATION  
ISOLATION VALVES SHEET**

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY	
I. Valves not excluded for which isolation is assured via SBO Procedure AOP-0050:					
A.	9.3-8b	1KJB*Z2	Turbine Plant	3" 1B21*MOV016	Not Excluded
			Miscellaneous Drains	3" 1B21*MOV019	Not Excluded
Comments:		These valves are normally open and are to remain open for MSIV drainage. Enclosure 7 of SBO Procedure AOP-0050 provides operator step 4.1 to manually close MSL Drain Header Shutoff Valve 1B21-MOV085, which is downstream of 1B21-MOV019. Closure of 1B21-MOV085 will isolate the penetration.			
II. Category 7 & 8 excluded valves:					
A.	6.3-1	1KJB*Z8	High Pressure Core Spray Pump Suction From Suppression Pool	20" 1E22*MOV015	7
	5.4-8	1KJB*Z16	RCIC Pump Suction From Suppression Pool	6" 1E51*MOV031	7
Comments:		The USAR figures show the suction inlet submerged below the minimum Suppression Pool Water Level. Per USAR Section 6.3.2.2, the HPCS suction strainer is at 75.5', which is 7.5' below the minimum water level. With the outboard valves on HPCS and RCIC both normally closed, this provides a water barrier from the containment atmosphere.			
B.	5.4-15a	1KJB*Z4	Reactor Water Clean Up Discharge To Main Condenser	4" 1G33*MOV028 4" 1G33*MOV034 3/4" 1WCS*RV144	7 7
Comments:		Large bore valves are normally closed failing as is and the small bore valve is a relief valve. The MOVs are only open for rejecting water from Reactor Water Cleanup (SOP-0090). Additionally, normally closed inboard valve 1G33*PVF033, downstream of MOV028, fails closed, which will also isolate the penetration.			

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY	
C.	6.3-1	1KJB*Z11	HPCS Test Return	10" 1E22*MOV023	7
			High Pressure Core	4" 1E22*MOV012	7
			Spray Pump Minimum	1" 1E22*RVF014	
			Flow Bypass and Thermal	1" 1E22*RVF035	
			Relief Discharge to	1" 1E22*RVF039	
			Suppression Pool		
			Suppression Pool Pump- Back Sys Return Line	4" 1DFR*V181 4" 1DFR*V182 4" 1DFR*MOV146	3 3 7

Comments: All valves are normally closed; MOVs fail as is; non-MOVs are check valves or small bore relief valves. Additionally, 1DFR\*V181 and V182 check valves isolate the 1DFR\*MOV146 line. 1E22\*MOV023 is only opened as required during an SBO (AOP-0050) to supply water from the Condensate Storage Tank to a low level Suppression Pool, and 1E22\*MOV012 is only open for HPCS pump startup or shutdown (SOP-0030). HPCS is an ECCS system and therefore not used in normal operation, hence valves would be closed. Per RBS USAR 6.3.2.2.1, HPCS starts on a LOCA signal with low water level and high drywell pressure, and HPCS is used as a backup to RCIC if the reactor becomes isolated from the main condenser and feedwater is lost. To assure continuous core cooling, a containment isolation signal does not close a HPCS valve once HPCS has been started. HPCS operates on normal AC or when normal AC is not available, such as during an SBO, on the HPCS Diesel Generator.

D.	5.4-12a	1KJB*Z20	RHR Shutdown	18" 1E12*MOV009	7
			Cooling Supply	18" 1E12*MOV008	7
			(Suction Isolation)	3/4" 1RHS*V240	3

Comments: Inboard and outboard MOVs are normally closed, failing as is; inboard small bore valve is a check valve. Per SOP-0031, valves are only open for Division A shutdown cooling flush, RHR pump warmup, and startup of shutdown cooling. 1E12\*MOV008 is also opened for loop fill. Per SBO procedure AOP-0050, the MOVs are open for emergency use of Division III for decay heat removal and for RPV Level Control during an SBO.



TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY
E. 5.4-12a	1KJB*Z21A	LPCI "A" To Reactor	10" 1E12*MOV F027A	
			10" 1E12*MOV F042A	7
			10" 1E12*MOV F037A	7
			8" 1E12*F099A	7
			4" 1E12*VF044A	7
5.4-12b	1KJB*Z21B	LPCI "B" To Reactor	10" 1E12*MOV F027B	
			10" 1E12*MOV F042B	7
			10" 1E12*MOV F037B	7
			8" 1E12*F099B	7
			4" 1E12*VF044B	7

Comments: Inboard MOVs F042A(B) and F037A(B) are normally closed, failing as is. Also, MOV\*F042A(B) are interlocked to remain closed with reactor pressure above 487 psig. Additionally, penetration is isolated by check valves 1E12\*AOVF041A(B), locked closed valves 1E12\*F099A(B) and 1E12\*VF044A(B), and by normally closed, failing as is valves 1E12\*MOV F037A(B), which are only open for diverting flow to refueling cavity during refueling or for return flow to fuel storage area during fuel pool cooling assist mode startup (SOP-0031).

F. 5.4-12a	1KJB*Z23A	RHR Heat Exchanger "A" Vent and Relief Valve Discharges To Suppression Pool	2" 1E12*MOV F073A	5
			6" 1RHS*RV3A	7
			6" 1E12*RVF055A	7
			2" 1E12*RVF025A	5
			1" 1E12*RVF017A	5
			1" 1E12*RVF005	5
			2" 1E21*RVF018	5
			2" 1E21*RVF031	5
			8" 1E12*RVF036	7

Comments: All valves are normally closed outboard valves: the small bore MOV (and SOV) fail as is, and the other valves are relief valves discharging into the Suppression Pool, therefore the containment is isolated.

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY	
G.	5.4-12b	1KJB*Z23B	RHR Heat Exchanger	2" 1E12*MOV073B	5
			"B" Vent and Relief	6" 1RHS*RV3B	7
			Valve Discharges	6" 1E12*RVF055B	7
			To Suppression	2" 1E12*RVF025C	5
			Pool	2" 1E12*RVF025B	5
				1" 1E12*RVF030	5
				1" 1E12*RVF101	5
				1" 1E12*RVF017B	5
				1" 1SSR*SOV139	5

Comments: All valves are normally closed outboard valves: the small bore MOV (and SOV) fail as is, and the other valves are relief valves discharging into the Suppression Pool, therefore the containment is isolated.

K.	5.4-12a	1KJB*Z24A	RHR "A" and LPCS	14" 1E12*MOV024A	7,8
			Test Returns and	4" 1E12*MOV011A	7
			Minimum Flow	4" 1E12*MOV064A	5
			Bypass and Heat	10" 1E21*MOV012	7
			Exchanger Dump	4" 1E21*MOV011	8
	To Suppression Pool				

Comments: All MOVs are normally closed failing as is except for open MOV F011 from LPCS minimum flow bypass, which is acceptable due to it being a suppression pool return (USAR Section 6.2.4.3.3 Criterion 56). Additionally, the penetration is isolated by check valves 1E12\*V34 and 1E21\*V10.

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY	
I.	5.4-12b	1KJB*Z24B	RHR "B" Test Return, RHR	14" 1E12*MOVF024B	7,8
			Pump B Minimum Flow	4" 1E12*MOVF011B	7
			Bypass and Heat Exchanger Dump to Suppression Pool	4" 1E12*MOVF064B	5
Comments: Penetration is isolated by outboard check valve 1E12*V65. Additionally, MOVs are outboard, normally closed valves failing as is.					
J.	5.4-12c	1KJB*Z24C	RHR Return "C"	14" 1E12*MOVF021	7
			Minimum Bypass	4" 1E12*MOVF064C	7,5
			Test Return to Suppression Pool		
Comments: Penetration is isolated by check valve 1E12*V64. Additionally, MOVs are normally closed valves failing as is.					
K.	9.1-23a	1KJB*Z27	Fuel Pool Cooling	12" 1SFC*MOV120	7
			and Cleanup Suction	12" 1SFC*MOV122	7
			Line	3/4" 1SFC*V350	3
Comments: All valves are normally closed; MOVs fail as is and small bore valve is a check valve. MOVs are only open for upper containment pool cooling while transferring fuel during an outage with the gates open and pools flooded.					
L.	6.3-1	1KJB*Z9	High Pressure Core	10" 1E22*MOVF004	7
			Spray To Reactor	10" 1E22*AOVF005	3
Comments: Inboard valve is a check valve and outboard valve is a normally closed MOV failing as is.					

TABLE F 2  
SBO Containment Penetration Isolation Valves Sheet

	<u>USAR FIGURE</u>	<u>PENETRATION IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE NO</u>	<u>EXCLUSION CATEGORY</u>
M.	6.3-4	1KJB*Z13	Low Pressure Core Spray To Reactor	10" 1E21*MOVF005 10" 1W12*AOVF006	7 3
	Comments:	Inboard valve is an AOV check valve; outboard valve is a normally closed MOV failing as is.			
N.	5.4-8	1KJB*Z18A	RCIC Pump Minimum Flow Bypass To Suppression Pool	2" 1E51*MOVF019	5,7
	Comments:	Outboard small bore MOV Flow Bypass is normally closed failing as is.			
O.	5.4-8	1KJB*Z19	RHR/RCIC Head Supply	6" 1E51*MOVF013 6" 1E51*AOVF065 6" 1E51*AOVF066 4" 1E12*MOVF023	7 3 3 7
	Comments:	Inboard and outboard lines are initially secure by check valves, and outboard lines past the check valve are normally closed MOV's failing as is.			
P.	5.4-12c	1KJB*Z21C	LPCI "C" To Reactor	10" 1E12*MOVF042C 10" 1E12*AOVF041C	7 3
	Comments:	Inboard valve is a check valve; outboard valve is a MOV normally closed failing as is.			
Q.	9.4-7b	1KJB*Z33	Containment And Drywell Purge And Containment Hydrogen Purge Outlet Lines	36" 1HVR*AOV128 3" 1CPP*MOV104 3" 1CPP*MOV105 36" 1HVR*AOV166	2 7 7 2
	Comments:	AOV's fail closed and Drywell Purge And MOV's are normally closed failing as is.			

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY	
R.	9.2-1d	1KJB*Z53A	Service Water	12" 1SWP*MOV81A	8
			Return	10" 1SWP*MOV5A	8
				6" 1SWP*MOV503A	7
				1" 1SWP*SOV522A	
				1" 1SWP*SOV522C	
Comments:		Failing open valve lineup is considered acceptable for Service Water since leakage would flow inboard due to pressure differences.			
S.	9.2-1d	1KJB*Z53B	Service Water	6" 1SWP*MOV503B	7
			Return	12" 1SWP*MOV81B	8
				10" 1SWP*MOV5B	8
				1" 1SWP*SOV522B	
				1" 1SWP*SOV522D	
Comments:		Failing open valve lineup is considered acceptable for Service Water since leakage would flow inboard due to pressure differences.			
T.	6.3-4	1KJB*Z12	Low Pressure Core Spray Pump Suction From Suppression Pool	20" 1E21*MOV5001	8
Comments:		The USAR figure shows the suction inlet submerged below the minimum Suppression Pool Water Level. Per USAR Section 6.3.2.2, the LPCS suction strainer is at 75.5', which is 7.5' below the minimum water level. This provides a water barrier from the containment atmosphere. The only open path is a return to the suppression pool. Additionally, the MOV failing open is desirable for LPCS suction to ensure the pump is not starved. The suction piping from the suppression pool chamber is considered an extension of the primary containment.			

TABLE F 2  
SBO Containment Penetration Isolation Valves Sheet

	<u>USAR FIGURE</u>	<u>PENETRATION IDENTIFICATION</u>	<u>LINE IDENTIFICATION</u>	<u>VALVE NO</u>	<u>EXCLUSION CATEGORY</u>
U.	5.4-8	1KJB*Z15	RHR Steam Supply and RCIC Steam Supply	8" 1E51*MOV063 3/4" 1E51*MOV076 8" 1E51*MOV064	8,6  8,6
	<p>Comments: Large bore MOVs failing open are desirable for steam supply (USAR Section 6.2.4.3.2 Criterion 55). Per SBO procedure AOP-0050, RCIC must be maintained during the event. DC powered RCIC steam line isolation valve, E51*MOV045 will be closed in the event of RCIC failure, per AOP-0050.</p>				
V.	5.4-12a	1KJB*Z25A	RHR Pump "A" Suction From Suppression Pool	20" 1E12*MOV004A	8
	5.4-12b	1KJB*Z25B	RHR Pump "B" Suction From Suppression Pool	20" 1E12*MOV004B	8
W.	5.4-12c	1KJB*Z25C	RHR Pump "C" Suction From Suppression Pool	20" 1E12*MOV105	8
	<p>Comments: The USAR figures show the suction inlet submerged below the minimum Suppression Pool Water Level. Per USAR Section 6.2.2.2, the RHR suction strainers are at 73'-4 3/4". Per USAR Table 7.6-1, the minimum water level is 86'-1 3/8". Therefore, the strainers are 12'-8 5/8" below the minimum water level. This provides a water barrier from the containment atmosphere. The only open path is a return to the suppression pool. Additionally, the MOV is normally open failing as is, which is desirable to protect the RHR pump. The suction piping from the suppression chamber is considered an extension of the primary containment.</p>				

TABLE F.2  
SBO Containment Penetration Isolation Valves Sheet

USAR FIGURE	PENETRATION IDENTIFICATION	LINE IDENTIFICATION	VALVE NO	EXCLUSION CATEGORY
X.	9.2-8d	1KJB*Z131	Ventilation Chilled Water Return	8 8 3
Comments:		Failing open valve line up is considered acceptable for Chilled Water since leakage would be inboard due to pressure differences.		
Y.	9.2-8d	1KJB*Z132	Ventilation Chilled Water Supply	8 3
Comments:		Inboard valve is a check valve isolating the penetration. MOV failing open is acceptable for Chilled Water since leakage would be inboard due to pressure differences.		

## **ATTACHMENT 4**

**Revision of Penetration Exclusion Category for**

**Valves 1E12\*MOVF064 A, B, and C**

**and**

**Valve 1E51\*MOVF045**



## Summary of Changes:

### Revision of Penetration Exclusion Category for Valves 1E12\*MOVF064 A, B, and C

RBS has revised the Exclusion Category provisions for containment isolation of the RHS pump (A, B, and C) 4" minimum flow by-pass line in the event of station blackout from exclusion category 7 to 5. The isolation valve for the RHR minimum flow by-pass line is 1E12\*MOVF064 (A, B, and C). This valve provides containment isolation in a design bases event. However, this valve is normally open and will fail as is on loss of AC power.

In the event of a Station Blackout (SBO) the RHR minimum flow by-pass valves would fail in the open position. This is a desirable fail-safe position for RHR pump operation. In the event that containment integrity must be established for these penetrations, it is assured for the following reasons:

1. A flow restricting orifice in each mini-flow line is less than 1.6" and thus would limit leakage to that of SBO isolation category 5 (i.e., under 3").
2. The discharge side of the mini-flow line is located below the water level of the suppression pool and thus provided with a water seal.
3. Inline check valve (1E12\*VF046 A, B, and C) is downstream of 1E12\*MOVF064 (A, B, and C) and near the penetration and would limit or stop reverse flow from the containment penetration.
4. The minimum-flow isolation valve, 1E12\*MOVF064 (A, B, and C) is located near the RHR pump and could be manually closed if required. Manual valve 1E12\*VF018 (A, B, and C), located downstream of 1E12\*MOVF064 (A, B, and C), can be closed by a dispatched operator.

**Summary of Changes:**

**Revision of Penetration Exclusion Category for Valve 1E12\*MOVF045**

RCIC steam line Containment Isolation valves 1E51\*MOVF063 and 1E51\*MOVF064 (A, B, and C) provide containment isolation in a design bases event. However, these valves are normally open and will fail as is on loss of AC power. This is a desirable fail-safe position for RCIC pump operation. The isolation function will be provided by the down stream DC powered RCIC steam line isolation valve, 1E51\*MOVF045, which will be closed in the event of a RCIC failure. This provision has been incorporated into Procedure AOP-0050, "Station Blackout." The Exclusion Category for isolation valve 1E51\*MOVF045 is changed to 6 (i.e. DC powered isolation).