

AmerGen
AmerGen Energy, L.L.C.

TMI-1
FIRE HAZARDS
ANALYSIS REPORT

Volume 2

THREE MILE ISLAND

UNIT NO. 1

FIRE HAZARDS ANALYSIS REPORT

VOLUME II

AmerGen Energy Company, LLC

DOCUMENT NO. 990-1745
REVISION 20

ATTACHMENT 3-0
SYSTEM AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

SHEET 1b

COMPONENTS AND CIRCUITS	D	D	F	F	F	F	F	I	I	I	I	I	I	I	I	R	R	R	R	R	R	T	REMARKS
	G	G	H	H	H	H	H	B	B	B	B	B	B	B	B	S	S	S	S	S	S	B	
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
	A	A	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	A	A	A	A	A	A	A	
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8	A	Z	Z	Z	Z	Z	
RC INVENTORY CONTROL																							
MAKEUP PUMP	B	AC	B	AC			AC	B			AC	AC	AC									AC	A=MU-P-1A, B=MU-P-1C, C=MU-P-1B
MU RECIRC VALVES																							
MU SUPPLY/DISCH VLVS																							
CORRESP. TO MU PUMP																							
MU PUMP TRIP & RESTART																							RECIRC. LINE MUST BE OPENED BEFORE RESTARTING PUMP
LETDOWN	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
PREVENT UNCONTROLLED LD BLEEDOFF THRU RC VENTS	1	1	F	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1=MU-V-3, 2=MU-V-2A/B, 3=MU-V-4/5 RC-V-28 AND 44; OR RC-V-40A AND 41A; OR RC-V-40B AND 41B; OR RC-V-29 AND 43
			X			X													X	X			
RC PRESSURE CONTROL																							
PRESSURIZER HEATERS	B	A				X				A	A	A								X	X	X	A=RC-G-8, B=RC-G-9
MAKEUP PUMP	B	AC	B	AC			AC	B			AC	AC	AC									AC	A=MU-P-1A, B=MU-P-1C, C=MU-P-1B
LETDOWN	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	
PORV PROTECTION			1	1				2														2	1=RC-RV-2, 2=RC-V-2
RAPID DEPRESS. PROTECTION	B	A	T	A			A	B			A	A	A						T	T	T	T	A=RC-V-1, B=RC-V-3, T=TRIP RCP NOTE 5
SPRAY LINE - PRESSURE CONTROL			M					M											M	M	M	M	RC-V-4
RC PUMP TRIP CAPABILITY																						X	
RC P SEAL COOLING																							
SEAL INJECTION	X		X	X			X	X	O	O	O	O	O	O						O		O	
THERMAL BARRIER COOLING	O		M	RS			RS	O	M	M	M	M	M	M								M	
RC TRIP			T	T			T																NOTE 4

LEGEND
+ - AREA WHERE REMOTE SHUTDOWN SYSTEM IS US RS - REMOTE SHUTDOWN
O - AVAILABLE - MUST BE USED A - "A" TRAIN
X - NOT AVAILABLE B - "B" TRAIN
S - SUPPORT NOT AVAILABLE C - "C" TRAIN
M - AVAILABLE - MANUAL OPERATION D - "D" TRAIN
O - AVAILABLE - OPEN BREAKER OR SWITCHES NOTES: 1. BLANK SPACE - ALL REDUNDANT COMPONENTS AVAILABLE (FOR SYSTEM) COMPONENTS); OR, SYSTEM AVAILABLE (FOR FUNCTION)
- - ONE OR OTHER IS AVAILABLE 2. TRIP FEEDWATER PUMP AND CLOSE FEEDWATER VALVES FROM C.R.
J - AVAILABLE - CUT & JUMPER PROCEDURE 3. IN CB-FA-3d AND CB-FA-4b, MU-P-1B WILL BE AVAILABLE AFTER MANUALLY CLOSING NS-V-32
F - SIMULTANEOUS ACTION - ONE WILL BE AVAILABLE 4. TRIP RC PUMPS, IF THERMAL BARRIER COOLING CANNOT BE REESTABLISHED WITHIN 10 MINUTES
5. IN CB-FA-1, RCP'S CAN BE TRIPPED FROM THE 6900 V SWGR IF TRIP CAPABILITY FROM C.R. IS LOST

COMPONENTS AND CIRCUITS	D	D	F	F	F	F	F	F	I	I	I	I	I	I	I	I	I	I	R	R	R	R	R	R	T	REMARKS	
	G	G	H	H	H	H	H	H	B	B	B	B	B	B	S	S	S	S	B	B	B	B	B	B	B		
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
	A	A	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	A	Z	Z	Z	1	1	1	1	2	3	1		
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8	2	1	2	3	a	b	c	d	e		
DECAY HEAT REMOVAL																											
EMERGENCY FEEDWATER TURBINE			S					S	X	M				S	S	M									S		
EMERGENCY FEEDWATER - MOTOR	B	A							X	A			A												A		
HSPS			X	X		X			X	X	X	X	X					X	X	X	X	X	X	X	X		
MAIN FEEDWATER OVER-FEEDING	T	T	T	T		T	T	T	T	T	T	T	T												M	T-TRIP TURBINE FROM C.R. V-CLOSE VALVES FROM C.R. M-SIMULTANEOUS ACTION (NOTE 2)	
HPI COOLING									O																		
MAIN STEAM EXHAUST		M	M			M	M		M	M			M	M											M	DUMP TO CODE SAFETY VALVES FIRST	
STEAM DUMP TO CONDENSER			1	1		1	1		1	1					1										2	1-MS-V-3A, 3B, 3C 3D, 3E, 3F 2-MS-V-8A, 8B	
MAIN STEAM SUPPLY TO EFW			X				X		X	M			X	X	M										X		
D.H. REMOVAL COLD SHUT-DOWN	B	A	B	A		A	B		A	A		A					B	A							A	AVAILABLE AFTER MANUAL ALIGNMENT OF VALVES	
SUPPORT SYSTEM																											
INTERMEDIATE COOLING PUMP	B	A	B	A			B		A	A		A													A		
IC VALVES			RS	M		M																			M	IC-V-1A, 1B, 2, 3, 4	
LEGEND																											
+ - AREA WHERE REMOTE SHUTDOWN SYSTEM IS USED														RS - REMOTE SHUTDOWN													
Ö - AVAILABLE - MUST BE USED														A - "A" TRAIN													
X - NOT AVAILABLE														B - "B" TRAIN													
S - SUPPORT NOT AVAILABLE														C - "C" TRAIN													
M - AVAILABLE - MANUAL OPERATION														D - "D" TRAIN													
O - AVAILABLE - OPEN BREAKER OR SWITCHES														NOTES: 1. BLANK SPACE - ALL REDUNDANT COMPONENTS AVAILABLE (FOR SYSTEM COMPONENTS); OR, SYSTEM AVAILABLE (FOR FUNCTION)													
- - ONE OR OTHER IS AVAILABLE														2. TRIP FEEDWATER PUMP AND CLOSE FEEDWATER VALVES FROM C.R.													
J - AVAILABLE - CUT & JUMPER PROCEDURE														3. IN CB-FA-3d AND CB-FA-4b, MU-P-1B WILL BE AVAILABLE AFTER MANUALLY CLOSING NS-V-32													
F - SIMULTANEOUS ACTION - ONE WILL BE AVAILABLE														4. TRIP RC PUMPS, IF THERMAL BARRIER COOLING CANNOT BE REESTABLISHED WITHIN 10 MINUTES													

ATTACHMENT 3-0
SYSTEM AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

SHEET 3b

COMPONENTS AND CIRCUITS	D	D	F	F	F	F	F	F	I	I	I	I	I	I	I	I	I	I	R	R	R	R	R	R	R	T	REMARKS	
	G	G	H	H	H	H	H	B	B	B	B	B	B	B	S	S	S	S	B	B	B	B	B	B	B	B		
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8	A	Z	Z	Z	1	1	1	1	2	3	1	
ISPH VENTILATION	B	A	X	A			A	B			A	A	A				X	X	X							A		
NUC SERV CLOSED CYCLE COOLING	BC	AC	B	A			B				AC	AC	AC													AC	A=NS-P-1A, B=NS-P-1C, C=NS-P-1B	
NUC SERV RIVER WATER	BC	AC	B	AC			A	BC			AC	AC	AC				B	A								A	A=NS-P-1A, B=NR-P-1C, C=NR-P-1B	
NR VALVES			M					M	M	M	M	M	M													M	NR-V-15A, 15B, 18	
DECAY HEAT CLOSED CYCLE	B	A	B	A			A	B			A	A	A				B	A								A		
DECAY HEAT RIVER WATER	B	A	B	A			A	B			A	A	A				R	R								A		
INSTRUMENT AIR COMPRESSOR	B	A								A	X	A	X	B												X		
COPPER AIR LINES/FITTINGS	X	X	X	X	X			X	X	X	X	X	X	X			X	X	X							X		
2 HR. BACKUP AIR	X								X	X																		

LEGEND

- + - AREA WHERE REMOTE SHUTDOWN SYSTEM IS USED
 - 0 - AVAILABLE - MUST BE USED
 - X - NOT AVAILABLE
 - S - SUPPORT NOT AVAILABLE
 - M - AVAILABLE - MANUAL OPERATION
 - O - AVAILABLE - OPEN BREAKER OR SWITCHES
 - - ONE OR OTHER IS AVAILABLE
 - J - AVAILABLE - CUT & JUMPER PROCEDURE
 - F - SIMULTANEOUS ACTION - ONE WILL BE AVAILABLE
 - RS - REMOTE SHUTDOWN
 - A - "A" TRAIN
 - B - "B" TRAIN
 - C - "C" TRAIN
 - D - "D" TRAIN
- NOTES: 1. BLANK SPACE - ALL REDUNDANT COMPONENTS AVAILABLE (FOR SYSTEM) COMPONENTS); OR, SYSTEM AVAILABLE (FOR FUNCTION)
 2. TRIP FEEDWATER PUMP AND CLOSE FEEDWATER VALVES FROM C.R.
 3. IN CB-FA-3d AND CB-FA-4b, MU-P-1B WILL BE AVAILABLE AFTER MANUALLY CLOSING NS-V-32
 4. TRIP RC PUMPS, IF THERMAL BARRIER COOLING CANNOT BE REESTABLISHED WITHIN 10 MINUTES

ATTACHMENT 3-0
SYSTEM AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

SHEET 5b

COMPONENTS AND CIRCUITS	D	D	F	F	F	F	F	I	I	I	I	I	I	I	I	I	I	R	R	R	R	R	R	T	REMARKS				
	G	G	H	H	H	H	H	B	B	B	B	B	B	B	B	B	B	S	S	S	S	S	S	B					
	F	F	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	F	F	F	F	F	F	F					
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8	a	2	1	2	3	a	1	1	1	1	2	3	1
AUXILIARY ELECTRICAL POWER																													
a. AC SOURCE																													
DIESEL GENERATOR	B	A							A	A	A																		A
4160 V SWGR	B	A							A	A	A																		A
480 V SWGR @ CONTROL BLDG	B	A							A	A	A																		A
480 V SWGR @ SCREEN HOUSE	B	A	B	A			A	B		A	A	A						B	A										A
480 V "ES" MCC	B	A							A	A	A																		A
480 V "ESV" MCC	BC	AC	B	AC			BC		AC	AC	AC																		AC
480 V MCC @ SCREEN HOUSE	B	A	B	A			A	B		A	A	A						B	A										A
120/240 V DP																													
b. DC SOURCE																													
INVERTER																													
BATTERY CHARGER																													
MAIN PANEL																													
ES DIST PNL @ CONTROL BLDG																													
ES DIST PNL @ DG BLDG	B	A																											

LEGEND

+	- AREA WHERE REMOTE SHUTDOWN SYSTEM IS USED	RS	- REMOTE SHUTDOWN
Ø	- AVAILABLE - MUST BE USED	A	- "A" TRAIN
X	- NOT AVAILABLE	B	- "B" TRAIN
S	- SUPPORT NOT AVAILABLE	C	- "C" TRAIN
M	- AVAILABLE - MANUAL OPERATION	D	- "D" TRAIN
O	- AVAILABLE - OPEN BREAKER OR SWITCHES	NOTES: 1. BLANK SPACE - ALL REDUNDANT COMPONENTS AVAILABLE (FOR SYSTEM COMPONENTS); OR, SYSTEM AVAILABLE (FOR FUNCTION)	
-	- ONE OR OTHER IS AVAILABLE	2. TRIP FEEDWATER PUMP AND CLOSE FEEDWATER VALVES FROM C.R.	
J	- AVAILABLE - CUT & JUMPER PROCEDURE	3. IN CB-FA-3d AND CB-FA-4b, MU-P-1B WILL BE AVAILABLE AFTER MANUALLY CLOSING NS-V-32	
F	- SIMULTANEOUS ACTION - ONE WILL BE AVAILABLE	4. TRIP RC PUMPS, IF THERMAL BARRIER COOLING CANNOT BE REESTABLISHED WITHIN 10 MINUTES	

TMI UNIT 1 APPENDIX "R" CABLES			Building <u>Auxiliary</u> Fire Zone <u>AB-FZ-3</u>		
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-P-1C	Makeup and Purification Pump	ME 7	PWR	Wrap existing tray 751 with one hour rated fire barrier No. 1AXC-FB04.	
MU-V-37	Makeup Pump Recirculation Isolation Valve	CR 232A	CONT	Install new cable and conduit wrapped with one hour rated fire barrier No. 1AXC-FB09 to Splice Box S14 in FH-FZ-1.	Addition to FHAR Rev. 7. This new cable for MU-V-37 is protected to ensure minimum flow path for the makeup pump MU-P-1C.

Attachment 3-1, SH. 1
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Auxiliary</u>		Fire Zone <u>AB-FZ-4</u>	
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-14A	Makeup Suction Isolation Valve	CG 102	PWR	Repower MU-V-14A (from 1A-ES-MCC). Spare existing cable CQ 14. Install new cable and conduit. Wrap conduit in AB-FZ-4 with one hour rated fire barrier No. 1AXC-FB07. *	Addition to FHAR Rev. 7. MU-V-14A is protected to prevent suction loss. IC and NR components are also protected here for alternate RCP thermal barrier cooling.
		CG 801	CONT	Spare existing cable CQ 301. Install new cable and conduit. Wrap conduit in AB-FZ-4 with one hour rated fire barrier No. 1AXC-FB08. *	
MU-V-36	Makeup Pump Recirc Isolation Valve	CQ232 A	CONT	Sheathed Rockbestos Firezone R cable routed via existing trays 148 & 146 to wrapped Splice B	CQ 232 in FHAR Rev. 7.
NR-V-15A	IC Cooler Outlet Valve A	CR 572A	CONT	Install new cable and conduit wrapped with one hour rated fire barrier No. 1AXC-FB06. *	Addition to FHAR Rev. 7. See remarks for MU-V-14A.
NR-V-15B	IC Cooler Outlet Valve B	CR 582A	CONT	Same as CR 572A. *	Addition to FHAR Rev. 7. See remarks for MU-V-14A.
RC-RV-2	Pressurizer Relief Valve	ED 523B	CONT	Sheathed Rockbestos Firezone R cable routed via existing trays 146 & 147 to one hour rated wrapped penetration 317 Rockbestos cable in Penet. 317 is wrapped with fire barrier No. 1AXC-FB05.	ED 523 in FHAR Rev. 7.
IC-V-4	IC Return to RB Isolation Valve	RV29A	CONT	Sheathed Rockbestos Firezone R cable in existing tray 178 and field run tray T-52-1 to Splice Box S-27 in FH-FZ-1.	Addition to FHAR Rev. 7. See remarks for MU-V-14A.
IC-V-3	IC Supply to RB Isolation Valve	RV 179	CONT	Sheathed Rockbestos Firezone R cable routed via existing trays T-52-22, 147 and 146 to wrapped Splice Box S-8 in FH-FZ-1.	Addition to FHAR Rev. 7. See remarks for MU-V-14A.

*Portions of these envelopes are fire barriers rated at 39 minutes, See Topical Report #094 for details.

Attachment 3-1, SH. 2
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Auxiliary</u>		Fire Zone <u>AB-FZ-4</u>	
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-16A	Emergency Makeup Valve	CQ 312A	CONT	Sheathed Rockbestos Firezone R cable in existing trays 148 & 146 to Splice Box S-25 in FH-FZ-1.	Addition to FHAR Rev. 7. MU-V-16A, MU-V-16B and MU-V-17 are protected to prevent over-filling of the RC pressurizer.
		----- CQ 312B	CONT	----- Same as CQ 312A.	
MU-V-16B	Emergency Makeup Valve	CQ 322A	CONT	Same as CQ 312A.	See remarks for MU-V-16A.
		----- CQ 322B	CONT	----- Same as CQ 312A.	
IC-V-2	IC Return from RB Isolation Valve	CR 364B	CONT	Sheathed Rockbestos Firezone R cable in existing trays 154 & 155.	See remarks for MU-V-14A.
LT-808	RG 1.97 BWST Level (Train A)	RE 383	INST	Install new cable in new conduit wrapped with one hour rated fire barrier 1AXC-FB10.	Addition to FHAR Rev. 9.

Attachment 3-1, SH. 3
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Auxiliary</u> Fire Zone <u>AB-FZ-5</u>			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
IC-P-1A	Intermediate Cooling Pump A	CG 83	PWR	Reroute existing cable in new conduit. Wrap new conduit and existing tray 590 with one hour rated fire barrier No. 1AXC-FB01.	
MU-V-37	Makeup Pump Recirc. Isolation Valve	CR 232A	CONT	Install new cable and new conduit wrapped with one hour rated barrier No. 1AXC-FB03.	CR 232 in FHAR Rev. 7.
DH-V-6B	Decay Heat Suction from RB Sump Valve	CR 262A	CONT	Same as CR 232A	CR 262 in FHAR Rev. 7.
LT-809	RG 1.97 EWST Level (Train B)	RE 384	INST	Install new cable and new conduit wrapped with one hour rated fire barrier No. 1AXC-FB02.	

Attachment 3-1, SH. 4
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building	Auxiliary	Fire Zone	AB-FZ-7
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
NS-P-1A	Nuclear Service Cooling Pump 1A	LP 6	PWR	Reroute existing cable thru new conduit. Wrap new conduit, existing tray 590, and field tray T-54-28 with one hour rated fire barrier No. 1AXD-FB02.	See PL 6A
NS-P-1A	Nuclear Service Cooling Pump 1A	LP 6A	PWR	In 13R, a portion of circuit LP6 was replaced with new cable LP 6A to resolve ampacity derating per MD-D542-001. Fire barrier protection installed as described for LP 6.	
NS-P-1C	Nuclear Service Cooling Pump 1C	LS 5	PWR	Reroute existing cable thru new conduit. Wrap new conduit and field run tray T-54-31 with one hour rated fire barrier No. 1AXD-FB01.	Modified in 13R under MD-D542-001. Circuit LS 5 remains protected as described.

Attachment 3-1, SH. 5
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building Control			Fire Zone
		Fire barrier wrap provided is rated one hour.			CB-FA-1
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EH-INV-1B	Inverter 1B	CH 1	PWR	Remove from trays. Reroute existing cable in new fire wrapped conduit & wrap draped cable with fire barrier No. 1CCD-FB11.	
EH-INV-1D	Inverter 1D	CH 2	PWR	Remove existing cable and conduit. Route new cable in fire wrapped conduit & wrap draped cable with fire barrier No. 1CCD-FB14.	
EH-BC-1B	Battery Charger 1B	CH 3	PWR	Remove from trays. Reroute existing cable in new fire wrapped conduit & wrap draped cable with fire barrier No. 1CCD-FB12.*	
EH-BC-1D	Battery Charger 1D	CH 4	PWR	Remove from trays. Reroute existing cable in new fire wrapped conduit & wrap draped cable with fire barrier No. 1CCD-FB13. *	
IC-P-1B	Intermediate Cooling Pump B	CH 61 A	PWR	Remove existing cable and install new cable through new trays and existing trays. Wrap new trays with fire barrier No. 1CCD-FB01* and draped cable with fire barrier No. 1CCD-FB16.	In 13R, circuit CH 61 replaced with new cable CH 61A to resolve ampacity derating per MD-D542-001.
MU-V-36	Makeup Pump Recirc Isolation Valve	CQ 232B	CONT	Install new cable from duct through wrapped conduit with fire barrier No. 1CCD-FB03* through wrapped Splice Box S-6 with fire barrier No. 1CCD-FB05 and new wrapped conduit fire barrier No 1CCD-FB03*.	CQ 232 in FHAR Rev. 7.
RC-V-2	Pressurizer Relief Block Valve	CS 262A	CONT	Install new cable from duct through wrapped conduit with fire barrier No. 1CCD-FB03*, through wrapped Splice Box S-6 with fire barrier No. 1CCD-FB05, and new wrapped conduit with fire barrier No. 1CCD-FB04*.	CS 262 in FHAR Rev. 7.
NR-V-18	Nuclear and IC Outlet Valve	CS 312A	CONT	Same as CS 262A.	CS 312 in FHAR Rev. 7.
EG-DP-VBB	1B 120V 1ø Vital AC Dist. Enl. VBB	EA 2	PWR	Wrap existing conduit and draped cable with fire barrier No. 1CCD-FB20*.	

* Portions or all of these envelopes are fire barriers rated at 39-50 minutes. See Topical Report #094 for details.

Attachment 3-1, SH. 6
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building Control Fire barrier wrap provided is rated one hour.			Fire Zone <u>CB-FA-1</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EG-DP-VBD	1B 120V 1Ø Vital AC Dist. Pnl. VBD	EA 4	PWR	Wrap existing conduit and draped cable with fire barrier No. ICCD-FB19*.	
EH-DP-1B	125/250V DC Main Dist. Pnl 1B	ED 52A	PWR	Wrap existing conduit and draped cable with fire barrier No. ICCD-FB21*.	
		ED 52B	PWR	Same as ED52A.	
		ED 55	PWR	Wrap existing conduit and draped cable with fire barrier No. ICCD-FB17*.	
		ED 56	PWR	Wrap existing cable and draped cable with fire barrier No. ICCD-FB18*.	
EH-DPES-1F	125/250V D.C. Engd Sfgds. Dist. Pnl.	ED 60C	PWR	Remove existing cable and install new cable through wrapped conduit with fire barrier No. ICCD-FB15.	
		ED 60D	PWR	Same as ED 60C.	
EE-SGES-1S	480V 1S Engd. Sfgds. Switchgear	ED 307A	CONT PWR	Remove existing cable from existing trays. Route new cable through new fire wrapped trays with fire barrier No. ICCD-FB01 and new fire wrapped conduit with fire barrier No. ICCD-FB08*.	
ED-SGES-1E	4160V 1E Engd Sfgds. Switchgear	ED 309A	CONT PWR	Remove existing cable from existing trays and conduit. Route new cable through new fire wrapped conduit with fire barrier No. ICCD-FB10*. Wrap draped cable.	
EH-DPESDG-1Q	ES DG B 125/250V D.C. Dist. Pnl. 1Q	ED 313	PWR	Remove existing cable from existing trays. Reroute through new fire wrapped conduit with fire barrier No. ICCD-FB09*. Wrap draped cable.	

* Portions or all of these envelopes are fire barriers rated at 39-50 minutes. See Topical Report #094 for details.

Attachment 3-1, SH. 7
EHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building Control Fire barrier wrap provided is rated one hour.			Fire Zone CB-FA-1
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EE-SGESSH-1T	480V 1T Engd. Sfgds. Screen House Switchgear	ED 5033	CONT PWR	Remove existing cable from existing trays to FH-FZ-2. Reroute through new fire wrapped trays with fire barrier No. ICCD-FB01* to wrapped Splice Box S-29 with fire barrier No. ICCD-FB01*.	
		ED 5034	CONT PWR	Same as ED 5033.	
		ED 5033A	CONT PWR	New conventional cable from wrapped Splice Box S-29 to new wrapped trays with fire barrier No. ICCD-FB01 through new wrapped trays and wrapped conduit with fire barrier No. ICCD-FB08*. Wrap draped cable.	
		ED 5034A	CONT PWR	Same as ED 5033A.	
EG-CCESV-1C	480V 1C Engd. Sfgds. Valve MCC	LP 5A	PWR	Wrap existing tray, conduit and draped cable with fire barrier No. ICCD-FB02*.	
		LP 5B	PWR	Same as LP 5A.	
DC-P-1B	DH Closed Cycle Pump B	LS 2	PWR	Remove existing cable from existing trays to FH-FZ-2. Reroute through new trays in FH-FZ-2 and new fire wrapped conduit with fire barrier No. ICCD-FB24* in CB-FA-1. Wrap draped cable.	
ED-CCESV-1C	480V 1C Engd. Sfgds. Valve MCC	LS 4A	PWR	Wrap existing conduit and draped cable with fire barrier No. ICCD-FB22*.	
		LS 4B	PWR	Same as LS4A.	
NS-P-1C	NS Cooling Pump C	LS 5A	PWR	Remove existing cable from existing trays to FH-FZ-2. Reroute through new trays in FH-FZ-2 and new fire wrapped trays and conduit with fire barrier No. ICCD-FB01* in CB-FA-1.	In 13R, LS 5A replaced LS 5 to resolve ampacity derating per MD-D542-001.

* Portions or all of these envelopes are fire barriers rated at 39-50 minutes.
See Topical Report #094 for details.

Attachment 3-1, SH. 8
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building Control Fire barrier wrap provided is rated one hour.			Fire Zone <u>CB-FA-1</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EG-CCESV-1B	480V 1B Engd. Sfgds. Valve MCC	LS 7	PWR	Same as LS5.	
ED-SGES-1E	4160V 1E Engd. Sfgds. Switchgear	ME 1	PWR	Wrap existing tray 745 & Pull Box P38 with fire barrier No. ICCD-FB09*.	
		ME 2	PWR	Same as ME 1.	
		ME 28	CONT	Wrap existing tray 126 and existing box P38 with fire barrier no. ICCD-FB09*.	
EF-P-2B	EF Motor Driven Pump B	ME 4	PWR	Same as ME 1.	
EG-SGES-1S	480V 1S Engd. Sfgds. Switchgear	ME 5	PWR	Same as ME 1.	
IC-V-4	IC Supply to RB - Isolation Valve	RV 29	CONT	Sheathed Rockbestos Firezone R cable in new fire wrapped conduit with fire Barrier no. ICCD-FB06*.	
IC-V-3	IC Return from RB- Isolation Valve	RV 179A	CONT	Same as CQ 232B.	RV 179 in FHAR Rev. 7.

* Portions or all of these envelopes are fire barriers rated at 39-50 minutes
See Topical Report #094 for details.

Attachment 3-1, SH. 9
FHAR Rev. 20

Building Control

Fire Zone CB-FA-1

TMI UNIT 1 APPENDIX "R" CABLES

Fire barrier wrap provided is rated one hour.

COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EG-Y-1B	Diesel Generator B	RZ 1	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 2	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 3	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 8	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 13	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 14	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 15	CONT	Same as ME 28.	
		-----	-----	-----	
		RZ 21	CONT	Same as ME 28.	
		-----	-----	-----	
RZ 22	IND	Same as ME 28.			
-----	-----	-----			
RZ 23	CONT	Same as ME 28.			
-----	-----	-----			
RZ 33	CONT	Same as ME 28.			
-----	-----	-----			
RZ 34	CONT	Same as ME 28.			
-----	-----	-----			
RZ 35	CONT	Same as ME 28.			
-----	-----	-----			
RZ 53	CONT	Same as ME 28.			
-----	-----	-----			
RZ 55	CONT	Same as ME 28.			

Attachment 3-1, SH. 10
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES			Building Control		Fire Zone CB-FA-2b
			Fire barrier wrap provided is rated ONE HOUR. Originally installed as 3 hour.		
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-14A	MU Pump Suction Isolation Valve from EWST	CG 802	CONT	Wrap existing tray 143 with fire barrier No. 1CCE-FB02.	Addition to FHAR Rev. 7. Rerouted cable needs protection in this fire area.
		----- CG 805	----- CONT	----- Same as CG 802.	
MU-V-16A	Emergency Makeup Valve A	CQ 313	CONT	Same as CG 802.	Addition to FHAR Rev. 7. MU-V-16A is protected to prevent over-filling of the RC pressurizer.
MU-V-16B	Emergency Makeup Valve B	CQ 323	CONT	Same as CG 802.	
RC3A-PT3	RC Pressure Wide Range	EA 105	CONT PWR	Same as CG 802.	
RS-SCC-A	Remote Shutdown Signal Cond. Cab. A	EA 6822	INST PWR	Same as CG 802.	
RC-RV-2	Pressurizer Relief Valve	ED 523C	CONT	Route cable in existing tray 143 which is wrapped with fire barrier No. 1CCE-FB02.	Addition to FHAR Rev. 8 Rerouted cable needs protection in this area.
DC-P-1A	Decay Heat Closed Clg Wtr Pp A	LP 23	CONT	Same as CG 802.	
DR-P-1A	Decay Heat Riv Wtr Pump A	LR 23	CONT	Same as CG 802.	
EE-SGES-1P	480V 1P Engd. Sfgds. Switchgear	LX 32	CONT	Same as CG 802.	

Attachment 3-1, SH. 11
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control				Fire Zone <u>CB-FA-2b</u>
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.				
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
MU-P-1A	Makeup and Purification Pump A	MD 68	CONT	Same as CG 802.		
PT-950	Steam Gen. A Pressure	RE 465	INST	Reroute existing cable in new fire wrapped conduit with fire barrier No. 1CCE-FB03	Addition to FHAR Rev. 7. Rerouted cable needs protection in this fire area.	
		RE 514	INST	Same as RE 465		
LT-775	Steam Gen. A Level	RE 473	INST	Same as RE 465.	Addition to FHAR Rev. 7. Rerouted cable needs protection in this fire area.	
		RE 510	INST	Same as RE 465.		
EG-Y-1A	Diesel Generator A	RY 4	CONT	Same as CG 802.		
		RY 23	CONT	Same as CG 802.		
RS-TSP-A	Remote Shutdown Transfer Switch Panel A	EA 6912	PWR	Route new fire wrapped conduit with fire barrier No. 1CCE-FB09		
NI-11	RG 1.97 Full Range Neutron Flux (Train A)	EA 19	PWR	Same as CG 802	Addition to FHAR Rev. 9	
RS-SCC-A	Remote Shutdown Signal Conditioning Cabinet A	EA 339	PWR	Install new cable in new conduit wrapped with fire barrier ICCE-FB10.	Addition to FHAR Rev. 9	

Attachment 3-1, SH. 12
FHAR Rev. 18

GPU NUCLEAR TMI UNIT 1 APPENDIX "R" CABLES		Building Control			Fire Zone
		Fire barrier wrap provided is rated one hour. Originally installed as three hour.			CB-FA-2c
COMONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
PT-950	Steam Gen. A Pressure	RE 465	INST	Route existing cable in new fire wrapped conduit with fire barrier No. 1CCE-FB03.	Addition to FHAR Rev. 7. Rerouted cable needs protection in this fire area.
		RE 514	INST	Same as RE 465.	
LT-775	Steam Gen. A Level	RE 473	INST	Same as RE 465.	Addition to FHAR Rev. 7. Rerouted cable needs protection in this fire area.
		RE 510	INST	Same as RE 465.	
RS-TSP-A	Remote Shutdown Transfer Switch Panel A	EA 6912	PWR	Route new fire wrapped conduit with fire barrier No. 1CCE-FB09.	
RS-SCC-A	Remote Shutdown Signal Conditioning Cabinet A	EA 339	PWR	Install new cable in new conduit wrapped with fire barrier 1CCE-FB10.	Addition to FHAR Rev. 9

Attachment 3-1, SH. 13
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Control</u>				Fire Zone <u>CB-FA-2d</u>
		Fire barrier wrap provided is rated one hour. Originally installed as three hour.				
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
IC-P-1B	Intermediate Cooling Pump B	CH 602	CONT	Reroute existing cable in new fire wrapped conduit with fire barrier No. 1CCE-FB04.		
EG-SEC-1C	480V 1C ESV MCC Transfer Switch	RU 283	CONT	Replace existing conduit RU 282 with new fire wrapped conduit with fire barrier No. 1CCE-FB06.		
		----- RU 284	CONT	----- Same as RU 283.		
		RU 289	CONT	----- Replace existing conduit RU 288 with new fire wrapped conduit with fire barrier No. 1CCE-FB05.		

Attachment 3-1, SH. 14
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control				Fire Zone	CB-FA-2e
		Fire barrier wrap provided is rated one hour. Originally installed as three hour.					
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS		
NNI/ICS	NNI/ICS Cabinet	EA 6041A	CONT PWR	Remove existing cable from field run tray T-44-3 and conduit. Route new cable through new fire wrapped conduit with fire barrier No. 1CCE-FB07.			

Attachment 3-1, SH. 15
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control			Fire Zone
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.			<u>CB-FA-2f</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
DR-V-1B	D.H. River Wtr. Discharge Valve B	CBF 361A	CONT	Wrap splice box S-16 and conduit stub with fire barrier No. 1CCE-FB08.	CBF 365 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- CBF 361B	CONT	----- Wrap 18" of Tray 137 and conduit stub with fire barrier No. 1CCE-FB08.	
MU-P-3C	Main Oil Pump for MU-P-1C	CH 201A	CONT	Same as CBF 361A.	CH 203 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- CB 201B	CONT	----- Same as CBF 361B.	
IC-P-1B	Intermediate Cooling Pump B	CH 601	CONT	Same as CBF 361B.	The cable is spliced within this fire area.
		----- CH 601A	CONT	----- Same as CBF 361A.	
		----- CH 603	CONT	----- Same as CBF 361B.	----- The cable is spliced within this fire area.
		----- CH 603A	CONT	----- Same as CBF 361A.	
MU-V-37	Makeup Pump Recirc. Isol. Valve	CR 232	CONT	Same as CBF 361B.	CR 235 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- CR 232E	CONT	----- Same as CBF 361A.	

Attachment 3-1, SH. 16
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control				Fire Zone <u>CB-FA-2f</u>
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.				
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
MU-V-14B	Makeup Pump B Suction Isolation Valve	CR 302C	CONT	Same as CBF 361A.	CR 305 in FHAR Rev. 7. The cable is spliced within this fire area.	
		CR 302D	CONT	Same as CBF 361B.		
MU-V-16C	Emergency Makeup Valve	CR 312D	CONT	Same as CBF 361A.	CR 314 in FHAR Rev. 7. The cable is spliced within this fire area.	
		CR 312E	CONT	Same as CBF 361B.		
MU-V-16D	Emergency Makeup Valve D	CR 322A	CONT	Same as CBF 361A.	Addition to FHAR Rev. 7. MU-V-16D is protected to prevent overfilling of the pressurizer.	
		CR 322B	CONT	Same as CBF 361B.		
NR-V-15B	IC Cooler Outlet Valve	CR 582	CONT	Same as CBF 361B.	CR 583 in FHAR Rev. 7. CR 583 is deleted by design change. CR 582 is spliced within this fire area.	
		CR 582B	CONT	Same as CBF 361A.		
EE-SGES-1S	480V 1S Engd. Sfgds. Switchgear	LS 11	CONT & IND	Same as CBF 361B.	The cable is spliced within this fire area.	
		LS 11A	CONT & IND	Same as CBF 361A.		
EG-CCES-1B	480V 1B Engd. Sfgds. MCC	LS 16	CONT & IND	Same as CBF 361B.	The cable is spliced within this fire area.	
		LS 16A	CONT & IND	Same as CBF 361A.		

Attachment 3-1, SH. 17
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.			Fire Zone CB-FA-2f
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
DC-P-1B	Decay Heat Closed Cooling Water Pump B	LS 21A	CONT	Same as CBF 361A.	LS 24 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- LS 21B	----- CONT	----- Same as CBF 361B.	
NS-P-1C	Nuclear Service Cooling Pump 1C	LS 26A	CONT	Same as CBF 361A.	LS 39 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- LS 26B	----- CONT	----- Same as CBF 361B.	
EE-SGESSH-1T	480V 1T ES Screen House Switchgear	LT 11B	CONT	Same as CBF 361A.	LT 14 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- LT 11C	----- CONT	----- Same as CBF 361B.	
DR-P-1B	Decay Heat River Water Pump B	LT 21A	CONT	Same as CBF 361A.	LT 21 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- LT 21B	----- CONT	----- Same as CBF 361B.	
EG-CCESSH-1B	480V 1B Engd. Sfgd. Valves MCC	LT 51B	CONT & IND	Same as CBF 361A.	LT 53 in FHAR Rev. 7. The cable is spliced within this fire area.
		----- LT 51C	----- CONT & IND	----- Same as CBF 361B.	

Attachment 3-1, SH. 18
FHAR Rev. 18

GPU NUCLEAR TMI UNIT 1 APPENDIX "R" CABLES		Building Control				Fire Zone
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.				<u>CB-FA-2g</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
NNI/ICS	NNI/ICS Cabinet	EA 6041A	CONT PWR	Remove existing conduit and cable. Reroute new fire wrapped conduit through CB-FA-2g with fire barrier No. 1CCE-FB07.		

Attachment 3-1, SH. 19
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES			Building Control Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.			Fire Zone <u>CB-FA-3a</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
NR-V-15A	IC Cooler Outlet Valve A	CR 572A	CONT	Route new cable in a new fire wrapped conduit with fire barrier No. 1CCG-FB01.	Addition to FHAR Rev. 7. Rerouted cable needs protection here.	
NR-V-15B	IC Cooler Outlet Valve B	CR 582A	CONT	Same as CR 572A.	Addition to FHAR Rev. 7. Rerouted cable needs protection here.	
IC-V-4	IC Supply to RB Isolation Valve	RV 28	CONT	Install new fire wrapped conduit through CB-FA-3a with fire barrier No. 1CCG-FB05.	Addition to FHAR Rev. 7. New route of RV 28 needs protection here.	

Attachment 3-1, SH. 20
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Control</u> Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.				Fire Zone <u>CB-FA-3a</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
EG-Y-1B	Diesel Generator B	RZ 59	MET. *POT.	Same as CR 572A.	Addition to FHAR Rev. 7. Rerouted cable needs protection here.	

Attachment 3-1, SH. 21
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control			
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.			
		Fire Zone <u>CB-FA-3b</u>			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EE-SGESSH-1R	480V 1R Engd. Sfgds. Screen House Switchgear	LX 52	CONT	Wrap existing conduit RP 71 with fire barrier No. 1CCG-FB02.	
EE-SGES-1P	480V 1P Engd Sfgds. Switchgear	MD 57	AM INST	Remove existing cable from existing tray and reroute in new fire wrapped conduit with fire barrier No. 1CCG-FB03.	

Attachment 3-1, SH. 22
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Control				Fire Zone
		Fire barrier wrap provided is rated one hour. Originally installed as 3 hour.				<u>CB-FA-3b</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
EE-SGESSH-1R	480V 1R Engd. Sfgds. Screen House Switchgear	MD 87	AM INST	Same as MD 57.		
RC3A-PT3	RC Pressure Wide Range	RG 201	INST	Wrap existing conduit with fire barrier no. 1CCG-FB04.		
MU-V-20	RCP Seal Injection Isolation Valve	RV 343	CONT	Reroute new fire wrapped conduit in CB-FA-3b with fire barrier No. 1CCG-FB05.	Addition to FHAR Rev. 7. New route of RV 343 needs protection here.	
EG-Y-1A	Diesel Generator A	RY 5	CONT	Same as LX 52.		
		RY 6	CONT	Same as LX 52.		

Attachment 3-1, SH. 23
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-1</u>
		Fire barrier wrap provided is rated one hour			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
NR-V-1C	NR-P-1C Discharge Valve	CBF 151	CONT	Existing cable through wrapped tray 150 with fire barrier No. 1FHC-FB03 and trays 165 & 166 with fire barrier No. 1FHC-FB02*.	CBF 154 in FHAR Rev. 7.
		CBF 154A	CONT	Same as CBF 151.	
DR-V-1B	D.H. River Water Discharge Valve B	CBF 361	CONT	Same as CBF 151.	
		CBF 364	CONT	Same as CBF 151.	
MU-P-3C	Main Oil Pump for MU-P-1C	CH 11A	PWR	Remove existing cable and replace with new Rockbestos Firezone R cable for entire route through tray 558 and field run tray T-52-14 in FH-FZ-1.	
MU-V-36	Make-up Pump Recirc. Isolation Valve	CQ 232A	CONT	Sheathed Rockbestos Firezone R cable in existing tray 146 in FH-FZ-1 to wrapped Splice Box S-8 with fire barrier No. 1FHC-FB07*.	CQ 232 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CQ 232B	CONT	New conventional cable from wrapped Splice Box S-8 with fire barrier No. 1FHC-FB07* to duct bank in new wrapped conduit with fire barrier No. 1FHC-FB07*.	
MU-V-37	Make-up Pump Recirc. Isolation Valve	CR 232A	CONT	New conventional cable in new wrapped conduit to wrapped conduit to wrapped Splice Box S-14 with fire barrier No. 1FHC-FB12.	CR 232 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 232B	CONT	Unsheathed Rockbestos Firezone R cable in new conduit to tray 150 and sheathed Rockbestos Firezone R cable to wrapped Splice Box S-24 with fire barrier No. 1FHC-FB13*.	
		CR 232C	CONT	New conventional cable from wrapped Splice Box S-24 with fire barrier No. 1FHC-FB13, through wrapped tray 150 with fire barrier No. 1FHC-FB03 to duct bank.	
MU-V-14B	MU Pump Suction Isolation Valve from BWST	CR 302A	CONT	Sheathed Rockbestos Firezone R cable from wrapped Splice Box S-24 with fire barrier No. 1FHC-FB13* through existing tray 150 in FH-FZ-1.	CR 302 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 302B	CONT	Same as CR232C.	

*Portions or all of these envelopes are fire barriers rated at 39-50 minutes.
See Topical Report 094 for details.

Attachment 3-1, SH. 24
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES			Building <u>Fuel Handling</u> Fire barrier wrap provided is rated one hour.		Fire Zone <u>FH-FZ-1</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-16C	Emergency Makeup Valve C	CR 311A	CONT	Sheathed Rockbestos Firezone R cable in existing trays 150 & 164 in FH-FZ-1.	CR 311 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 311B	CONT	Same as CR 311A.	
		CR 312A	CONT	Same as CR 302A.	CR 312 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 312B	CONT	Same as CR 302A.	
		CR 312C	CONT	Same as CR 232C.	
MU-V-16D	Emergency Makeup Valve D	CR 321A	CONT	Same as CR 311A.	Addition to FHAR Rev. 7. MU-V-16D is protected to prevent over-filling of the pressurizer. The cables are spliced within this fire zone.
		CR 321B	CONT	Same as CR 311A.	
		CR 322C	CONT	Same as CR 302A.	
		CR 322D	CONT	Same as CR 302A.	
		CR 322E	CONT	Same as CR 232C.	
IC-V-2	IC Return to RB Isol. Valve	CR 362A	CONT	Same as CR 302A	CR 362 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 362B	CONT	Same as CR 232C.	
		CR 365A	CONT	Same as CR 302A.	CR 365 in FHAR Rev. 7. The cable is spliced within this fire zone.
		CR 365B	CONT	Same as CR 232C.	

Attachment 3-1, SH. 25
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-1</u>
		Fire barrier wrap provided is rated one hour.			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EE-SGESSH-1T	480V ES Screen Hse. Swgr. 1T	ED 308A	CONT PWR	Wrap existing field run tray T-52-58, conduit, and box T 847 with fire barrier No. 1FHC-FB05*.	
		ED 308B	CONT PWR	Same as ED 308A.	
RC-RV-2	Pressurizer Relief Block Valve	ED 523B	CONT	Same as CQ 232A	ED 523 in FHAR Rev. 7. The cable is spliced within this fire zone.
		ED 523C	CONT	New conventional cable from wrapped Splice Box S-8 in wrapped conduit to duct with fire barrier No. 1FHC FB07*.	
EE-SGESSH-1T	480V ES Screen Hse. Swgr. 1T	ED 5033	CONT PWR	Wrap existing conduit, draped cable and cable in tray 558 with fire barrier No. 1FHC-FB05*.	
		ED 5034	CONT PWR	Same as ED 5033.	
EE-SGESSH-1T	480V 1T ES Screen Hse Swgr.	LT 11	CONT & IND	Same as CBF 151.	
		LT 12	CONT	Same as CBF 151.	
		LX 61	CONT	Same as CBF 151.	

*Portions of these envelopes are fire barriers rated at 39-50 minutes.
See Topical Report #094 for details.

Attachment 3-1, SH. 26
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-1</u>
		Fire barrier wrap provided is rated one hour.			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
NR-P-1C	Nuclear Service River Water Pump C	LT 16	CONT	Same as CBF 151.	LT 33 in FHAR Rev. 7.
		LT 19	CONT	Same as CBF 151.	
		LT 33A	CONT	Same as CBF 151.	
DR-P-1B	Decay Heat River Water Pump B	LT 21	CONT & IND	Same as CBF 151.	
		LT 24	CONT	Same as CBF 151.	
EG-CCESSH-1B	480V 1B Engd. Sfgds. Screen House MCC	LT 51	CONT & IND	Same as CBF 151.	
MU-P-1C	Make-up Pump C	ME 7	PWR	Wrap the entire length of cable in tray No. 751 in FH-FZ-1 with fire barrier No. 1FHC-FB01.	
EE-SGESSH-1T	480V 1T Engd. Sfgds. Screen House Swgr.	ME 11	PWR	Wrap the entire length of tray 756 in FH-FZ-1 with fire barrier no. 1FHC-FB04.	
SP6A-PT1	Steam Gen. A. Outlet Pressure	RE 109	INST	Cut and reroute existing cable from Embd. ducts to fire wrapped conduit and Splice Box S-11 with fire barrier No. 1FHC-FB10.	The cable is spliced within this fire zone.
		RE 109B	INST	Sheathed Rockbestos Firezone R cable from wrapped Splice Box S-11 with fire barrier No. 1FHC-FB10 through existing trays 842 & 843 to wrapped penetration 313 with fire barrier No. 1FHC-FB17.	

Attachment 3-1, SH. 27
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Fuel Handling Fire barrier wrap provided is rated one hour.			Fire Zone <u>FH-FZ-1</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
SP6B-PT1	Steam Gen. B. Outlet Pressure	RE 110	INST	Wrap existing trays 840 & 841 and Pent. 205 with fire barrier No. 1FHC-FB06 & 1FHC-FB15.	
SP6A-PT2	Steam Gen. A. Outlet Pressure	RE 111	INST	Same as RE 110.	
SP6B-PT2	Steam Gen. B. Outlet Pressure	RE 112	INST	Same as RE 109.	The cable is spliced within this fire zone.
		RE 112B	INST	Same as RE 109B	
RC1-LT3	Pressurizer Level (Temp. Comp.)	RE 158	INST	Same as RE 110.	
RC4A-TE1	RC Outlet Temp. Wide Range	RE 170	INST	Cut and reroute existing cable through new fire wrapped conduit from Splice Box S-9 to Embd. ducts. Wrap box with fire barrier No. 1FHC-FB08.	The cable is spliced within this fire zone.
		RE 170B	INST	Sheathed Rockbestos Firezone R cable from wrapped Splice Box S9 with fire barrier 1FHC-FB08 through existing trays 837, 838 & 839 to wrapped penetration 204 with fire barrier No. 1FHC-FB16.	
RC5A-TE2	RC Inlet Temp. Wide Range	RE 178	INST	Same as RE 109.	The cable is spliced within this fire zone.
		RE 178B	INST	Same as RE 109B.	

Attachment 3-1, SH. 28
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-1</u>
		Fire barrier wrap provided is rated one hour.			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
RC5A-TE4	RC Inlet Temp. Wide Range	RE 180	INST	Cut and reroute existing cable through new fire wrapped conduit from Splice Box S-12 to Embd. ducts. Wrap box with fire barrier No. 1FHC FB11.	The cable is spliced within this fire zone.
		----- RE 180B	----- INST	----- Sheathed Rockbestos Firezone R cable from wrapped Splice Box S12 with fire barrier No 1FHC-FB11 through existing trays 844 & 845 to wrapped penetration 314 with fire barrier No. 1FHC-FB18.	
PT-950	Steam Gen. A. Pressure Train A	RE 465	INST	Same as RE 170.	The cable is spliced within this fire zone.
		----- RE 465B	----- INST	----- Same as RE 170B.	
PT-951	Steam Gen. B. Pressure Train B	RE 467	INST	Same as RE 110.	
LT-775	Steam Gen. A. Level (Full Range - Train A)	RE 473	INST	Same as RE 170.	The cable is spliced within this fire zone.
		----- RE 473B	----- INST	----- Same as RE 170B.	
LT-776	Steam Gen. B. Level (Full Range - Train B)	RE 479	INST	Same as RE 110.	
RC2-TE2	Pressurizer Temp.	RE 495	INST	Same as RE 110.	
RC3A-PT1	RC Pressure Narrow Range	RG 18	INST	Same as RE 170.	The cable is spliced within this fire zone.
		----- RG 18B	----- INST	----- Same as RE 170B.	

Attachment 3-1, SH. 29
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building Fuel Handling		Fire Zone <u>FH-FZ-1</u>	
		Fire barrier wrap provided is rated one hour.			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
RC3A-PT3	RC Pressure Wide Range (Loop A)	RG 201	INST	Same as RE 170.	The cable is spliced within this fire zone.
		----- RG 201B	----- INST	----- Same as RE 170B.	
MU-P-1C	Makeup Pump C	RK 953	CONT	Same as CR 232C	The cable is spliced within this fire zone.
		----- RK 953A	----- CONT	----- Same as CR 302A.	
EF-V-30B	EF Train B Control Valve to Steam Gen. A	RL 56	INST	Cut and reroute existing cable through new fire wrapped conduit from Embd. ducts to Splice Box S-10. Wrap box and conduit with fire barrier No. 1FHC-FB09.	The cable is spliced within this fire zone.
		----- RL 56A	----- INST	----- Sheathed Rockbestos Firezone R cable in new conduit and existing trays 1008 & 1009 through FH-FZ-1.	
EF-V-30D	EF Train B Control Valve to Steam Gen. B	RL 57	INST	Same as RL 56.	The cable is spliced within this fire zone.
		----- RL 57A	----- INST	----- Same as RL 56A.	
IC-V-4	IC Supply to RB Isol. Valve	RV 29	CONT	Sheathed Rockbestos Firezone R cable in new conduit from Embd. duct through existing trays 169 & 170 to wrapped Splice Box S27 with fire barrier No. 1FHC-FB19.	
		----- RV29A	----- CONT	----- Sheathed Rockbestos Firezone R cable from wrapped Splice Box S27 with fire barrier No. 1FHC-FB19 to existing tray 170 in FH-FZ-1.	
IC-V-3	IC supply to RB Isol. Valve	RV 179	CONT	Same as CQ 232A.	The cable is spliced within this fire zone.
		----- RV 179A	----- CONT	----- Same as CQ 232B.	
LT-809	RG 1.97 EWST Level (Train E)	RE 384	INST	Install fire barrier (1FHC-FB20) on conduit RE 384. Cable is already routed through fire wrapped trays 840 and 841 (1FHC-FB06).	Addition to FHAR Rev. 9
NI-12	RG 1.97 Full Range Neutron Flux (Train B)	RG 441	INST	Install new cable to existing fire wapped pent. 201 (1FHC-FB14) and tray 841 (1FHC-FB06) and new conduit RG 441 wrapped with fire barrier (1FHC-FB21).	Addition to FHAR Rev. 9

Attachment 3-1, SH. 30
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-2</u>
		Fire barrier wrap provided is rated one hour.			
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-37	Makeup Pump Recirc. Isolation Valve	CR 232C	CONT	Install new cable and new fire wrapped conduit with fire barrier No. 1CCD-FB23.	CR 232 in FHAR Rev. 7.
DH-V-6B	RB Sump to DH Pump B Isol. Valve	CR 262A	CONT	Same as CR232C.	Addition to FHAR Rev. 7. DH-V-6B must be protected because the time to manually operate DH-V-5B will exceed the requirements since the valve is not accessible until the fire in this zone is extinguished.
IC-V-2	IC Return from RB Isol. Valve	CR 362B	CONT	Same as CR 232C.	CR 362 in FHAR Rev. 7.
		----- CR 365B	CONT	----- Same as CR 232C.	----- CR 365 in FHAR Rev. 7.

Attachment 3-1, SH. 31
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Fuel Handling</u>			Fire Zone <u>FH-FZ-5</u>
Fire barrier wrap provided is rated three hours.					
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-37	Makeup Pump Recirc. Isolation Valve	CR 232C	CONT	Install new cable and new fire wrapped conduit with fire barrier No. 1CCE-FR01.	CR 232 in FHAR Rev. 7
IC-V-2	IC Return from RB Isolation Valve	CR 362B	CONT	Same as 232C.	CR 362 in FHAR Rev. 7
		----- CR 365B	----- CONT	----- Same as 232C.	----- CR 365 in FHAR Rev. 7

Attachment 3-1, Sh. 32
FHAR Rev. 18

TMI UNIT 1 APPENDIX "R" CABLES			Building Fuel Handling Fire Zone FH-FZ-6 Fire barrier wrap provided is rated one hour		
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
MU-V-36	MU Pumps Recirc. Isol. Valve	CQ 232B	CONT	Install new cable in fire wrapped electrical duct 3221 with fire barrier No. 1CCC-FB01*.	CQ 232 in FHAR Rev. 7
RC-V-2	Pressurizer Relief Block Valve	CS 262A	CONT	Same as CQ 232B.	CS 262 in FHAR Rev. 7
NR-V-18	Nuclear & IC Cooler Outlet Valve	CS 312A	CONT	Same as CQ 232B.	CS 312 in FHAR Rev. 7
PT-950	Steam Gen A Pressure (Train A)	RE 465	INST	Wrap Electrical duct 3301 with fire barrier No. 1CCC-FB03	
LT-775	Steam Gen. A Level (Wide Range Train A)	RE 473	INST	Same as RE 465	
IC-V-4	IC Supply to RB Isolation Valve	RV 29	CONT	Install new cable in fire wrapped electrical duct 3257 with fire barrier No. 1CCC-FB02*.	
IC-V-3	IC Return from RB Isol. Valve	RV 179A	CONT	Same as CQ 232B.	RV 179 in FHAR Rev. 7
EG-CCEV-1C	480 IC Engd. Sfgds. Valve MCC	LP 5A LP 5B	PWR PWR	Wrap electrical duct 3253 with fire barrier No. 1CCC-FB04*. Wrap electrical duct 3254 with fire barrier No. 1CCC-FB05*.	Addition to FHAR Rev. 7
NI-11	RG 1.97 Full Range Neutron Flux (Train A)	EA 19	PWR	Install new cable in fire wrapped electrical duct 3223 with fire barrier No. 1CCC-FB07*.	Addition to FHAR Rev. 9
NI-11	RG 1.97 Full Range Neutron Flux (Train A)	RG 342	INST	Install new cable in fire wrapped electrical duct 3306 with fire barrier No. 1CCC-FB06*.	Addition to FHAR Rev. 9

* Portions of these barriers are rated at 50 minutes. See Topical Report #094 for details.

Attachment 3-1, Sh. 33
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building Intake Screen Pumphouse Fire Barrier wrap provided is rated one hour			Fire Zone	ISPH-FZ-1
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
NR-V-1C	NR-F-1C Discharge Valve	CBF 151	CONT & IND	Cut and reroute existing cable thru new wrapped conduit to wrapped Splice Box S-1 with fire barrier No 1SHD-FR01*.	CBF 151 in FHAR Rev. 7. This cable is spliced within this fire zone.	
		CBF 151A	CONT & IND	Sheathed Rockbestos firezone R cable from Splice Box S-1 with fire barrier No. 1SHD-FR01* to new conduit, to existing Trays 511, 114 and 115 and to switchgear.		
		CBF 154	CONT	Same as CBF 151 (New Remote Shutdown Circuit)	CBF 154 in FHAR Rev. 7. This cable is spliced within this fire zone.	
		CBF 154A	CONT	Same as CBF 151A (New Remote Shutdown Circuit)		
EE-SGESSH-1T	480V 1T Engd. Sfgds. Screenhouse Switchgear	ED308A	CONT PWR	Cut and reroute exist, cable to Splice Box S-2. Cable and box are wrapped with fire barrier No. 1SHD-FR02.	ED 308A in FHAR Rev. 7. This cable is spliced within this fire zone.	
		ED308C	CONT PWR	Sheathed Rockbestos Firezone R cable from Splice Box S-2 with fire barrier No. 1SHD-F02 to new conduit to existing trays 511 and 512 and to switchgear.		
		ED308B	CONT PWR	Same as ED308A	ED308B in FHAR Rev. 7. This cable is spliced within this fire zone.	
		ED308D	CONT PWR	Same as ED308C		
		LT11	CONT & IND	Same as CNF 151	LT 11 in FHAR Rev. 7. This cable is spliced within this fire zone.	
		LT11A	CONT & IND	Same as CBF 151A		

* Portions of these envelopes are fire barriers rated at 39-50 minutes. See Topical Report #094 for details.

Attachment 3-1, Sh. 34
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Intake Screen Pumphouse</u> Fire Barrier wrap provided is rated one hour		Fire Zone <u>ISPH-F2-1</u>	
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EE-SGESSH-1T (Cont'd)	480V 1T Engd. Sfgds. Screenhouse Switchgear	LT12	CONT	Same as CBF 151.	LT 12 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LT12A	CONT	Same as CBF 151A.	
		LX61	CONT	Same as CBF 151	LX 61 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LX61A	CONT	Same as CBF 151A	
		ME11	PWR	Wrap cable in tray 735 & 736 with fire barrier No. 1SHD-FB05*.	
NR-P-1C	Nuclear Service River Water Pump C	LT6	CONT	Same as CBF 151	LT 16 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LT16A	CONT	Same as CBF 151A	

* Portions of this envelope are rated at 39 minutes. See Topical Report #094 for details.

Attachment 3-1, Sh. 35
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES		Building <u>Intake Screen Pumphouse</u> Fire Zone <u>ISPH-FZ-1</u> Fire barrier wrap provided is rated one hour.			
COMPONENT	CIRCUIT COMPONENT FUNCTION	CIRCUIT NO.	FUNCTION	DESCRIPTION OF WORK	REMARKS
NR-P-1C (Cont'd)	Nuclear Service River Water Pump C	LR 18	CONT	Unsheathed Rockbestos Firezone R cable routed in conduit. Replace LR18 & LT17 with a single 7/c-1/2 Rockbestos Firezone R cable See ISPH-FZ-2.	
	LT 18		CONT	Unsheathed Rockbestos Firezone R cable in conduit.	
	LT 19		CONT	Same as CBF 151.	LT 19 in FHAR Rev. 7. This cable is spliced within this fire zone.
	LT 19A		CONT	Same as CBF 151A.	
	LT 33		CONT	Same as CBF 151 (New remote shutdown circuit).	LT 33 in FHAR Rev. 7. This cable is spliced within this fire zone.
	LT 33A		CONT	Same as CBF 151A (New remote shutdown circuit).	
EG-CCESSH-1B	480V 1B Engd. Sfgds. Screen House MCC	LT 51	CONT & IND	Same as CBF 151.	LT 51 in FHAR Rev. 7. This cable is spliced within this fire zone.
	LT 51A		CONT & IND	Same as CBF 151A.	

Attachment 3-1, Sh. 36
FHAR Rev. 17

TMI UNIT I APPENDIX "R" CABLES			Building Intake Screen Pumphouse Fire Barrier wrap provided as rated one hour		Fire Zone ISPH-FZ-2
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
NR-V-1A	NR-P-1A Discharge	CBE 489	CONT	Cut and reroute existing cable through new wrapped conduit to wrapped Splice Box S-3 with fire barrier No. 1SHD-FB03 *	CBE 489 in FHAR Rev. 7. This cable is spliced within this fire zone.
		CBE 489A	CONT	Sheathed Rockbestos Firezone R cable from Splice Box S-3 with fire barrier No. 1SHD-FB03 * to new conduit to existing tray 110, and to switchgear.	
EE-SGESSH-1R	480V 1R Engd. Sfgds. Switchgear	ED 108A	CONT PWR	Cut and reroute exit. cable to Splice Box S-4. Cable and box are wrapped with fire barrier No. 1SHD-FB04.	ED 108A in FHAR Rev. 7. This cable is spliced within this fire zone
		ED 108C	CONT PWR	Sheathed Rockbestos Firezone R cable from Splice Box S-4 with fire barrier No 1SHD-FB04 in new conduit, existing tray 515 to switchgear.	ED 108B in FHAR Rev. 7. This cable is spliced within this fire zone.
		ED 108B	CONT PWR	Same as ED108A.	
		ED 108D	CONT PWR	Same as ED108C.	
		LR 11	CONT	Same as CBE 489.	LR 11 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LR 11A	CONT	Same as CBE 489A	LR 12 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LR 12	CONT	Same as CBE 489	
		LR 12A	CONT	Same as CBE 489A	
		LX 51	CONT	Same as CBE 489	LX 51 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LX 51A	CONT	Same as CBE 489A	LX 53 in FHR Rev. 7. This cable is spliced within this fire zone, and combined with LX 51A.
		LX 53	CONT	Same as CBE 489	

* Portions of this barrier are rated at 50 minutes.
See Topical Report #094 for Details.

Attachment 3-1, SH.37
FHAR Rev. 20

TMI UNIT 1 APPENDIX "R" CABLES			Building Intake Screen Pumphouse Fire Barrier wrap provided as rated one hour		Fire Zone ISPH-FZ-2
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
EE-SGESSH-IR	480V 1R Engd. Sfgds. Screen House Switchgear	MD 11	PWR	Wrap cable in tray 733 with fire barrier No. ISHD-FB06.*	
NR-P-1A	Nuclear Service River Water Pump A	LR 16	CONT & IND	Same as CBE 489	LR 16 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LR 16A	CONT	Unsheathed Rockbestos Firezone R cable routed in conduit.	
		LR 17	CONT	Unsheathed Rockbestos Firezone R cable routed in conduit.	
		LR 18	CONT	Unsheathed Rockbestos Firezone R cable routed in conduit. Replace LR18 and LT17 with a single 7/c-12 Rockbestos Firezone R cable A total of (7) conductors are needed for both circuits. (LR18 and LT17 are presently run in the same conduit to the same component.)	
		LR 19	CONT	Same as CBE 489.	LR 19 in FHAR Rev. 7. This cable is spliced within this fire zone.
		LR 19A	CONT	Same as CBE 489A	
EG-CC-ESSH-1A	480V 1A Engd Sfgds Screen House MCC	LR 47	CONT	Same as CBE 489	LR 47 FHAR Rev. 8. This cable is spliced within this fire zone.
		LR 47A	CONT	Same as CBE 489A	

* Portions of this barrier are rated at 39 minutes.
See Topical Report #094 for Details

Attachment 3-1, SH.38
FHAR Rev. 20

TMI UNIT 1 APENDIX "R" CABLES			Building Reactor		Fire Zone	RB-FZ-1a
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
RC-V-2	Pressurizer Relief Block Valve	CS 33B	PWR	Remove and spare existing cable Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 317 to valve Install radiant energy heat shield ICC-REHS-03 on penetration 317.	CS 33A in FHAR Rev. 7	
		CS 261B	CONT	Same as CS 33B	CS 261A in FHAR Rev. 7	
		CS 261C	CONT	Same as CS 33B	EX 261A in FHAR Rev. 7	
RC-RV-2	Pressurizer Relief Valve	ED 523E	CONT	Remove and spare existing cable Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 317 to valve. Install radiant energy heat shield ICC-REHS-03 on penetration 317 and on cable in penetration	ED 523A in FHAR Rev. 7	
T-775	Steam Generator A Level (Wide Range Train A)	RE 473C	INST	Remove and spare existing cable Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 204 to transmitter LT-775 via Box J831. Install radiant energy heat shield ICC-REHS-06 on penetration and ICC-REHS-01 on the transmitter and transmitter splicing box/condulet.	Addition to FHAR Rev 7. The new cable is routed in this zone.	

Attachment 3-1, SH 39
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES			Building <u>Reactor</u>		Fire Zone	<u>RB-FZ-1b</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
RC1-LT3	Pressurizer Level (Temp. Cont)	RE 158B	INST	Remove and spare existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 205 to transmitter. Install radiant energy heat shield ICC-REHS-05 on penetration and ICC-REHS-04 on the transmitter and transmitter splicing box/condulet	RE 158A in FHAR Rev. 7.	
LT-775	Steam Generator A Level (Wide Range - Train A)	RE 473C	INST	See RB-FZ-1A	RE 473A in FHAR Rev 7	

Attachment 3-1, SH 40
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES		Building Reactor			Fire Zone	RB-FZ-1c
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
RC-RV-2	Pressurizer Relief Valve	ED 523E	CONT	See RB-FZ-1a	ED 523A in FHAR Rev. 7	
RC-V-2	Pressurizer Relief Block Valve	CS 33B	RWP	See RB-FZ-1A	CS33A in FHAR Rev. 7	
		CS 261B	CONT	See RB-FZ-1A	CS 261A in FHAR Rev. 7	
		CS 261C	CONT	See RB-FZ-1a	CS 261A in FHAR Rev. 7	
RC1-LT3	Pressurizer Level (Temp. Comp)	RE 158B	INST	See RB-FZ-1B	RE 158A in FHAR Rev. 7.	
TE-961	RC Inlet Temp (Loop B)	RE 463A	INST	Remove existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 205 to RTD. Install radiant energy heat shield ICC-REHS-05 on penetration, and ICC-REHS-08 on the RTD and RTD splicing box/condulet		
PT-950	Steam Gen A Pressure (Train A)	RE 465C	INST	Remove and spare existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 204 to transmitter. Install radiant energy heat shield ICC-REHS-06 on penetration and ICF-REHS-03 on the transmitter and transmitter splicing box/condulet.	RE 465A in FHAR Rev. 7	
PT-951	Steam Gen B Pressure (Train B)	RE 467A	INST	Remove existing cable Route new unsheathed Rockbestos Firezone R cable in conduit from penetration 205 to transmitter. Install radiant energy heat shield ICC-REHS-05 on penetration and ICF-REHS-04 on the transmitter and transmitter splicing box/condulet		
LT-775	Steam Gen. A Level (Wide Range-Train A)	RE 473C	INST	See RB-FZ-1a	RE 473A in FHAR Rev. 7	

Attachment 3-1, SH 41
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES		Building Reactor		Fire Zone	RB-FZ-1c
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
LT-776	Steam Gen. B Level (Wide Range - Train B)	RE 479A	INST	Remove existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit form penetration 205 to transmitter. Install radiant energy heat shield ICC-REHS-05 on penetration and ICC-REHS-02 on transmitter splicing box/condulet	
RC2-TE2	Pressurizer Temperature	RE 495A	INST	Remove existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit form penetration 205 to terminal box T670 (splice to RTD leads) Install radiant energy heat shield ICC-REHS-05 on penetration and ICF-REHS-01 on the terminal box and conduit containing the RTD leads outside of the D ring	
PT-949	RC Pressure Wide Range (Loop B)	RE 499A	INST	Remove existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit form penetration 205 to transmitter. Install radiant energy heat shield ICC-REHS-05 on penetration and ICF-REHS-05 on the transmitter and the transmitter splicing box/condulet.	
TE-960	RC Outlet Temp (Loop B)	RE 501A	INST	Remove existing cable. Route new unsheathed Rockbestos Firezone R cable in conduit form penetration 205 to transmitter. Install radiant energy heat shield ICC-REHS-05 on penetration and ICF-REHS-05 on the transmitter and the transmitter splicing box/condulet.	
NI-12	RG 1.97 Full Range Neutron Flux (Train B)	RG 441A	INST	Install new cable in existing fire wrapped Pent. 201 (ICC-REHS-07) and new conduit, pull box P850, and gamma metric J-Box wrapped with radiant energy heat shield ICC-REHS-09.	Addition to FHAR Rev. 9
		RG 441B	INST	Route new cable from the new gamma metric J-box to the new fission chamber detector. Install radiant energy heat shield ICC-REHS-09 from the gamma metric J-Box to the D-Ring	

Attachment 3-1, SH. 42
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES		Building <u>Reactor</u>		Fire Zone	<u>RB-FZ-1d</u>
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
RC-RV-2	Pressurizer Relief Valve	ED 523E	CONT	See RB-FZ-1A	ED-523A in FHAR Rev. 7
RC-RV-2	Pressurizer Relief Block Valve	CS 33B	PWR	See RB-FZ-1A	CS 33A in FHAR Rev. 7
		CS 261B	CONT	See RB-FZ-1A	CS 261A in FHAR Rev. 7
		CS 261C	CONT	See RB-FZ-1a	CS 261A in FHAR Rev. 7
RC2-TE2	Pressurizer Temperature	RTD Lead	INST		Protection is not required Operator procedure allows manual calculation of temperature compensated pressurizer level.

Attachment 3-1, SH. 43
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES			Building Reactor		Fire Zone	RB-FZ-1e
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
TE-971	RC Inlet Temp Loop B	RE 463A	INST	See RB-FZ-1c.		
TE-960	RC Outlet Temp Loop B	RE 501A	INST	See RB-FZ-1c		

Attachment 3-1, SH. 44
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES		Building Reactor		Fire Zone	RB-FZ-2
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO.	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS
RC-RV-2	Pressurizer Relief Block Valve	CS 33B	PWR	See RB-FZ-1a	ECS 33 in FHAR Rev. 7
		CS 261B	CONT	See RB-FZ-1a	CS 261A in FHAR Rev. 7
		CS 261C	CONT	See RB-FZ-1a	CS 261A in FHAR Rev. 7
RC-RV-2	Pressurizer Relief Valve	ED 523E	CONT	See RVB-FZ-1a	ED 523A in FHAR Rev. 7
PT-950	Steam Gen A Pressure (Train A)	RE 465C	INST	See RB-FZ-1c	RE 465A in FHAR Rev. 7

Attachment 3-1, SH 45
FHAR Rev. 18

TMI UNIT 1 APENDIX "R" CABLES		Building Reactor			Fire Zone	RB-FZ-2
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
PT-951	Steam Gen. B Pressure Train B	RE 467A	INST	See RB-FZ-1c.		
RC2-TE2	Pressurizer Temperature	RE 473C	INST	See RB-FZ-1a.	RE 473A in FHAR Rev. 7	
		RE 495A	INST	See RB-FZ-1c.		
PT-949	RC Pressure Loop B Wide Range	RE 499A	INST	See RB-FZ-1c.		

Attachment 3-1, SH 46
FHAR Rev 18

TMI UNIT 1 APENDIX "R" CABLES		Building Reactor			Fire Zone	F _B -FZ-3
COMPONENT	COMPONENT FUNCTION	CIRCUIT NO	CIRCUIT FUNCTION	DESCRIPTION OF WORK	REMARKS	
PT-949	RC Pressure Wide Range (Loop B)	RE 499A	INST	See RB-FZ-1c		

Attachment 3-1, SH 47
FHAR Rev. 18

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 1

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
AS-V-4	Closed	Closed	Closed	Spurious	No manual action required	2 Hours ⁸	None	IB-FZ-2	This valve must remain closed to prevent uncontrollable release of main steam when the turbine driven emergency feedwater pump is used. The valve will be manually closed if it spuriously opens. The 120 minute limit corresponds to the time allowed to operate EP-P-1 and EF-V-30 control valves. See Note 8.
BS-V-2A	Closed	Closed	Closed	See Discussion	1 Hr	3 to 72 Hrs ¹	BS-V-2B	AB-FZ-4	This valve must remain closed to prevent introduction of NaOH into the RCS. Any spurious operation will be corrected manually before starting the corresponding DH pump.
BS-V-2B	Closed	Closed	Closed	See Discussion	1 Hr.	3 to 72 Hrs ¹	BS-V-2A	AB-FA-4	Same remark as BS-V-2A
BS-V-3A	Closed	Closed	Closed	See Discussion	2 Hrs	3 to 72 Hrs ¹	BS-V-3B	AB-FA-1	This valve, on the RB Sump-BWST suction line, is required to be closed to prevent the reactor coolant from entering the spray system during cold shutdown. It will be manually closed before starting the corresponding DH pump for cold shutdown.
BS-V-3B	Closed	Closed	Closed	See Discussion	2 Hrs	3 to 72 Hrs ¹	BS-V-3A	AB-FA-2	Same remark as BS-V-3A
CO-V-12	Closed	Open	Open	See Discussion	--	No Limit	CO-V-13 CO-V-14B	TB-FA-1	CO-V-12 with CO-V-14A or CO-V-13 with CO-V-14B are required to be opened if the hot well is used as the source of condensate water for the EF system. Since the CST's are the primary source of condensate water, these valves will be manually opened when required.
CO-V-13	Closed	Open	Open	See Discussion	--	No Limit	CO-V-12 CO-V-14A	TB-FA-1	Same remark as CO-V-12
CO-V-14A	Open	Open	Open	See Discussion	--	No Limit	CO-V-13 CO-V-14B	IB-FZ-4	Same remark as CO-V-12

Rev 18

ATTACHMENT 2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 2

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
CO-V-14B	Open	Open	Open	See Discussion	--	No Limit	CO-V-12	IB-FZ-4	Same remark as CO-V-12
CO-V-111A	Open	Open	Open	--	--	None	CO-V-14A EF-V-1A EF-V-1B	IB-FZ-4	CO-V-111A with CO-V-111B and EF-V-1A with EF-V-1B provides two paths for the condensate water from the CSTs to the EF system. Since Appendix R assumes only one hot short to occur for any fire scenario, at least three valves are always opened for shutdown. Therefore, spurious operation of one valve does not present a problem.
CO-V-111B	Open	Open	Open	--	--	None	EF-V-1A EF-V-1B	IB-FZ-4	Same remark as CO-V-111A
DC-V-2A	Open	--	Throttled	Spurious/Required	2 Hrs	3 to 72 Hrs. ¹	DC-V-2B	AB-FA-1	This electro-pneumatic valve is required to be throttled open to provide cooling water through the DH cooler. Valve fails open upon loss of power or instrument air. Spurious closure can be mitigated by disconnecting power or air at the valve solenoid. It can be manually open for cold shutdown.
DC-V-2B	Open	--	Throttled	Spurious/Required	2 Hrs	3 to 72 Hrs. ¹	DC-V-2A	AB-FA-2	Same remark as DC-V-2A.
DC-V-65A	Closed	--	Throttled	Spurious/Required	2 Hrs	3 to 72 Hrs. ¹	DC-V-65B	AB-FA-1	This electro-pneumatic valve is required to be throttled closed to provide cooling water through the DH cooler. Valve fails closed upon loss of power or instrument air. Spurious opening can be mitigated by disconnecting power or air at the valve solenoid. It can be manually throttled closed for cold shutdown.
DC-V-65B	Closed	--	Throttled	Spurious/Required	2 Hrs	3 to 72 Hrs. ¹	DC-V-65A	AB-FA-2	Same remark as DH-V-65A
DH-V-1	Closed	Closed	Open	Spurious/Required	3 Hrs.	3 to 72 Hrs. ¹	None	RB-FZ-1e	DH-V-1, DH-V-2, and DH-V-3 are in series. One of the high-low pressure boundary valves is required to remain closed during hot shutdown. They must be opened for the decay heat removal during cold shutdown. Spurious opening of DH-V-1 is of no concern because DH-V-2 is prevented from spurious opening by removing the electric power. DH-V-1 and 2 will be manually opened for cold shutdown.

Rev. 15

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 3

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
DH-V-2	Closed	Closed	Open	Spurious/ Required	2 Hrs	3 to 72 Hrs ¹	None	RB-FZ-1c	Same remark as DH-V-1.
DH-V-3	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	None	AB-FZ-4	This valve must be opened for the decay heat removal. It will be operated manually during cold shutdown. Protection from spurious operation is provided for DH-V-1 and 2. See discussion above.
DH-V-4A	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	DH-V-4B	AB-FZ-4	The valve on the decay heat loop in service must be opened during the later stage of cooldown. It will be opened manually.
DH-V-4B	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	DH-V-4A	AB-FZ-4	Same remark as DH-V-4A.
DH-V-5A	Open	Open	Closed	Required	45 Mins	3 to 72 Hrs ¹	DH-V-5B	AB-FZ-5	This suction valve on the decay heat loop in service must be closed during the later stage of cooldown. It can also be used to mitigate spurious operation of RB sump isolation valve DH-V-6A (6B) during hot shutdown (45 min. time limit). For either case, the valve will be closed manually.
	Open	Closed	Closed	Required	45 Mins.	45 Mins See discussion			
DH-V-5B	Open	Open	Closed	Required	45 Mins	3 to 72 Hrs ¹	DH-V-5a	AB-fz-5	Same remark as DH-V-5A.
	Open	Closed	Closed	Required	45 Mins	45 Mins			
DH-V-6A	Closed	Closed	Closed	Spurious	45 Mins	3 to 72 Hrs ¹	DH-V-6B DH-V-5A	AB-FA-1	This RB sump isolation valve must remain closed to prevent the contents of the SWST from draining to the reactor sump during hot shutdown. It is also required to remain closed when the corresponding DH loop is used during the later stage of cooldown. Spurious operation of the valve will be corrected manually (45 min. time limit). DH-V-5A (5B) can also be closed to mitigate spurious operation of DH-V-6A (6B) during hot shutdown.
	Closed	Closed	Closed	Spurious	45 Mins	45 Mins			

Rev 15

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 4

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
DH-V-6A (Cont'd)									The 45 minute limit for mitigating spurious opening of DH-V-6A or B is based on a calculation of the allowable reduction in volume in the BWST which will still allow sufficient borated water for safe shutdown by feed-and-bleed (HPI) cooling. The calculation (GPUN no T1-5360-212-007) assumed a single open DH-V-6A or B valve, an initial BWST volume of 337,000 gallons, and a re-volume of 17,000 gallons for feed-and-bleed cooling. Makeup and seal injection requirements (for cases where HPI is not used) will be less.
DH-V-6B	Closed	Closed	Closed	Spurious	45 Mins	3 to 72 Hrs ¹	DH-V-6A	AB-FA-2	Same remark as DH-V-6A
	Closed	Closed	Closed	Spurious	45 Mins	45 Mins	DH-V-5B		
DH-V-7A	Closed	Closed	Closed	Spurious	90 Mins	3 to 72 Hrs ¹	DH-V-7B	AB-FZ-4	This valve on the DH loop in service must remain closed during cold shutdown to prevent DH water from diverting to the makeup system. It will be manually corrected if it spuriously operates.
DH-V-7B	Closed	Closed	Closed	Spurious	90 Mins	3 to 72 Hrs ¹	DH-V-7A	AB-FZ-4	Same remarks as DH-V-7A
DH-V-12A	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	DH-V-12B	AB-FZ-4	This mechanical valve must be manually opened when the corresponding loop of the DH system is used during the later stage of cooldown.
DH-V-12B	Open	Open	Open	Required	90 Min	3 to 72 Hrs ¹	DH-V-12A	AB-FZ-4	Same remark as DH-V-12A. This valve is open if the reactor is critical.
DH-V-64	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	None	AB-FZ-4	This mechanical valve is required to be opened during cold shutdown to provide DH water to the RCS pressurizer spray line. The valve will be manually opened.

Rev 15

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
DH-V-75A	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 71 Hrs ¹	DH-V-77A DH-V-78A	AB-FA-1	The DH vent valves DH-V-75A (75B) and DH-V-76A (76B) are required to open before starting the corresponding DH pump and are required to close when the pump is operating. If these valves cannot be controlled electrically, mechanical valves DH-V-77A (77B) and DH-V-78A (78B) can be used instead. NOTE: Procedural requirements for venting fumes require DH-V-77/78 A/B valves for venting.
DH-V-75B	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	DH-V-77B DH-V-78B	AB-FA-2	Same remark as DH-V-75A
DH-V-76A	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	DH-V-77A DH-V-78A	AB-FA-1	Same remark as DH-V-75A
DH-V-76B	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	DH-V-77B DH-V-78B	AB-FA-2	Same remark as DH-V-75A
DH-V-77A	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	None	AB-FA-1	Same remark as DH-V-75A
DH-V-77B	Closed	Closed	Open, then Closed	See Discussion	90 Mins.	3 to 72 Hrs ¹	None	AB-FA-2	Same remark as DH-V-75A
DH-V-78A	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	None	AB-FA-1	Same remark as DH-V-75A.
DH-V-78B	Closed	Closed	Open, then Closed	See Discussion	90 Mins	3 to 72 Hrs ¹	None	AB-FA-2	Same remark as DH-V-75A.
DR-V-1A	Closed	Open	Open	Required	--	3 to 72 Hrs ¹	DR-V-1B	ISPH-FZ-1	The valve is required to be opened before starting the DR pump to provide cooling river water to the decay heat service cooler.
DR-V-1B	Closed	Open	Open	Required	--	3 to 72 Hrs ¹	DR-V-1A	ISPH-FZ-2	Same remark as DR-V-1A.
EF-V-1A	Open	Open	Open	See Discussion	--	None	CO-V-111A CO-V-111B	IB-FZ-3	Same remark as CO-V-111A

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 6

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
EF-V-1B	Open	Open	Open	See Discussion	--	None	CO-V-111A CO-V-111B	IB-FZ-3	Same remark as CO-V-111A
EF-V-2A	Open	Open	Open	Spurious	(2 Hrs)	No Limit ² or 2 Hrs ⁸	None	IB-FZ-3	One of EF-V-2A and EF-V-2B are required to remain open to allow feedwater into one steam generator when the turbine driven emergency feedwater pump is used. Spurious closure of one valve is acceptable. Manual correction of the spuriously closed valve is planned
EF-V-2B	Open	Open	Open	Spurious	(2 Hrs)	No Limit ² or 2 Hrs ⁸	None	IB-FZ-3	Same remark as EF-V-2A
EF-V-4	Closed	Closed	Closed	Spurious	--	None	EF-V-5	IB-FZ-4	EF-V-4 is in series with EF-V-5. At least one valve should remain closed to prevent river water from being fed to the emergency feedwater pump suction. Spurious opening of one valve by a hot short does not present a problem.
EF-V-5	Closed	Closed	Closed	Spurious	--	None	EF-V-4	IB-FZ-4	Same remarks as EF-V-4
EF-V-8A	Open	Open	Open	Spurious	--	None	EF-V-8B EF-V-8C	IB-FZ-3	EF-V-8A, 8B, or 8C are required to remain open when their corresponding EF pumps are used for shutdown. Since these valves are locked to their safe shutdown position (open), they are always available.
EF-V-8B	Open	Open	Open	Spurious	--	None	EF-V-8A EF-V-8C	IB-FZ-2	Same remark as EF-V-8A
EF-V-8C	Open	Open	Open	Spurious	--	None	EF-V-8A EF-V-8B	IB-FZ-3	Same remark as EF-V-8A.

Rev 15

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
EF-V-30A	Closed	Throttled	Closed	Required/Spurious	20 Mins or 2 Hrs ⁸	20 Mins or 2 Hrs ⁸ See Discussion	EF-V-30D	IB-FZ-3	<p>EF-V-30A, 30B, 30C, and 30D control the flow of feedwater into the steam generators. One valve for at least one steam generator is required to be operable, while the valves not being used are required to stay closed to prevent over-filling of the steam generators.</p> <p>Since the valves are equipped with only a 2-hour backup air supply, they will be manually controlled after the first 2 hours if IA is not available then. HPI Cooling requires operation within 2 hours for the IB-FZ-3 and IB-FZ-8 fires.</p> <p>See note 8 for the 20-minute limit for these valves in FH-FZ-5, CB-FA-2g, IB-FZ-2, and DG-FA-2.</p>
EF-V-30B	Closed	Throttled	Closed	Required/Spurious	20 Mins or 2 Hrs ⁸	20 Mins or 2 Hrs ⁸	EF-V-30C	IB-FZ-3	Same remark as EF-V-30A
EF-V-30C	Closed	Throttled	Closed	Required/Spurious	20 Mins or 2 Hrs ⁸	20 Mins or 2 Hrs ⁸	EF-V-30B	IB-FZ-3	Same remark as EF-V-30A
EF-V-30D	Closed	Throttled	Closed	Required/Spurious	20 Mins or 2 Hrs ⁸	20 Mins or 2 Hrs ⁸	EF-V-30A	IB-FZ-3	Same remark as EF-V-30A
EF-V-52A	Open	Open	Open	--	--	None		IB-FZ-3	EF-V-52A, 52B, 52C, and 52D are located downstream of the EF control valves. They are mechanical valves.
EF-V-52B	Open	Open	Open	--	--	None		IB-FZ-3	Same remark as EF-V-52A
EF-V-52C	Open	Open	Open	--	--	None		IB-FZ-3	Same remark as EF-V-52A.
EF-V-52D	Open	Open	Open	--	--	None		IB-FZ-3	Same remark as EF-V-52A.

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 8

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
FW-V-5A	Open	Closed	Closed	Required	--	No Limit ³	FW-V-5B	TB-FA-1	Control valves FW-V-17A, 17B, 16A, and 16B close to prevent overfilling of the steam generators. The main feedwater pumps are tripped or the block valves 5A, 5B, 92A, or 92B are closed if the control valves spuriously open
FW-V-5B	Open	Closed	Closed	Required	--	No Limit ³	FW-V-5A	IB-FZ-6	Same remark as FW-V-5A.
FW-V-16A	Throttled	Closed	Closed	Spurious	--	No Limit ³	FW-V-16B	TB-FA-1	Same remark as FW-V-5A.
FW-V-16B	Throttled	Closed	Closed	Spurious	--	No Limit ³	FW-V-16A	IB-FZ-6	Same remark as FW-V-5A.
FW-V-17A	Throttled	Closed	Closed	Spurious	--	No Limit ³	FW-V-17B	TB-FA-1	Same remark as FW-V-5A.
FW-V-17B	Throttled	Closed	Closed	Spurious	--	No Limit ³	FW-V-17A	IB-FZ-6	Same remark as FW-V-5A.
FW-V-92A	Open	Closed	Closed	Required	--	No Limit ³	FW-V-92B	TB-FA-1	Same remark as FW-V-5A.
FW-V-92B	Open	Closed	Closed	Required	--	No Limit ³	FW-V-92A	IB-FZ-6	Same remark as FW-V-5A.
IC-V-1A	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	IC-V-1B	RB-FZ-1c	The valve corresponding to the letdown cooler to be used for shutdown is required to remain open. The valve will be manually corrected if it spuriously operates. Letdown can be delayed for up to four hours
IC-V-1B	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	IC-V-1A	RB-FZ-1c	Same remark as IC-V-1A.

Rev 17

003/002
T3-2.8

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
IC-V-2	Open	Open	Open	Spurious	30 Mins Or 2 Hrs	30 Mins Or 4 Hrs ⁹	None	RB-FZ-1c	<p>IC-V-2, 3, and 4 are in series and are required to remain open to allow cooling water through the letdown coolers and RC pump coolers. Electrical cables for the valves are normally protected from fire damage to provide thermal barrier cooling, where required. Manual correction of spurious operation would be necessary within 30 minutes in some fire areas/zones to support thermal barrier cooling. If seal injection is available, the next time limit is that required for establishing letdown (4 hr. time).</p> <p>Spurious operation of IC-V-3 and 4 can also be corrected by opening switches 15 of EH-DPES-IE at CB-FA-2d and 5 of EH-DP-1M at CB-FA-2c, respectively.</p> <p>In most of the areas requiring manual operations, four hours are available for establishing letdown flow. In cases where thermal barrier cooling was required, modifications were normally made to IC valves to assure that no spurious closure would occur. However, in some areas degradation of the ESAS system can cause spurious initiation of reactor building (containment) isolation, and closure of these valves. The ESAS output signal can be promptly isolated at the remote shutdown transfer switch panel, and the valves can be manually operated at the remote shutdown panels after this ESAS isolation.</p>
IC-V-3	Open	Open	Open	Spurious	30 Mins Or 2 Mins	30 Mins Or 4 Hrs ⁹	None	AB-FZ-4	Same remark as IC-V-2.
IC-V-4	Open	Open	Open	Spurious	30 Mins Or 2 Mins	30 Mins Or 4 Hrs ⁹ See Discussion	None	AB-FZ-7	Same remark as IC-V-2.

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
IC-V-79A	Open	Open	Open	Spurious	--	None	None	RB-FZ-2	IC-V-79A, 79B, 79C, and 79D are required to remain open for RCP thermal barrier cooling when seal injection is not available. Spurious operation of the valves is prevented by removing its electrical power.
IC-V-79B	Open	Open	Open	Spurious	--	None	None	RB-FZ-2	Same remark as IC-V-79A
IC-V-79C	Open	Open	Open	Spurious	--	None	None	RB-FZ-2	Same remark as IC-V-79A.
IC-V-79D	Open	Open	Open	Spurious	--	None	None	RB-FZ-2	Same remark as IC-V-79A.
MS-V-2A	Open	Open	Open	Spurious	2 Hrs	3 Hrs (2 Hrs.)	MS-V-2B	IB-FZ-2	The valve must remain open for the atmospheric steam dump. The steam will be allowed to dump to the code safety valves if it spuriously closes. The valve will be manually opened if necessary for operation of turbine-driven EF-P-1 (2 Hrs) or MS-V-4A/4B. The 180 minute times shown reflect an assumption of maintaining hot shutdown for up to three hours before it is necessary to begin cooldown and, therefore, to use MS-V-4A or B
MS-V-2B	Open	Open	Open	Spurious	2 Hrs	3 Hrs	MS-V-2A	IB-FZ-2	Same remark as MS-V-2A
MS-V-3A	Closed	Closed	Closed	(Prevention of Spurious Desirable)	No manual action required	No Limit ¹⁰	MS-V-8B	TB-FA-1	MS-V-3A, 3B, 3C, 3D, 3E, and 3F should be closed to prevent uncontrollable dumping of steam to the condenser. Spurious operation of these valves can be corrected by closing MS-V-8A and MS-V-8B from the Control Room

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
									<p>Cooldown from a single spurious MS-V-3 opening is within the limits calculated for Main Steam breaks. Prevention of single valve spurious operation is not therefore required, but is desirable to prevent blowing condenser rupture disks.</p> <p>Calculation C-1101-911-EE10-001 "Appendix R 72 Hour Cold Shutdown Analysis" addressed cool down capability for fires that require evacuation of the control room. MS-V-3A may be used to support this cool down but use is not necessary since the valve is of a different design than the other Turbine Bypass Valves. Cold shutdown conditions can be achieved in less than 72 hours by using any three Turbine Bypass Valves (MS-V-B/C/D/E/F) and two Atmospheric Dump Valves (MS-V-4A/B). This cool down method would only be used if there was an urgent need to proceed to cold shutdown to prevent core damage (damage to the condenser).</p>

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 12

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MS-V-3B	Closed	Closed	Closed	(Prevention of Spurious Desirable)	No Manual Action Required	No Limit ¹⁰	MS-V-8B	TB-FA-1	Same remark as MS-V-3A
MS-V-3C	Closed	Closed	Closed	(Prevention of Spurious Desirable)	No Manual Action Required	No Limit ¹⁰	MS-V-8B	TB-FA-1	Same remark as MS-V-3A
MS-V-3D	Closed	Closed	Closed	(Prevention of Spurious Desirable)	No Manual Action Required	No Limit ¹⁰	MS-V-8A	TB-FA-1	Same remark as MS-V-3A
MS-V-3E	Closed	Closed	Closed	(Prevention of Spurious Desirable)	No Manual Action Required	No Limit ¹⁰	MS-V-8A	TB-FA-1	Same remark as MS-V-3A
MS-V-3F	Closed	Closed	Closed	(Prevention of Spurious Action Desirable)	No Manual Action Required	No Limit ¹⁰	MS-V-8A	TB-FA-1	Same remark as MS-V-3A
MS-V-4A	Closed	Throttled	Closed	Required/ Spurious	2 Hrs	3 Hrs	MS-V-4B	IB-FZ-2	The valve must be under control for the atmospheric steam dump. If valve cannot be remotely operated, the steam will be allowed to dump to the code safety valves until the valve can be manually controlled. Spurious opening of the valve will be corrected by closing MS-V-2A/2B See remark under MS-V-2A
MS-V-4B	Closed	Throttled	Closed	Required/ Spurious	2 Hrs	3 Hrs	MS-V-4A	IB-FZ-2	Same remark as MS-V-4A. See remark under MS-V-2A

Rev 18

003/002
T3-2 12

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 13

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MS-V-6	Open	Open	Open	Required	--	No Limit	None	IB-FZ-2	The valve is required to control the steam pressure to the EF turbine when the EF turbine-driven pump is used for shutdown. It is a pneumatic valve controlled by a pressure controller. It fails open on loss of instrument air (IA)
MS-V-8A	Open	Open	Closed	Required	No Manual Action Required	No Limit ¹⁰	MS-V-8B	IB-FZ-2	Same remark as MS-V-3A.
MS-V-8B	Open	Open	Closed	Required	No Manual Action Required	No Limit ¹⁰	MS-V-8A	IB-FZ-2	Same remark as MS-V-3A.
MS-V-10A	Closed	Open	Open	Required	2 Hrs ⁸	2 Hrs ⁸	MS-V-10B	IB-FZ-2	MS-V-10A or 10B or MS-V-13A or 13B supply steam to the EF turbine. One is required to be opened when the turbine-driven EF pump is used for shutdown (2 Hrs). The MS-V-13A and 13B bypass pressurization valves will be used if available.
MS-V-10B	Closed	Open	Open	Required	2 Hrs ⁸	2 Hrs ⁸	MS-V-10A	IB-FZ-2	Same remark as MS-V-10A
MS-V-56A	Open	Closed	Closed	Required	--	No Limit	MS-V-56B	TB-FA-1	MS-V-56A and 56B automatically close when the main feedwater turbine trips. They are closed if main feedwater is not used.
MS-V-56B	Open	Closed	Closed	Required	--	No Limit	MS-V-56A	TB-FA-1	Same remark as MS-V-56A
MS-V-13A	Closed	Open	Open	Required	2 Hrs ⁸	2 Hrs ⁸	MS-V-13B	IB-FZ-2	Same remark as MS-V-10A.
MS-V-13B	Closed	Open	Open	Required	2 Hrs ⁸	2 Hrs ⁸	MS-V-13A	IB-FZ-2	Same remark as MS-V-10A
MU-V-1A	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	MU-V-1B	RB-FZ-1c	One of the inlet valves corresponding to the cooler in use must remain open if letdown is used. The valve will be manually corrected if it spurious closes. Letdown can be delayed for up to four hours.
MU-V-1B	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	MU-V-1A	RB-FZ-1c	Same remark as MU-V-1A

Rev 17

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-2A	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	MU-V-2B	RB-FZ-1c	One of the outlet valves corresponding to the cooler in use must remain open if letdown is used. The valve will be manually corrected if it spuriously closes. Uncontrolled letdown can be mitigated by closing MU-V-2A/2B or MU-V-3 or MU-V-4 and MU-V-5
MU-V-2B	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	MU-V-2A	RB-FZ-1c	Same remark as MU-V-2A
MU-V-3	Open	Open	Open	Spurious	2 Hrs	4 Hrs ⁴	None	AB-FZ-4	The valve must remain open if letdown is used. The position of the valve will be manually corrected if it spuriously operates. See remark under MU-V-2A for uncontrolled letdown. Spurious closure of MU-V-3 can be corrected by opening switch 15 of EH-DPES-1E in CB-FA-2d (for fires in areas other than CB-FA-2d)
MU-V-4	Open	Open or Closed	Open or Closed	Required/Spurious	2 Hrs	4 Hrs ⁴	MU-V-5 MU-V-98	AB-FZ-3	MU-V-4 with mechanical valve MU-V-99, MU-V-5 with mechanical valves, MU-V-97A and 97B, and mechanical valves MU-V-98 with MU-V-109A and 109B are three parallel paths for letdown flow. One path must be opened for letdown. If letdown is required for RC pressure control, the preferred means of flow control is through MU-V-5 or MU-V-98, MU-V-4 must be closed. The position of the valve will be manually corrected if required. See remark under MU-V-2A for uncontrolled letdown
MU-V-5	Throttled	Throttled	Throttled	Required/Spurious	2 Hrs	4 Hrs ⁴	MU-V-98	AB-FZ-3	Same remark as MU-V-4

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-6A	Open	Open	Open	Spurious	2 Hrs	4 Hrs. ⁴	MU-V-6B MU-V-70A	AB-FZ-6	The valve corresponding to the demineralizer in use prior to the fire must remain open if letdown is used for shutdown. The valves will be manually corrected, if the pneumatic valve spuriously closes. Mechanical valve MU-V-70A can also be manually opened to bypass the demineralizer if required. Only one letdown flowpath is utilized while the other is kept closed.
MU-V-6B	Open	Open	Open	Spurious	2 Hrs	4 Hrs. ⁴	MU-V-6A MU-V-70A	AB-FZ-6	Same remarks as MU-V-6A ;
MU-V-8 3 Way Valve	Open to MU Tank	Open to MU Tank or Bleed Tanks	Open to Bleed Tanks	Required/ Spurious	2 Hrs	Desirable in 4 Hrs. ⁴	None	AB-FZ-6	This valve is normally positioned such that letdown flow is through the makeup tank. This valve should be available to transfer letdown flow to the bleed tanks to prevent MU tank overflow. This will be accomplished by manual operation, if necessary. Overflow to WDL-T-2 will occur about 5 minutes after makeup tank suction isolation, with normal 140 gpm letdown flow. This overflow is acceptable.
MU-V-11A	Open	Open	Open	Spurious	2 Hrs	4 Hrs. ⁴	MU-V-11B MU-V-110	AB-FZ-5	The valve corresponding to the filter in use prior to the fire must remain open if letdown is used for shutdown. The valve will be manually repositioned if the pneumatic valve spuriously closes. Mechanical valve MU-V-110 can be manually opened to bypass the filter. Only one letdown flowpath is utilized while the other is kept closed.
MU-V-11B	Open	Open	Open	Spurious	2 Hrs	4 Hrs. ⁴	MU-V-11A MU-V-110	AB-FZ-5	Same remarks as MU-V-11A
MU-V-110	Closed	Open	Open	Required	2 Hrs	4 Hrs. ⁴	None	AB-FZ-5	Same remarks as MU-V-11A.
MU-V-12	Open	Open	Closed	Spurious	--	No Limit	None	AB-FZ-3	MU-P-1A and 1B can take suction from the MU tank via MU-V-12 and from the BWST via MU-V-14A. Since the makeup tank is not relied upon for safe shutdown, the position of MU-V-12 has no effect on safe shutdown. NOTE: The makeup pump shall be tripped immediately if MU-V-12 spuriously closes to prevent pump damage and then restarted once a flow path is established from the BWST. See discussion for MU-V-14A/B for additional details on seal injection.

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 16

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-14A	Closed	Open	Open	Required	2 Hrs	2 Hrs ⁵	MU-V-14B	AB-FZ-4	<p>This valve is required to be opened to allow MU-P-1A or MU-P-1B to take suction from the BWST. If seal injection were required the valve should be opened from the control room within 8 minutes after spurious or intended isolation of letdown recirculation to the makeup tank. (Otherwise the makeup tank would empty and the pump would cavitate) For those areas where thermal barrier cooling is available, operation of makeup system for seal injection is not required. Normal makeup can be delayed approximately 2 hours. The valve can be manually opened before starting the makeup pump</p> <p>The valve could be damaged by an AB-FZ-4 fire close to the valve, but cable protection has been specified in AB-FZ-4 and the separation is sufficient (in this sprinklered area) to assure that both thermal barrier cooling and seal injection will not be lost</p>
MU-V-14B	Closed	Open	Open	Required	No Manual Action Required	2 Hrs ⁵	MU-V-14A	AB-FZ-4	<p>MU-V-14B is required to be opened to allow MU-P-1C to take suction from the BWST for normal RCS inventory control. The valve should be opened before starting the makeup pump. Normal makeup can be delayed approximately 2 hours</p>
MU-V-16A	Closed	Open/Throttled	Open/Throttled	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁶ or 1 Hr.	MU-V-16B	AB-FZ-4	<p>MU-V-16A, 16B, 16C, and 16D may be used for RC inventory control and are used for HPI cooling. One valve corresponding to the MU pump used during shutdown must be opened, if required for RCS inventory control or HPI. These valves can be jog control. Manual control is acceptable for RCS inventory control. The preferred path for RCS inventory control (not HPI) is MU-V-17. Spurious operation of other valves not in use would allow uncontrolled</p>

Rev 17

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 17

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-16A (Con'd)									<p>Makeup flow, pressurizer overfill, and PORV cycling RCS primary side enters into "feed and bleed" condition. Spurious operation can be mitigated by tripping the operating MU pump, provided seal injection is not required, and manually correcting the position of the valve corresponding to the makeup pump to be used for reactor coolant inventory control.</p> <p>See also discussion under MU-V-17.</p>
MU-V-16B	Closed	Open/Throttled	Open/Throttled	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr	MU-V-16A	AB-FZ-4	Same remark as MU-V-16A.
MU-V-16C	Closed	Open/Throttled	Open/Throttled	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr	MU-V-16D	AB-FZ-6	Same remark as MU-V-16A.
MU-V-16D	Closed	Open/Throttled	Open/Throttled	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr.	MU-V-16C	AB-FZ-6	Same remark as MU-V-16A.
MU-V-17	Modulating	Modulating	Modulating	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr	MU-V-92	AB-FZ-3	<p>The makeup flow line through MU-V-17 and 18 is used for normal make-up flow and for RC pressure control when the pressurizer heaters are not available. Mechanical valve MU-V-92 can be used to control makeup flow if MU-V-17 is unavailable. MU-V-217 can be isolated by mechanical valves MU-V-91A and MU-V-91B. MU-V-217 is a bypass around MU-V-17, and if this valve spuriously opens, MU-V-18 must be closed or the pump tripped, or MU-V-222 (manual in the reactor building) closed to stop uncontrollable makeup flow. If MU-V-18 spuriously closes, it can be manually opened. This makeup path is preferred for normal RC inventory control.</p>
MU-V-18	Open	Open	Open	Required/Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr.	None	AB-FZ-4	<p>Same remark as MU-V-17.</p> <p>MU-V-18 is air-to-open, spring-to-close, energize-solenoid-to-close, fail-closed on loss of air.</p>

Rev 18

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-20	Open	Open	Open	Spurious	1 Hr.	2 Hrs	None	FH-FZ-2	<p>MU-V-20 and 32 are required to remain open for RCP seal injection when thermal barrier cooling is not available. These valves are made available where seal injection is required. For other areas, manual correction is planned. Immediate correction of spurious operation of one of these valves is not required. Manual action should however be taken within about two hours to restore seal injection for these areas. Spurious operation of MU-V-20 can also be corrected by opening switch 5 of EH-DP-1M at CB-FA-2c.</p> <p>Flow through the seal injection path is sufficient to provide the minimum flow required by one makeup pump. See the discussion on MU-V-36.</p> <p>MU-V-20 is air-to-open, spring-to-close, energize-solenoid-to-close. It fails closed on loss of air, but it also provided with a local air accumulator.</p>
MU-V-32	Open	Open	Open	Required/Spurious	1 Hr	2 Hrs	None	AB-FZ-3	<p>Same remark as MU-V-20. MU-V-32 is controlled by an E/P converter (MU-32-E/P) which gets signals from a manual controller (MU-42-FIC) or from flow transmitter MU-42-DPT. It fails to mid-position on loss of signal or on zero signal.</p>
MU-V-36	Open	Open	Open	Spurious	1 Hr.	2 Hrs	None	AB-FZ-3	<p>MU-V-36 and 37 must stay open to assure minimum acceptable flow through the MU pumps to prevent pump damage. Reopening within 2 hours is acceptable if seal injection is available. Seal injection flow of 32 gpm is sufficient to satisfy the minimum flow requirement.</p> <p>The two-hour value is a very conservative assumption, based on a letter from the pump manufacturer, who states that the pumps can operate at flows as low as the design seal injection flow for days or weeks without serious effects (Gordon Parks of Bingham-Willamette to D H Stevens of Gilbert/Commonwealth, August 25, 1986).</p>

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
MU-V-37	Open	Open	Open	Spurious	1 Hr	2 Hrs	None	AB-FZ-3	Same remark as MU-V-36
MU-V-38	Closed	Closed	Closed	Spurious	None	None	None	RB-FZ-2	This valve must remain closed to prevent excessive leakage (and) temperature through the RCP #1 seal. The valve is kept closed by removing electrical power (unit 9A breaker open at the 1B radwaste 480 V CC)
MU-V-70A	Closed	Closed	Closed	Required	2 Hrs	4 Hrs ⁴	None	AB-FZ-3 AB-FZ-6	
MU-V-76A	Closed	Open (See Disc)	Open	--	--	--	None	AB-FZ-3	Mechanical valves MU-V-76A and 76B may be used if desired to allow MU-P-1c to be used for RC pressure control with the normal makeup path and control valves
MU-V-76B	Closed	Open (See Disc)	Open	--	--	--	None	AB-FZ-3	Same remark as MU-V-76A.
MU-V-91A	Open	Open	Open	Required	2 Hrs	2 Hrs ⁵	MU-V-91B	AB-FZ-3	Same remark as MU-V-17
MU-V-91B	Open	Open	Open	Required	2 Hrs	2 Hrs ⁵	MU-V-91A	AB-FZ-3	Same remark as MU-V-17
MU-V-92	Closed	Closed	Closed	Required	2 Hrs	2 Hrs ⁵	MU-V-17	AB-FZ-3	Same remark as MU-V-17.
MU-V-97A	Open	Open	Open	Required	2 Hrs	4 Hrs ⁴	MU-V-97B	AB-FZ-3	Same remark as MU-V-4
MU-V-97B	Open	Open	Open	Required	2 Hrs	4 Hrs ⁴	MU-V-97A	AB-FZ-3	Same remark as MU-V-4
MU-V-98	Closed	Closed	Closed	Required	2 Hrs	4 Hrs ⁴	MU-V-5	AB-FZ-3	Same remark as MU-V-4
MU-V-99	Open	Open	Open	Required	2 Hrs	4 Hrs ⁴	MU-V-4	AB-FZ-3	Same remark as MU-V-4
MU-V-109A	Closed	Closed	Closed	Required	2 Hrs	4 Hrs ⁴	MU-V-5	AB-FZ-3	Same remark as MU-V-4
MU-V-109B	Closed	Closed	Closed	Required	2 Hrs	4 Hrs ⁴	MU-V-5	AB-FZ-3	Same remark as MU-V-4
MU-V-217	Closed	Closed	Closed	Spurious	2 Hrs or 1 Hr	2 Hrs ⁵ or 1 Hr.	MU-V-18	AB-FZ-4	See notes under MU-V-17.
NR-V-1A	Open	Open	Open	Spurious	No Manual Action Required	30 Mins	NR-V-1B NR-V-1C	ISPH-FZ-1	The valve corresponding to the NR pump in use must remain open for NS and IC cooling
NR-V-1B	Open	Open	Open	Spurious	No Manual Action Required	30 Mins	NR-V-1A NR-V-1C	ISPH-FZ-2	Same remark as NR-V-1A

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 20

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
NR-V-1C	Open	Open	Open	Spurious	No Manual Action Required	30 Mins	NR-V-1A NR-V-1B	ISPH-FZ-2	Same remark as NR-V-1A
NR-V-2	Closed	Closed	Closed	Spurious	--	None	NR-V-7	ISPH-FZ-2	NR-V-2 is in series with NR-V-7. At least one valve must stay closed to prevent NR water from diverting to the secondary service. Spurious opening of one valve by a hot short does not present a problem.
NR-V-3	Open	Open	Open	Spurious	--	None	None	ISPH-FZ-2	This valve must remain opened to allow flow of cooling river water to NS heat exchangers and IC coolers. This valve will be kept open by removing the electric power.
NR-V-4A	Closed	Closed	Closed	Spurious	--	No Limit	NR-V-4B	AB-FZ-1	Deicing makeup is normally provided by the secondary service river water system. NR-V-4A is in series with NR-V-4B. Both are normally closed. At least one valve must stay closed. Spurious opening of one valve by a hot short does not present a problem. The valves are opened during deicing makeup (infrequent operation). Administrative controls have been developed to protect against spurious wide opening of the valve during that time.
NR-V-4B	Closed	Closed	Closed	Spurious	--	No Limit	NR-V-4A	AB-FZ-1	Same remark as NR-V-4A
NR-V-5	Open	Open	Open	Spurious	--	None	None	AB-FZ-1	This valve must remain open to allow flow of cooling river water to NS heat exchangers and IC coolers. This valve will be kept opened by removing electric power.
NR-V-6	Closed	Closed	Closed	Spurious	--	None	None	AB-FZ-1	This valve must remain closed to prevent diversion of NR water. This valve is kept closed by removing the electric power.
NR-V-7	Closed	Closed	Closed	Spurious	--	None	NR-V-2	ISPH-FZ-2	Same remark as NR-V-2

Rev 19

003/002
T3-2.20

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
NR-V-8A	Open	Open	Open	Spurious	--	None	NR-V-8B NR-V-8C NR-V-8D	AB-FZ-1	Three inlet valves are normally opened for NS heat exchangers. Two valves must stay opened for shutdown. Spurious closing of one valve by a hot short does not present a problem.
NR-V-8B	Open	Open	Open	Spurious	--	None	NR-V-8A NR-V-8C NR-V-8D	AB-FZ-1	Same remark as NR-V-8A.
NR-V-8C	Open	Open	Open	Spurious	--	None	NR-V-8A NR-V-8B NR-V-8D	AB-FZ-1	Same remark as NR-V-8A
NR-V-8D	Open	Open	Open	Spurious	--	None	NR-V-8A NR-V-8B NR-V-8C	AB-FZ-1	Same remark as NR-V-8A
NR-V-10A	Open	Open	Open	Spurious	--	None	NR-V-10B	AB-FZ-1	At least one inlet valve is normally opened for IC coolers. One valve may be closed. These valves must remain in their prefire positions for shutdown. They are kept that way by removing the electric power.
NR-V-10B	Open	Open	Open	Spurious	--	None	NR-V-10A	AB-FZ-1	Same remark as NR-V-10A.
NR-V-15A	Throttled	Throttled	Throttled	Spurious	2 Hrs	4 Hrs ⁴	NR-V-15B	AB-FZ-1	At least one outlet valve is normally throttled open for IC coolers. One valve may be closed. These valves must remain in their prefire positions for shutdown. For locations where thermal barrier cooling is used, this valve must be available. For a fire in other locations, manual correction will be required for the letdown cooling function. No manual action is required to support thermal barrier cooling.
NR-V-15B	Throttled	Throttled	Throttled	Spurious	2 Hrs.	4 Hrs. ⁴	NR-V-15A	AB-FZ-1	Same remark as NR-V-15A.

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 22

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
NR-V-16A	Open	Open	Open	Spurious	--	None	NR-V-16B NR-V-16C NR-V-16D	AB-FZ-1	Three outlet valves are normally opened for NS heat exchangers. Two valves must stay open for shutdown. Spurious closing of one valve by a hot short does not present a problem.
NR-V-16B	Open	Open	Open	Spurious	--	None	NR-V-16A NR-V-16C NR-V-16D	AB-FZ-1	Same remark as NR-V-16A
NR-V-16C	Open	Open	Open	Spurious	--	None	NR-V-16A NR-V-16B NR-V-16D	AB-FZ-1	Same remark as NR-V-16A
NR-V-16D	Open	Open	Open	Spurious	--	None	NR-V-16A NR-V-16B NR-V-16C	AB-FZ-1	Same remark as NR-V-16A
NR-V-18	Throttled	Throttled	Throttled	Required/ Spurious	30 Mins. or 2 Hrs	30 Mins or 4 Hrs ⁸	NR-V-19	AB-FZ-1	This outlet valve must remain open to allow NR water flow to NS heat exchangers and IC coolers. For fires in other locations where RCP thermal barrier cooling is required, this valve must be available. For a fire in other locations where RCP thermal barrier cooling is NOT required, manual correction will be required. NR-V-18 is required to control system pressure. Manual operation is acceptable for this purpose.
NR-V-19	Closed	Closed	Closed	Spurious	30 Mins	30 Mins or 4 Hrs ⁸	NR-V-18	AB-FZ-1	NR-V-19 is only open in a throttled condition during deicing conditions (approx 2 months of the year). If valve spuriously closes flow will continue through NR-V-18 which is open in parallel with NR-V-19. Spurious opening would cause loss of pressure control, and will be manually corrected.

Rev 17

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 23

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
NS-V-32	Open	Closed	Closed	Required	No Manual Action Required	2 Hrs ⁵	None	AB-FZ-5	This valve should be closed to isolate non-essential cooling loads for events which disable two NS pumps and/or two NR pumps and which at the same time require MU-P-1B.
RC-V-1	Closed/ Open	Closed	Closed	Spurious	See Discussion	45 Mins	RC-V-3	RB-FZ-1d	RC-V-1 is in series with RC-V-3. RC-V-1 opens on RC pressure above 2205 psig. RC-V-1 must remain closed to prevent rapid depressurization of the RCS. Otherwise, RC-V-3 must be closed to mitigate depressurization. This spurious opening of RC-V-1 will be corrected by closing RC-V-3 or tripping the reactor coolant pumps. These actions can be accomplished from the control room or at the 6900V switch gear.
RC-RV-2	Closed	Closed (Cycling) ⁸	Closed/ Required	Spurious	See Discussion	Immediate	RC-V-2	RB-FZ-1d	RC-RV-2 is in series with RC-V-2. RC-RV-2 opens on high RCS pressure. RC-RV-2 must remain closed to prevent rapid depressurization of the RCS. Otherwise, RC-V-2 must be closed to mitigate depressurization. Opening of both is required for HPI cooling.
RC-V-2	Open	Closed (Open) ⁸	Closed	Required	See Discussion	Immediate	RC-RV-2	RB-FZ-1d	Same remarks as RC-RV-2.
RC-V-3	Open	Closed	Closed	Required	See Discussion	3 to 72 Hrs ¹	RC-V-1	RB-FZ-1d	Same remark as RC-V-1. RC-V-3 should be closed for cold shutdown to allow flow of DH water to the pressurizer spray line. The valve will be manually closed (if necessary) for cold shutdown.

Rev. 17

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

Sheet 24

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
RC-V-4	Closed	Closed	Open	Required	90 Mins	3 to 72 Hrs ¹	None	RB-FZ-3	This valve is required to be open during cold shutdown to allow flow of DH water to the pressurizer flow of DH water to the pressurizer spray line. The valve will be manually opened (if necessary) for cold shutdown
RC-V-28	Closed	Closed	Closed	Required	--	None	RC-V-44	RB-FZ-3	RC-V-28 is in series with RC-V-44. A control scheme modification is made to RC-V-44 to prevent spurious opening due to any one hot short. *See note below
RC-V-44	Closed	Closed	Closed	Required	--	None	RC-V-28	RB-FZ-3	Same remark as RC-V-28
RC-V-40A	Closed	Closed	Closed	Required	--	None	RC-V-41A	RB-FZ-1d	RC-V-40A is in series with RC-V-41A. A control scheme modification is made to RC-V-41A to prevent spurious opening of RC-V-41A due to any one hot short. *See note below
RC-V-41A	Closed	Closed	Closed	Required	--	None	RC-V-40A	RB-FZ-1d	Same remark as RC-V-40A
RC-V-40B	Closed	Closed	Closed	Required	--	None	RC-V-41B	RB-FZ-1e	RC-V-40B is in series with RC-V-41B. A control scheme modification is made to RC-V-41B to prevent spurious opening of RC-V-41B due to any one hot short. *See note below.
RC-V-41B	Closed	Closed	Closed	Required	--	None	RC-V-40B	RB-FZ-1e	Same remark as RC-V-40B

*NOTE. In the unlikely event that both valves would be spuriously opened during a fire by a combination of cable failures (i.e. open circuits and multiple hot shorts), it has been demonstrated that the plant capability to achieve and maintain cold shutdown conditions is not jeopardized

Rev 17

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
RC-V-42	Closed	Closed	Closed	Required	--	None	RC-V-43	RB-FZ-3	RC-V-42 is in series with RC-V-43. A control scheme modification is made to CR-V-43 to prevent spurious opening of RC-V-43 due to any one hot short. *See note below
RC-V-43	Closed	Closed	Closed	Required	--	None	RC-V-42	RB-FZ-3	Same remark as RC-V-42. NOTE: These RC vent valves (i.e., RC-V-28, 44, 40A, 41A, 40B, 41B, 42, AND 43) may be required to be opened in some fire areas where letdown is not available to vent excess reactor coolant. Manual operation is not required because one set of valves is available for operation from the control room.
WDL-V-1	Open	Open	Open	Required/Spurious	2 Hrs	4 Hrs ⁴	None	AB-FZ-6	This pneumatic valve should be open during cold shutdown to divert letdown flow to the bleed tanks if makeup tank overflowing is imminent. Overflow to WDL-T-2 will occur about 5 minutes after makeup tank suction isolation, with normal 140 gpm letdown flow. This overflow is acceptable. The valve can be manually opened by connecting an external air or nitrogen supply if normal operation is not possible.
WDL-V-2	Open	Closed	Closed	Required/Spurious	2 Hrs	4 Hrs ⁴	WDL-V10	AB-FZ-6	This pneumatic valve must be closed during cold shutdown when WDL-V1 is open. The valve can be closed by disconnecting the air supply if normal operation is not possible.

*NOTE. In the unlikely event that both valves would be spuriously opened during a fire by a combination of cable failures (i.e. open circuits and multiple hot shorts), it has been demonstrated that the plant capability to achieve and maintain cold shutdown conditions is not jeopardized.

ATTACHMENT 3-2
VALVES FOR OR ASSOCIATED WITH SAFE SHUTDOWN

VALVE NUMBER	POSITION			REQUIRED OR SPURIOUS	TIME FOR OPERATION ⁶		REDUNDANT ⁷ VALVES	VALVE LOCATION (FIRE AREA/ZONE)	DISCUSSION
	NORMAL	HOT SHUTDOWN	COLD SHUTDOWN		ACTION ACHIEVABLE	ACTION REQUIRED			
WDL-V-3	Open	Open	Open	Required/ Spurious	2 Hrs	4 Hrs ⁴	WDL-V4 WDL-V5	AB-FZ-5	This valve or one of the redundant valves should be open during cold shutdown to divert letdown flow to a bleed tank with sufficient capability if makeup tank overflowing is imminent. Overflow to WDL-T-2 will occur about 5 minutes after makeup tank suction isolation, with normal 140gpm letdown flow. This overflow is acceptable. The valve can be opened by connecting an external air or nitrogen supply if normal operation is not possible.
WDL-V-4	Open	Open	Open	Required/ Spurious	2 Hrs	4 Hrs ⁴	WDL-V3 WDL-V5	AB-FZ-5	Same remark as WDL-V-3
WDL-V-5	Open	Open	Open	Required/ Spurious	2 Hrs	4 Hrs ⁴	WDL-V3 WDL-V4	AB-FZ-5	Same remark as WDL-V-3

FOOTNOTES

- 1 The initiation of the decay heat cooling system (DH) can occur anytime between 3 to 72 hours after an Appendix R fire. For fires that require equipment repair before the DH system can be used, the 72 hour time limit applies. DH can be initiated any time the reactor coolant system temperature and pressure are suitable, which can occur any time after approximately 3 hours.
- The 3 to 72 hour manual actions required for DH system operation are not required for hot shutdown.
- 2 Study results show that only one motor-driven EF pump and one OTSG are required for cooling. No corrective action is therefore required if the valve is not open. Therefore, "No Limit" entries are used in the table. See GPUN Memo 5520-85-0520, 10-01-85 released via DRF 038078, and the attached study by R W Moore, Babcock and Wilcox, "Evaluation of Effects of Reduced or Delayed EFW Flow for Appendix R Requirements - TMI."
- 3 Main feedwater flow to the OTSGs must be stopped to prevent overcooling or overfeeding the OTSGs. If either the flow control valves or their stop valves cannot be closed quickly, the main feedwater pumps or the condensate pumps must be tripped to stop MF flow. Therefore, "No Limit" entries have been used in the Action Required table, since valve action cannot be taken.
- 4 The letdown function will be used to ease reactor coolant system inventory and pressure control. The letdown function is only absolutely necessary when the pressurizer heaters are not available and feed and bleed is used for solid plant pressure control and when required, to reestablish pressurizer pressure control at the termination of HPI cooling. All "Action Required" table entries relative to the letdown function show "4 hours" for the time required to establish and maintain a letdown flow path. While components are listed for various letdown flow paths and supporting equipment, only one path will be established, depending on available components.
- 5 The "2 Hr." values for MU-V-14 and MU-V-16's are based on events for which emergency feedwater is available, seal injection is not required, and pressure control is available, so that normal makeup is not immediately required. Makeup can be delayed with the reactor in hot shutdown, for two hours. Correction of spurious operation of MU-V-16A, B, C, or D, or 17, or 217 is, however, required within 1 hour during which the RCS enters into "feed and bleed" condition. An alternative means of correcting spurious opening of these valves is to trip the makeup pump. This is acceptable so long as thermal barrier cooling is available, so that RCP seal injection is not required.
- 6 The Action Achievable column should be regarded as a conservative estimate, for all manual actions implemented in the fire emergency procedures. The Action Required column is also a conservative estimate. In most cases, an adequate margin can be shown without detailed analysis of the system and component operating sequences and times. Action required times are supported by analysis as required.
- 7 The Redundant Valves column refers, in most cases, to those valves which serve an equivalent function in a redundant train, and does not, in all cases, identify valves which provide the required shutdown function for all Appendix R fire events.
- 8 The "2 Hrs" limit applies for the IB-FZ-3 and IB-FZ-8 fires for which HPI cooling is used, and is a minimum figure based on the desirability of re-establishing EFW as soon as reasonably achievable, taking into account the time required to extinguish the fire and gain manual control. HPI can safely be used for a considerably longer period, and the reactor can, in fact, be cooled down on HPI and DHR-LPI alone. See the following TMI-1 Abnormal Transient Procedures (ATP's):
 ATP-1210-4 Rev 7 (06-13-86) "Lack of Primary to Secondary Heat Transfer"
 ATP-1210-6 Rev 6 (06-13-86) "Small Break LOCA Cooldown"
 ATP-1210-Rev 8 (06-13-86) "HPI Cooling - Recovery from Solid Operations"
- At least one of the EF-V-30 valves is required immediately (i.e., within 20 minutes) for EFW cooling (all zones except IB-FZ-3 and IB-FZ-6). The "20 Min" Action Required values are based on small-break LOCA analyses which show acceptable primary system response with neither high pressure injection nor emergency feedwater available for 20 minutes after reactor trip. This situation occurs in two fire areas, FH-FZ-5 and CB-FA-2g, where the valve circuits can be promptly isolated at the Remote Shutdown Transfer Switch Panel, and manually controlled using handwheels under direction of control room operators. Also, loss of backup air supply due to a fire in IB-FZ-2 and DG-FA-2 leads to a similar situation (i.e., 20 Min Action Required) for the EF-V-30 valves. In these fire areas they will be normally controlled using handwheels under direction of control room operators.
- For the small-break LOCA analyses, see the reference under note 2, and GPUN-SDD-TI-211A, Rev 3, System Design Description, Div II, "High Pressure Injection System Cross Connect and High Capacity Makeup Valve, TMI Restart Task RM-14, B/A 412072."
- 9 The IC and NR valves are required to support thermal barrier cooling and letdown cooling. Westinghouse has stated that reactor coolant pump seals will survive for 30 minutes with acceptable leakage, without thermal barrier cooling or seal injection (with the reactor coolant pumps tripped). For a running RC pump, this time limit is lowered to 10 minutes. The 30 minutes manual operating time is based on events which require thermal barrier cooling, the reactor coolant pumps are assumed to be tripped.
- The next limit for operation of these valves would be 4 hours, for establishing letdown cooling. Seal injection is available in these cases.
10. "No Limit" applies to spurious opening of MS-V-3A, 3B, 3C, 3D, 3E, and 3F since it can always be corrected by closing MS-V-8A and MS-V-8B from the Control Room.
11. A combination of two Atmospheric Dump Valves (MS-V-4A/B) and three Turbine Bypass Valves (any three of MS-V-3B/C/D/E/F) may be used to achieve cold shutdown conditions within 72 hours for fires that require the evacuation of the Control Room. These combinations are identified in Calculation C-1101-911-E6120-001, "Appendix R 72 Hour Cold Shutdown Analysis". Implementation is addressed under guidance provided to the Technical Support Center (TSC) in "TSC Engineering Calculation Guide 15 0". This guidance will be used for implementation if the plant requires an accelerated cool down to protect the reactor core from damage (cool down path reliability issue) and with the understanding that condenser damage is expected and acceptable. Implementation also affects the habitability of the Turbine Building. Valves MS-V-3A (Turbine Bypass Valve) may also be used but is not relied on for achieving cold shutdown conditions based due to a different design than the other MS-V-3 valves. Main Steam Safety Valves MS-V-17A/B/C/D, MS-V-18A/B/C/D, MS-V-19A/B/C/D, MS-V-20A/B/C/D and MS-V-21A/B (MS-V-21A/B are a smaller size and would not make any significant contribution to cool down) are addressed in the calculation but are not used for this function since they are not designed for manual operation.

ATTACHMENT 3-3A
SAFE SHUTDOWN EQUIPMENT

CONDENSATE

Page 1 of 1

Component	Function	Required for:		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
NOTE: The Condensate system provides water to the Emergency Feedwater system. Components of this system needed for safe shutdown are therefore included in the Emergency Feedwater system and the balance of this table has been deleted.					

ATTACHMENT 3-3B
SAFE SHUTDOWN EQUIPMENT

CONTROL BUILDING AND OTHER VENTILATION

Page 1 of 1

Component	Function	Required for.		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
NOTE: Analysis shows that Control Building, DC and NS Room, Diesel Generator and EF Pump Room ventilation systems are not required for safe shutdown. The components associated with these systems have therefore been deleted.					
<u>INTAKE PUMP AND SCREEN HOUSE</u>					
AH-E-27A AH-E-27B	IPSH Fan A IPSH Fan B	X X	X X	R R	One of the fans is required for IPSH ventilation
AH-D-6A AH-D-6B	Discharge Damper Discharge Damper	X X	X X	R R	The damper corresponding to the fan in use must open and the other damper must close

ATTACHMENT 3-3C
SAFE SHUTDOWN EQUIPMENT

CORE FLOODING

Page 1 of 1

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
<p>NOTE Under Appendix R, isolation of this system is desirable before reactor pressure drops below 700 psi, but isolation is not required for safe shutdown, nor is operation of this system required for safe shutdown for Appendix R events. The balance of this table has therefore been deleted</p>					

ATTACHMENT 3-3D
SAFE SHUTDOWN EQUIPMENT

DECAY HEAT CLOSED CYCLE
COOLING WATER

Page 1 of 1

Component	Function	Required for:		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
DC-P-1A DC-P-1B	DH Closed Cycle Pump A DH Closed Cycle Pump B	X X	X X	R R	These pumps provide cooling water to the decay heat removal coolers, makeup pumps MU-P-1A and MU-P-1C and the decay heat removal pumps. Only one is required to operate during shutdown. It must match the operating DH river water pump, decay heat pump, and makeup pump. DC-P-1B can be operated from the "B" Aux. RSP.
DC-V-2A DC-V-2B	DH Cooler A Inlet Valve DH Cooler B Inlet Valve		X X	R R	These electro-pneumatic valves are required to be opened during cooldown. Energization of valve solenoid allows remote throttling from the Control Room. They are equipped with spring-opposed piston operators for throttling service and for closing with 80 psi air. They have hand jacks for manual operation, and time is available for manual operation for cold shutdown. The valves fail open upon loss of power or instrument air. Loss of Control Room control, or spurious closure can be mitigated by disconnecting power or air at the solenoid and manually operating the valves. Only one is required during shutdown. It must match the operating DHCCC system train.
DC-V-65A DC-V-65B			X X	R R	These electro-pneumatic valves are required to be closed during cooldown. Energization of valve solenoid allows remote throttling from the Control Room. The valve opens on increasing signal and closed upon loss of power or instrument air. A handwheel is available and time is available for manual operation for cold shutdown. Loss of Control Room control, or spurious closure can be mitigated by disconnecting power or air at the solenoid and manually operating the valves. Only one is required during shutdown. It must match the operating DHCCC system train. Manual operation of DC-V-2A or B and DC-V-65A or B may result in high radiation exposure.

003/002
T3-3.4

Rev. 17

ATTACHMENT 3-3E
SAFE SHUTDOWN EQUIPMENT

DECAY HEAT REMOVAL

Page 1 of 3

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
DH-P-1A DH-P-1B	Decay Heat Pump 1A Decay Heat Pump 1B		X X	R R	One decay heat pump is required to operate during the later stages of cooldown. It must match the operating decay heat river water pump and decay heat closed cycle pump. DH-P-1B can be operated from 1E-4160 volt switchgear.
DH-V-1 DH-V-2 DH-V-3	Decay Heat Suction Valve Inside Containment Decay Heat Suction Valve Inside Containment Decay Heat Suction Valve Outside Containment		X X X	R R R	These motor-operated valves are normally closed and are considered High Low pressure interface valves. They must not be allowed to be spuriously opened during hot shutdown, however they are required to be opened during the later stages of cooldown. They can be operated manually if required. They must remain open to maintain a suction water supply to the DH pumps when they are operating. DH-V-1 is inside the secondary shield wall and radiation level must be considered before operating the valve manually. The integrity of the High Low pressure interface is maintained by keeping DH-V-2 closed (power removed).
DH-V-4A DH-V-4B	Decay Heat Discharge Valve to RC Loop A Decay Heat Discharge Valve to RC Loop B		X X	R R	These motor-operated valves are normally closed and the one on the decay heat loop in service is required to be opened during the later stages of cooldown. They can be operated manually if required.
DH-V-5A DH-V-5B	Decay Heat Suction Valve from BWST Decay Heat Suction Valve from BWST	X X	X X	R R	These motor-operated valves are normally open and are required to close during the later stages of cooldown. These valves can mitigate BWST drainage due to spurious opening of DH0V-6A/6B. They can be operated manually if required.

003/002
T3-35

Rev 17

ATTACHMENT 3-3E
SAFE SHUTDOWN EQUIPMENT

DECAY HEAT REMOVAL

Page 2 of 3

Component	Function	Required for.		Req'd Or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
DH-V-6A DH-V-6B	Decay Heat Suction from RB sump isolation valve	X X	X X	S S	These motor-operated valves from the reactor building sump are normally closed and must remain closed when decay heat pumps are running to prevent loss of suction to the pumps. These valves can have their breakers opened to prevent spurious operation when decay heat pumps are running. For hot shutdown, see entries in Attachment 3-3L, Makeup. They can be operated manually if required.
DH-V-7A DH-V-7B	Decay Heat Discharge Valve to make up pumps suction		X X	S S	These motor-operated valves are normally closed and should remain closed not to divert DH water to the makeup system. These valves can have their breakers opened to prevent spurious operation when decay heat pumps are running. They can be operated manually if required.
DH-V-12A	Decay Heat Suction Valve- Reactor to DH-P-1A		X	R	One of these manual valves are required to be opened during the later stages of cooldown, corresponding to the decay heat loop in service.
DH-V-12B	Decay Heat Suction Valve- Reactor to DH-P-1B		X	R	
DH-V-64	Decay Heat Spray Line Isolation Valve		X	R	
DH-V-75A DH-V-75B	DH-P-1A Vent Valve DH-P-1A Vent Valve		X X	R R	This manually-operated, normally closed valve is located outside the reactor building. It must be opened to permit use of pressurizer spray through RC-V-4 during cold shutdown. These solenoid operated valves are required to open to vent DH-P-1A before it is operated. They must be closed when the DH pump is operating. If they cannot be opened, manual valves on DH-V-77A and DH-V-78A can be used instead.

003/002
T3-3 6

Rev. 17

ATTACHMENT 3-3E
SAFE SHUTDOWN EQUIPMENT

DECAY HEAT REMOVAL

Page 3 of 3

Component	Function	Required for.		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
DH-V-75B DH-V-76B	DH-P-1B Vent Valve DH-P-1B Vent Valve		X X	R R	These solenoid operated valves are required to open to vent DH-P-1B before it is operated. They must be closed when the DH pump is operating. If they cannot be opened, manual valves DH-V-77B and DH-V-78B can be used instead.
DH-V-77A DH-V-78A	DH-P-1A Vent Valve DH-P-1A Vent Valve		X X	R R	These manual valves can be used to vent DH-P-1A before it is operated for cold shutdown if DH-V-75A and DH-V-76A are not available.
DH-V-77B DH-V-78B	DH-P-1B Vent Valve DH-P-1B Vent Valve		X X	R R	These manual valves can be used to vent DH-P-1B before it is operated for cold shutdown if DH-V-75B and DH-V-76B are not available.
BS-V-2A BS-V-2B	Sodium Hydroxide Storage Tank inertie valves to Decay Heat Suction Header		X X	S S	These motor operated valves must remain closed to prevent introduction of NaOH into the reactor coolant system. Their position must be verified, and may be manually corrected, before operation of the decay heat removal system.
BS-V-3A BS-V-3B	Reactor Building Spray suction valves from the RB sump		X X	R R	These motor operated valves on the reactor building sump/BWST suction line are normally open and must be closed when decay heat pumps are running to prevent reactor coolant from entering the spray system. These valves can be shut manually if they cannot be closed electrically. Spurious operation is not a concern, since the decay heat system will operate only after the fire is extinguished.

003/002
T3-3 7

Rev. 17

ATTACHMENT 3-3F
SAFE SHUTDOWN EQUIPMENT

DECAY HEAT RIVER WATER

Page 1 of 1

Component	Function	Required for		Req'd Or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
DR-P-1A DR-P-1B	D H River Water Pump A D H River Water Pump B	X X	X X	R R	These pumps provide cooling water from the Susquehanna River to the decay heat service coolers. Only one is required to operate during shutdown, it must match the operating train of the decay heat closed cycle cooling water. DR-P-1B can be operated from the "B" Aux. Remote Shutdown Panel (RSP)
DR-V-1A DR-V-1B	DR-P-1A Discharge Valve DR-P-1B Discharge Valve	X X	X X	R R	These motor operated valves are normally closed. The valve corresponding to the pump to be used during the fire is required to be opened during shutdown. DR-V-1B can be controlled from the "B" Aux. RSP.
DR-S-1A DR-S-1B DR-V-24A DR-V-24B	DR-P-1A Disch Strainer DR-P-1B Disch Strainer DR-S-1A Backwash Valve DR-S-1B Backwash Valve	- - - -	- - - -	- - - -	These strainers and backwash valves are not required. Sufficient time exists to operate them manually.

003/002
T3-3 8

Rev. 18

ATTACHMENT 3-3G
SAFE SHUTDOWN EQUIPMENT

EMERGENCY FEEDWATER

Page 1 of 3

Component	Function	Required for.		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
EF-P-1 EF-P-2A EF-P-2B	EF Turbine Driver Pump EF Motor Driven Pump A EF Motor Driven Pump B	X X X		R R R	These pumps deliver water from the condensate system to the steam generators. One motor-driven or one turbine-driven pump is required to operate for safe shutdown. EF-P-2B can be controlled from the 1E 4160V ES Switchgear for remote shutdown
EF-V-2A,B	EF Pump Discharge Header Valves	X		S	These motor operated valves are normally opened. They are required to remain open only to allow feed water into both steam generators from a single pump. Spurious closure of the valves may be manually corrected. Since analysis shows that only one steam generator is required, spurious closure is not a concern
EF-V-4 EV-V-5	EF Suction Isolation Valve EF Suction Isolation Valve	- -	- -	- -	These motor operated valves are normally closed. To prevent river water contamination of the EFW system, at least one valve should remain closed. Since Appendix R assumes only one spurious operation to occur per fire scenario, at least one valve will remain closed during the fire. Cables to these valves do not therefore require evaluation
EF-V-30A EF-V-30B EF-V-30C EF-V-30D	EF Train A Ctl. Vlv to Stm Gen A EF Train B Ctl. Vlv. to Stm Gen B EF Train A Ctl. Vlv to Stm Gen A EF Train B Ctl. Vlv to Gen B	X X X X		R R R R	These air-operated, solenoid-controlled, control valves are normally closed. They fail closed upon loss of instrument air. At least one valve for each steam generator in service is required to be operable or manually operated for safe shutdown. The remaining control valve in each loop is required to remain closed to prevent overfilling of the steam generators

003/002
T3-3 9

Rev. 17

ATTACHMENT 3-3G
SAFE SHUTDOWN EQUIPMENT

EMERGENCY FEEDWATER

Page 2 of 3

Component	Function	Required for:		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
					<p>Normally, these valves are controlled by the HSPS system. However, during remote shutdown, the train B solenoid valve control are transferred to the RSP "B" while the train A solenoid valves are closed from the RSP "A".</p> <p>Since the valves are equipped with only a two hour backup air supply, they must be manually controlled after the first two hours if instrument air is not available.</p>
EF-V-52A	EF Train A Flow Iso. Vlv To Stm. Gen A	-	-	-	Power has been removed from these valves They are used as manual valves, normally open
EF-V-52B	EF Train B Flow Iso Vlv To Stm. Gen B.	-	-	-	
EF-V-52C	EF Train B Flow Iso Vlv To Stm. Gen A	-	-	-	
EF-V-52D	EF Train A Flow Iso Vlv To Stm. Gen. A	-	-	-	
EF-V-8A	EF-P-2A Recirculating Valve	-	-	-	<p>These valves are mechanically blocked open with air and electrical service removed from the solenoid valve. The valve corresponding to the EF pump which will be used during the fire should remain open</p> <p>Since these valves are locked to the safe shutdown position (open), cables to these valves do not need to be evaluated.</p>
EF-V-8B	EF-P-1 Recirculating Vlv	-	-	-	
EF-V-8C	EF-P-2B Recirculating Valve	-	-	-	

003/002
T3-3 10

Rev 20 |

ATTACHMENT 3-3G
SAFE SHUTDOWN EQUIPMENT

EMERGENCY FEEDWATER

Page 3 of 3

Component	Function	Required for.		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
CO-V-111A and B EF-V-1A and B	CST. Cross-connect Valves EFW Pump Suction Header Valves	-	-	-	These motor operated valves provide two ways for the emergency feedwater pumps to take suction from both condensate storage tanks. One is through the cross-over header of the two condensate storage tanks with CO-V-111A and B open, and the other is through the common suction header of the emergency feedwater pumps with EF-V-1A and B open. During normal operation, all four valves are opened; however, only one set of valves are required to remain opened during the fire. Since Appendix R assumes only one spurious operation to occur per fire scenario, at least three valves will remain open during shutdown. The cables for these valves do not therefore will not be evaluated.
CO-P-3A CO-P-3B	Powdex backwash pumps	-	-	-	The Powdex backwash pumps may need to be shut off or isolated from the condensate system if the emergency feedwater system is used. This can be done manually.
CO-V-10A CO-V-10B	Condensate storage Tank drain to EFW and Hotwell	-	-	-	These motor operated valves are normally open. They must open to provide emergency feedwater. The valves are locked open, by keeping the circuit breaker locked open
CO-V-14A and CO-V-12, or CO-V-14B and CO-V-13	Condenser Hotwell to Condensate storage Tank cross tie valves	X		R	One pair of these motor-operated valves must open or remain open if condensate is required from the condenser hotwell for emergency feedwater operation, or if condensate is required from the condensate storage tanks for main feedwater operation. Manual operation is acceptable.
AS-P-1A AS-P-1B	Auxiliary Boiler feed pumps	-	-	-	The auxiliary boiler feed pumps should be secured, if operating, to prevent draindown of the condensate storage tanks.

003/002
T3-3 11

Rev 20

ATTACHMENT 3-3H
SAFE SHUTDOWN EQUIPMENT

INTERMEDIATE COOLING

Page 1 of 2

Component	Function	Required for:		Req'd Or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
IC-P-1A IC-P-1B	Intermediate Cooling Pump A Intermediate Cooling Pump B	X X	X X	R R	<p>These pumps provide cooling water to the letdown coolers to support letdown flow in the make-up and purification system and to the reactor coolant pump seal thermal barrier coolers. When R.C. pump seal injection is not available, one pump must be available within 30 minutes for tripped RCP's (10 minutes for running RCPs)</p> <p>Only one pump is required for shutdown. IC-P-1B can be operated from the "B" Aux Remote Shutdown Panel (RSP).</p>
IC-V-1A IC-V-1B	IC Supply to Letdown Iso Valve IC Supply to Letdown Iso Valve	X X	X X	S S	
IC-V-2	IC Return from RB Iso Valve	X	X	S	<p>Prior to the fire, either of these motor operated valves is normally open. This depends upon which letdown cooler is aligned for plant operation.</p> <p>For safe shutdown, these valves should remain in their pre-fire position. IC-V-1B can be operated from "B" Aux. RSP.</p> <p>Since sufficient time is available to initiate letdown flow, the valve's position can be manually corrected if it spuriously operated.</p> <p>This motor operated valve is normally opened and is required to be opened for shutdown. The valve position can be manually corrected if it spuriously operates except when reactor coolant pump seal injection is not available and thermal barrier cooling is required immediately. The valve can be controlled from the "B" Aux RSP.</p>

003/002
T3-3 12

Rev 17

ATTACHMENT 3-3H
SAFE SHUTDOWN EQUIPMENT

INTERMEDIATE COOLING

Page 2 of 2

Component	Function	Required for.		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
IC-V-3	IC Return from RB Iso Valve	X	X	S	<p>These pneumatic operated valves are normally opened. They are required to remain opened to ensure cooling water through the letdown and RCP thermal barrier coolers.</p> <p>These valves are equipped with a 2 hr. backup air bottle to keep them open upon loss of instrument air. Their position can be manually corrected if they spuriously operate except when seal injection is not available and thermal barrier cooling is required immediately.</p> <p>IC-V-3 and IC-V-4 are also equipped with a transfer switch at the RSTSP "A" and "B" respectively, which will isolate cables to the control room and transfer control to the RSP "A" for IC-V-3 and "B" Aux. RSP for IC-V-4.</p>
IC-V-4	IC Supply to RB Iso Vlv.	X	X	S	
IC-V-79A	RCP A Cooler Isolation Valve	-	-	-	<p>These motor operated valves are normally open. They are required to remain open for seal thermal barrier cooling when seal injection is not available. The valves have power removed.</p>
IC-V-79B	RCP B Cooler Isolation Valve	-	-	-	
IC-V-79C	RCP C Cooler Isolation Valve	-	-	-	
IC-V-79D	RCP D Cooler Isolation Valve	-	-	-	

003/002
T3-3 13

Rev 17

ATTACHMENT 3-3I
SAFE SHUTDOWN EQUIPMENT

LETDOWN

Page 1 of 3

Component	Function	Required for		Req'd Or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
MU-V-1A	Letdown Cooler A inlet valve	X	X	S	During normal operation, both pairs of motor operated inlet and outlet valves can be opened which place both letdown coolers in service.
MU-V-2A	Letdown Cooler A outlet valve	X	X	R/S	
MU-V-1B	Letdown Cooler B inlet valve	X	X	S	MU-V-2A and 2B can be controlled from remote shutdown panel (RSP) "B". The required pair can be manually operated for letdown. The uncontrolled letdown may be mitigated by closing MU-V-2A and 2B.
MU-V-2B	Letdown Cooler B inlet valve	X	X	R/S	
MU-V-3	Letdown Block Valve	X	X	R/S	This pneumatic solenoid operated valve is normally opened and de-energized. If letdown is required and the valve spuriously closes, it can be manually opened. MU-V-3 can be operated from remote shutdown panel (RSP) "A". The uncontrolled letdown may be mitigated by closing MU-V-3.
MU-V-4	Orifice Block Valve	X	X	R/S	This pneumatic solenoid operated valve is normally opened and de-energized. If letdown is required for RCS pressure control, the valve should be closed. If it cannot be closed due to spurious operation, manual valve MU-V-99 must be closed to prevent uncontrolled letdown flow. (See Remarks under MU-V-2A/B and 3.)
MU-V-99	Orifice Block Valve	X	X	R	This manual valve must be closed if MU-V-4 cannot be closed and letdown is required for RCS pressure control.
MU-V-5	Letdown Flow Control Valve	X	X	R/S	This pneumatic control valve is used to control letdown flow down to 10 GPM. If letdown is required for RCS pressure control, this valve is the preferred means of flow control. If it cannot be controlled or spuriously opens, manual valves MU-V-97A or 97B can be closed to prevent uncontrolled letdown flow. (See Remarks under MU-V-2A/B and 3.)

003/002
T3-3 14

Rev. 18

ATTACHMENT 3-3I
SAFE SHUTDOWN EQUIPMENT

LETDOWN

Page 2 of 3

Component	Function	Required for		Req'd Or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
MU-V-97A MU-V-97B	MU-V-5 Manual Isolation Valves	X X	X X	R R	One of these manual valves must be closed if MU-V-5 cannot be controlled
MU-V-98 MU-V-109A MU-V-109B	Manual Bypass Valves for MU-V-5 and the letdown orifice	X X X	X X X	R R R	These three manual valves can be used to control letdown flow if letdown is required for RCS pressure control and MU-V-5 is not available. If this flow path is needed, all three valves should be in the throttle position so that the entire letdown pressure decrease is not taken across one valve only.
MU-V-6A MU-V-6B	Demineralizer MU-K-1A Inlet Valve Demineralizer MU-K-1B Inlet Valve	X X	X X	S S	One of these pneumatic solenoid operated valves is normally open depending on which demineralizer is in service. If it should spurious close, manual bypass valve MU-V-70A must be opened to provide a letdown flow path.
MU-V-70A	Demineralizer Bypass Valve	X	X	R	This manual valve must be opened to provide a letdown flow path if MU-V-6A or 6B spurious closes.
MU-V-8	Letdown to MU/Bleed Tank Control Valve	X	X	R/S	This motor operated valve is normally positioned to send letdown flow to the make-up tank. This valve may need to transfer letdown flow to the bleed tanks to prevent the MU tank from overflowing. This can be accomplished by manual operation, because the MU tank overflow will be drained to WDL-T-2.
MU-V-11A MU-V-11B	Make-up Filter MU-F-1A Inlet Valve Make-up Filter MU-F-1B Inlet Valve	X X	X X	S S	One of these pneumatic solenoid operated valves is normally open depending on which filter is in service. If it spurious closes, manual bypass valve MU-V-110 must be opened to provide a letdown flow path to the make-up tank.

003/002
T3-3.15

Rev. 17

ATTACHMENT 3-3I
SAFE SHUTDOWN EQUIPMENT

LETDOWN

Page 3 of 3

Component	Function	Required for.		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MU-V-110	Make-up Filter Bypass Valve	X	X	R	This manual valve must be opened to provide a letdown flow path to the make-up tank if MU-V-11A/11B spuriously closes
WDL-V-1	Letdown to Bleed Tanks Isolation Valve	X	X	R/S	This pneumatic valve must be open to divert letdown to the bleed tanks. The valve must be opened by connecting an external air or nitrogen supply if normal operation is not possible
WDL-V-2	Letdown to Deborating Demineralizer Isolation Valve	X	X	R/S	This pneumatic valve must be closed to divert letdown to the bleed tanks. The valve must be closed by disconnecting air supply if normal operation is not possible.
WDL-V-3	Letdown Valve to Bleed Tank WDL-T-1A	X	X	R/S	One of these pneumatic valves must be open to a bleed tank with sufficient capacity to accept letdown flow. The valve must be opened by connecting an external air or nitrogen supply if normal operation is not possible.
WDL-V-4	Letdown Valve to Bleed Tank WDL-T-1B	X	X	R/S	
WDL-V-5	Letdown Valve to Bleed Tank WDL-T-1C	X	X	R/S	

003/002
T3-3.16

Rev 17

ATTACHMENT 3-3J
SAFE SHUTDOWN EQUIPMENT

MAIN FEEDWATER

Page 1 of 2

Component	Function	Required for:		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
<p>NOTE: Appendix R requires an assumption of loss of off-site power for fire events. The main feedwater system is not available after a loss of off-site power. The main feedwater system is not required for safe shutdown under Appendix R. Emergency feedwater is used for shutdown. Shutdown of the system is required to prevent OTSG overfill and primary loop overcooling. In that event, the following components are required.</p>					
FW-U-1A or B	Main feedwater pump turbines	X		R	<p>Trip of the turbines may be required to mitigate spurious opening of the control valves, to prevent steam generator overfill. This is the only operation required for safe shutdown under Appendix R.</p> <p>These motor operated angle stop check valves are normally open. They may be required to close to mitigate OTSG overfill during safe shutdown under Appendix R.</p> <p>These motor-operated valves are normally open. These valves may be required to close to mitigate spurious opening of the respective FW-V-17A and B main control valves</p> <p>These pneumatic valves are required to operate to control steam generator level if main feedwater is used for shutdown. Flow is controlled on steam generator level. Spurious opening would flood a steam generator, and spurious closure would lower steam generator level and initiate emergency feedwater. They may be required to close to mitigate OTSG overfill.</p> <p>Spurious opening can be mitigated by closing the corresponding block valve FW-V-92A or B, or tripping pumps, and initiating emergency feedwater.</p>
FW-P-1A or B	Main feedwater pumps				
FW-V-1A or B	Main feedwater pumps discharge isolation	X		R	
FW-V-5A and B	Main control block valves	X		R	
FW-V-16A and B	Low-load control valves	X		R	

ATTACHMENT 3-3J
SAFE SHUTDOWN EQUIPMENT

MAIN FEEDWATER

Page 2 of 2

Component	Function	Required for		Req'd Or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
FW-V-17A and B	Main control valves	X		S	<p>These pneumatic control valves are normally modulating during operation. They may be required to close to permit control of steam generator level by the FW-V-16A and B low-load control valves if main feedwater is used. Spurious opening would flood a steam generator.</p> <p>Spurious opening can be mitigated by closing the corresponding block valve FW-V-5A or B, or tripping pumps, and initiating emergency feedwater.</p>
FW-V-92A and B	Low-load control block valves	X		R	<p>These motor-operated valves are normally open. These valves may be required to close to mitigate spurious opening of the respective FW-V-16A and B low-load control valves.</p>
CO-P-1A, 1B & 1C	Condensate pumps	-	-	-	<p>These condensate pumps are not required for shutdown. Tripping of the condensate pumps will starve feedwater pump suction and prevent OTSG overfill.</p>
CO-P-2A, 2B & 2C	Condensate booster pump	-	-	-	<p>These condensate booster pumps are not required for shutdown. Tripping of the condensate booster pumps will also starve feedwater pump suction and prevent OTSG overfill.</p>

003/002
T3-3 18

Rev. 17

ATTACHMENT 3-3K
SAFE SHUTDOWN EQUIPMENT

MAIN STEAM

Page 1 of 3

Component	Function	Required for.		Req'd or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
SV-1,2,3,4	Turbine Stop Valves	X		R	These electro-hydraulic valves are required to close during safe shutdown. They will automatically close when the main turbine is tripped. If they fail to close the Turbine Control valves are available to close.
CV-1,2,3,4	Turbine Control Valves	X		R	These valves are required to close for safe shutdown if the Turbine Stop Valves fail to close due to a hot short. These valves will not fail to close in the event of a fire. Reliance on these valves to isolate main steam is not a concern.
MS-V-3A-F	Main Steam Dump to Condenser Valves	X		S	These air-operated valves are normally closed and are required to remain closed for cooldown by atmospheric dump valves MS-V-4A and B. They are controlled by an E/P converter which gets signal from the NNI/ICS. Their pneumatic line is equipped with solenoid valves which when deenergized will block control from the E/P converter, drain the air to the valves and close it. Spurious opening of more than one MS-V-3 without closure of MS-V-8A/8B is a pressurized thermal shock concern. See Attachment 3-2 Note 11.
MS-V-8A, B	Main Steam Dump to Condenser Valves	X		R	These motor-operated valves are normally opened. They are required to mitigate spurious operation of MS-V-3A,B,C,D,E,F. Both valves can be controlled from the RSP "B" for remote shutdown.
MS-V-4A,B	Atmospheric Dump Valves	X		R	These air-operated valves are normally closed. Cooldown can be achieved with one valve under control, provided it serves a steam generator whose level is under control. The other valve must be under control or closed. These valves can be manually controlled. An open MS-V-4 is less severe than a main steam break or a stuck-open relief valve incident, for which analyses are available to show acceptable plant response. The relief valves are available if both dump valves stay closed. For remote shutdown, MS-V-4A can be closed when it spuriously opens from the RSP "A" while MS-V-4B can be controlled from RSP "B". See Attachment 3-2 Note 11

003/002
T3-3 19

Rev. 19

ATTACHMENT 3-3K
SAFE SHUTDOWN EQUIPMENT

MAIN STEAM

Page 2 of 3

Component	Function	Required for:		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MS-V-2A,B	Steam Dump Header Isolation Valve	X		S	These motor operated valves are normally opened. The valve corresponding to the steam generator, atmospheric dump valve and emergency feedwater (EFW) turbine-driven pump steam valve to be used during the fire should remain open, if less than two OTSG's, atmospheric dump valves (MS-V-4A and B), or EFW steam valves (MS-V-10A and B) are used.
MS-V-10A,B	EF-P-1 Steam Valves	X		R	Two valves are preferred for steam to the EF turbine driven pump. One is sufficient. Spurious operation can be manually corrected. These motor-operated valves are normally closed. Only one is required to be opened when the emergency feedwater (EF) turbine driven pump is used. These valves are normally used at low main steam pressures, but can be used at normal (high) pressures.
MS-V-6	EF Turbine Isolation	X		R	This air-operated valve is normally opened. It is required to control the steam pressure to the emergency feedwater turbine when the emergency feedwater turbine-driven pump is used for shutdown. It is equipped with a pressure controller (MS_PC-5) which closes the valve on increasing signal. The valve will fail open on loss of instrument air.
AS-V-4	Aux Steam Isolation Valve	X		S	This motor operated valve is normally closed. It should remain closed if the turbine driven EFW pump (EF-P-1) is used, to avoid uncontrolled loss of main steam to the auxiliary steam system. Manual closure is acceptable.

ATTACHMENT 3-3K
SAFE SHUTDOWN EQUIPMENT

MAIN STEAM

Page 3 of 3

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MS-V-56A and B	Main Feedwater Turbine Main Steam Stop Valves	X	-	-	These valves open automatically on main turbine trip and automatically close when the feedwater turbine trips. When the main feedwater system is used instead of the emergency feedwater system, the valve corresponding to the pump in service must remain open. When main feedwater is not used, they should close. Since the main feedwater turbine control valves MS-V-57A and B are in series with these valves, closure of these valves is not required.
MS-V-5A and B	Main Feedwater Turbine Main Steam Isolation	-	-	-	These motor-operated valves are normally open. When the main feedwater system is used instead of the emergency feedwater system, the valve corresponding to the pump in service must remain open. They are not required for safe shutdown under Appendix R.
	Extraction Steam. Stop Valves	-	-	-	Protection is not required. Check valves are provided upstream.
MS-V-13A MS-V-13B	MS-V-10A Bypass MS-V-10B Bypass	X X		R R	These air-operated valves are used for EFW turbine steam supply at normal (high) main steam pressures. They are not required for emergency operation if MS-V-10A or B is available.

003/002
T3-3 21

Rev. 17

ATTACHMENT 3-3L
SAFE SHUTDOWN EQUIPMENT

MAKEUP

Page 1 of 4

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MU-P-1A MU-P-1B MU-P-1C	Makeup Pump A Makeup Pump B Makeup Pump C	X X X	X X X	R R R	<p>These pumps provided makeup water to the reactor coolant (RC) system for pressure, inventory, and reactivity control, for reactor coolant pump (RCP) seal injection, and for high pressure injection cooling</p> <p>Only one pump is required to operate for safe shutdown with primary to secondary cooling available for decay heat removal Pumps MU-P-1B and MU-P-1C can be controlled from remote shutdown panel (RSP) "B". If MU-P-1C is used, the intermediate cooling system must be available to provide RCP thermal barrier cooling since RCP seal injection flow is not normally lined up to MU-P-1C. NOTE Makeup pumps and associated components are required for cold shutdown if reactor coolant temperature is 190 °F. or greater as seal injection is required Makeup could also be required if reactor coolant temperature exceeds 135° F and reactor coolant pressure control must be re-established due to a steam space in the pressurizer.</p> <p>Two pumps are required for high pressure injection (HPI) cooling in the IB-FZ-3 and IB-FZ-8 fire cases</p>
MU-P-2A MU-P-2B MU-P-2C	Aux Oil Pump for MU-P-1A Aux Oil Pump for MU-P-1B Aux Oil Pump for MU-P-1C	X X X	X X X	R R R	<p>These pumps are normally operated in conjunction with and as backup to the main oil pumps to insure sufficient lubrication for the makeup pumps' motor and bearings Either the aux Oil pump or the main oil pump corresponding to the makeup pump in use is required for shutdown</p>
MU-P-3A MU-P-3B MU-3-3C	Main Oil Pump for MU-P-1A Main Oil Pump for MU-P-1B Main Oil Pump for MU-P-1C	X X X	X X X	R R R	<p>These pumps operate continuously during makeup pump operation to supply the pump motor and bearing with sufficient lubricating oil. See remarks above for MU-P-2A, 2B & 2C. MU-P-3B and 3C can be operated from remote shutdown panel (RSP) "B".</p>
MU-P-4A MU-P-4B MU-P-4C	Lubrication Pump for MU-P-1A Lubrication Pump for MU-P-1B Lubrication Pump for MU-P-1C	- - -	- - -	- - -	<p>Lubrication pumps MU-P-4A, B or C for the reduction gears are not needed since it is assumed that the shaft driven pump is sufficient. If a shaft driven oil pump is not operable, the affected make-up pump is declared inoperable</p>

003/002
T3-3A 2

Rev 18

ATTACHMENT 3-3L
SAFE SHUTDOWN EQUIPMENT

MAKEUP

Page 2 of 4

Component	Function	Required for		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MU-V-12	Makeup Tank Isolation Valve	-	-	-	This motor operated valve is normally open. Since the makeup tank is not relied on for safe shutdown, the position of this valve has no effect on safe shutdown. It may also stay open because no gas binding is expected.
MU-V-14A	MU Pump Suction Isolation Valve from BWST	X	X	R	This motor operated valve is normally closed. It is required to be opened to allow MU-P-1A or MU-P-1B to take suction from the BWST. It can be manually operated before starting the makeup pump. The valve can be controlled from RSP "A" provided off-site power is available.
MU-V-14B	MU Pump Suction Isolation Valve from BWST	X	X	R	This motor operated valve is normally closed. It is required to be opened to allow MU-P-1C to take suction from the BWST. The valve can be controlled from RSP "B" and must be opened rapidly if MU-P-1C is the only make-up available for operation. Otherwise, MU-P-1C starting must be delayed.
MU-V-16A MU-V-16B	Emergency Makeup Valve Emergency Makeup Valve	X X	X X	R/S R/S	These motor operated valves are normally closed. One is required to open to inject makeup water into the RC system when MU-P-1A or MU-P-1B is used and the normal makeup path is not available or if HPI cooling is required. Jog control is required for RCS inventory control. Spurious opening of these valves can be mitigated by tripping the operating MU pump and manually closing the valves.
MU-V-16C MU-V-16D	Emergency Makeup Valve Emergency Makeup Valve	X X	X X	R/S R/S	These motor operated valves are normally closed. One is required to open to inject makeup water into the RC system when MU-P-1C is used. Both valves can be controlled from the RSP "B". The valve in use must be jog controllable. Spurious opening of these valves can be mitigated by tripping the operating MU pump and manually closing the valves.

003/002
T3-3A 3

Rev. 18

ATTACHMENT 3-3L
SAFE SHUTDOWN EQUIPMENT

MAKEUP

Page 3 of 4

Component	Function	Required for:		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MU-V-17 MU-V-18	Pressurizer Level Control Valve Normal Makeup Valve	X X	X X	R/S R/S	These pneumatic operated valves provide the normal make-up path. MU-V-17 is controlled by an E/P converter (MU25-E/P) which gets signals from a manual controller (RC1-LIC) or from instruments RC1-LT1/2/3 and RC1-TE1/2. MU-V-18 is a solenoid operated valve which is normally deenergized (open). The valve will close when the ES logic spuriously actuates or upon loss of instrument air. If MU-V-17 spuriously opens, MU-V-18 must be closed to stop uncontrolled make-up flow. If MU-V-18 spuriously closes, an alternative make-up flow path through MU-V-16A or B can be used. MU-V-18 can be operated from remote shutdown panel RSP "B"
MU-V-217	Bypass Valve for MU-V-17	X	X	S	This normally closed motor operated valve is a bypass around MU-V-17. If MU-V-17 spuriously opens, MU-V-18 must be closed to stop uncontrolled make-up flow or make-up pump tripped.
MU-V-92	MU-V-17 Manual Bypass Valve	X	X	R	This normally closed manual valve can be used to control make-up flow if MU-V-17 is not available.
MU-V-91A MU-V-91B	MU-V-17 Isolation Valves	X X	X X	R R	These normally open manual valves can be used to isolate MU-V-17 if it is uncontrollable
MU-V-20 MU-V-32	RC Pump Seal Water Isolation Valve RC Pump Seal Injection Valve	X X	X X	S R/S	These pneumatic valves provide a path for RCP seal injection. MU-V-20 is a solenoid operated valve which is normally deenergized (open). It has a backup air bottle that will keep the valve open upon loss of instrument air. MU-V-20 can be operated from remote shutdown panel (RSP) "B". MU-V-32 is controlled by an E/P converter (MU32-E/P) which gets signal from a manual controller (MU42-FIC) or from instrument MU42-dPT. This path is only used with MU-P-1A or MU-P-1B. MUP-1C is not normally aligned for seal injection. Either the RCP seal injection or the RCP thermal barriers are required to protect RCP pump seals

003/002
T3-3A 4

Rev. 18

ATTACHMENT 3-3L
SAFE SHUTDOWN EQUIPMENT

MAKEUP

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
MU-V-36 MU-V-37	MU Pumps Recirc Iso Valves	X X	X X	S S	These motor operated valves are normally open. They are required to stay open to assure minimum acceptable flow through the MU pumps to prevent pump damage. Both valves must be protected from spurious closure whenever one of the make-up pumps is running and the seal injection path is not available The pump manufacturer (Bingham-Willamette) states that flow marginally below the minimum stated requirement (e.g., 32 gpm seal injection instead of 40 gpm required) is permissible for some time, without serious effects. An alternative to protection of these valves is to ensure that makeup plus seal injection flow is above 40 gpm at all times (assuming one pump is operating). MU-V-36 can be controlled from RSP "A" provided off-site power is available. MU-V-37 can be controlled from RSP "B". The spuriously closed valve can be manually aligned.
MU-V-38	RCP #1 Seal Bypass			S	Control Power Breaker for this motor operated valve is open to prevent spurious opening of the valve which can result in extensive leakage and elevated temperature of the No 1 RCP seals
MU-V-76A MU-V-76B	MU Pump C Make-up Header Isolation Valves	X X	X X	R R	These manual valves must be opened if MU-P-1C is needed for reactor coolant pressure control in order to permit the pump to use the normal makeup path
DH-V-6A DH-V-6B	RX Bldg Sump to DH Pump A RX Bldg Sump to DH Pump B	X X	X X	S S	These motor operated valves are normally closed and are required to stay closed for hot and cold shutdown. If they should open spuriously, water from the BWST will drain to the Reactor Building sump. If this occurs, ample time (45 minutes) is available to manually close these valves or to manually close DH-V-5A/5B before the BWST level gets too low to provide water to the make-up pumps. DH-V-6A and B have remote shutdown features at the 480V engineered safeguard valve MCC 1A and 1B respectively. For cold shutdown, see entries in Attachment 3-3E, Decay Heat Removal.

ATTACHMENT 3-3M
SAFE SHUTDOWN EQUIPMENT

NUCLEAR SERVICES CLOSED CYCLE COOLING WATER

Page 1 of 1

Component	Function	Required for.		Req'd or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
NS-P-1A NS-P-1B NS-P-1C	NS Cooling Pump A NS Cooling Pump B NS Cooling Pump B	X X X	X X X	R R R	These pumps provide cooling water to makeup pump 1B Only one pump is required for safe shutdown NS-P-1C can be controlled from the "B" Aux. Remote shutdown panel (RSP)
NS-V-4 NS-V-15 NS-V-35	Reactor Coolant Pump Cooling Containment Isolation Valves	- - -	- - -	- - -	Reactor coolant pumps, and hence, reactor coolant pump cooling, are not required for safe shutdown
NS-V-32	Nonessential Services Isolation Valve	X	X	R	This motor-operated valve should be closed to isolate nonessential cooling loads when two NS pumps and/or two nuclear service river water (NR) pumps are disabled and MU-P-1B is used for shutdown Manual operation is acceptable
NS-V-52A NS-V-52B NS-V-52C	Reactor Building Fan Cooler Inlet Valves	- - -	- - -	- - -	Since analysis shows that no fan cooler is required for reactor building cooling, these valves are not required.
NS-V-53A NS-V-53B NS-V-53C	Reactor Building Fan Cooler Outlet Valves	- - -	- - -	- - -	See remarks for NS-V-52A, 52B, 53C
NS-V-108A NS-V-108B	Control Bldg Air Condt Outlet Control Valves	- -	- -	- -	These pneumatically operated valves are normally open Since analysis shows that no chillers are required for control building ventilation, these valves are not required

003/002
T3-3A 6

Rev. 17

ATTACHMENT 3-3N
SAFE SHUTDOWN EQUIPMENT

NUCLEAR SERVICE RIVER WATER

Page 1 of 3

Component	Function	Required for		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
NR-P-1A	Nuclear Service River Water Pump A	X	X	R	These pumps provide water from the Susquehanna River to the nuclear service heat exchange of the NS system and to the intermediate service coolers of the IC system. One pump is required for shutdown. These pumps can operate without pressurized lubricating water. NR-P-1C can be controlled from Auxiliary Remote Shutdown Panel (Aux. RSP) "B"
NR-P-1B	Nuclear Service River Water Pump A	X	X	R	
NR-P-1C	Nuclear Service River Pump C	X	X	R	
NR-V-1A NR-V-1B NR-V-1C	NR-P-1A Discharge Valve NR-P-1B Discharge Valve NR-P-1C Discharge Valve				The discharge valves for each pump are motor operated and are open on the normally operating pumps. The valve corresponding to the pump intended to be used at the time of fire should remain opened. NR-V-1C can be controlled from the "B" Aux. RSP.
NR-V-2 NR-V-7	NR-SR System Tie Valve NR-SR System Tie Valve				To ensure cooling water to the NS and the IC heat exchangers, at least one of these valves should stay closed. They are motor operated and are normally closed. Since Appendix R assumes only one spurious operation to occur per fire scenario, at least one valve will remain closed during the fire. These valves do not therefore require evaluation.
NR-V-3 NR-V-5	N R Line Isolation Valve N R Line Isolation Valve				These motor operated valves are normally opened and required to remain opened for safe shutdown. Spurious operation of either valve will block the flow of cooling water to the nuclear service heat exchangers and the intermediate service coolers. Spurious closure of these valves is prevented by removing the 480 volt ac power to the valves.

003/002
T3-3A 7

Rev. 19

ATTACHMENT 3-3N
SAFE SHUTDOWN EQUIPMENT

NUCLEAR SERVICE RIVER WATER

Page 2 of 3

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
NR-V-4A NR-V-4B	De-Ice Makeup Valve De-Ice Makeup Valve	X X	X X	S S	<p>Prior to the fire, the position of these valves could either be throttled, open or closed. For safe shutdown, one of the valves must be closed or must remain in the prefire position to ensure enough water to the nuclear service heat exchangers and to the intermediate service coolers. The valves are opened during deicing makeup.</p> <p>Deicing makeup is required only when the deicing letdown from circulating water exceeds the makeup capacity of the secondary services river water system. Administrative controls will be developed to protect against spurious wide opening of these valves during these short, infrequent period of operation.</p>
NR-V-6	NR-SR System Intertie Valve	-	-	-	This motor operated valve is normally closed. To ensure enough cooling water to the NS and IC heat exchangers, the valve should stay closed. The valve is kept closed by removing 480 volt ac power.
NR-V-8A,B,C,D NR-V-16A,B,C,D	NS Cooler Inlet Valves NS Cooler Outlet Valves	- -	- -	- -	Three out of four pairs of motor operated valves are normally opened. At least two sets of valves (4 valves) should remain opened for safe shutdown because two NS heat exchangers are required to be operable. Since Appendix R only assumes one spurious operation to occur during any fire scenario, at least five valves will remain open during the fire. Cables to these valves therefore do not need to be evaluated.
NR-V-18 NR-V-19	NS and IC Cooler Outlet Valve	X X	X X	R S	One of these motor operated valves is normally opened and is required to remain opened for safe shutdown to allow cooling water to flow through the nuclear service heat exchangers and the intermediate service coolers. Control of valve NR-V-18 is required for nuclear service river water system pressure control. It can be controlled from the "B" Aux RSP and the Control Room.

003/002
T3-3A 8

Rev. 17

ATTACHMENT 3-3N
SAFE SHUTDOWN EQUIPMENT

NUCLEAR SERVICE RIVER WATER

Page 3 of 3

Component	Function	Required for		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
NR-V-10A, B	IC Cooler Inlet Valve	-	-	-	Spurious opening of NR-V-19 would cause loss of the system pressure control with NR-V-18 It can be manually corrected During normal operation, both valves are opened For safe shutdown these motor operated valves should remain opened. Spurious closure of the valve is prevented by removing 480 volt power supply.
NR-V-15A, B	IC Cooler Outlet Valve	X	X	S	One of these motor operated valves is normally opened while the other one is closed For safe shutdown, they should remain in their prefire position Manual correction of the valve position is allowed only when the intermediate cooling system is not used for reactor coolant pump thermal barrier cooling or letdown cooling. Control of the valves is required for intermediate cooling system temperature control NR-V-15B can be controlled from the "B" Aux RSP.
NR-S-1A	NR-P-1A Disc Strainer	-	-	-	Evaluation of these strainers and backwash valves is not required Sufficient time exists to operate them manually.
NR-S-1B	NR-P-1B Disc Strainer	-	-	-	
NR-S-1C	NR-P-1C Disc Strainer	-	-	-	
NR-V-53A	NR-S-1A Backwash Valve	-	-	-	
NR-V-53B	NR-S-1A Backwash Valve	-	-	-	
NR-V-53C	NR-S-1A Backwash Valve	-	-	-	

003/002
T3-3A 9

Rev. 17

ATTACHMENT 3-30
SAFE SHUTDOWN EQUIPMENT

REACTOR BUILDING EMERGENCY
COOLING RIVER WATER

Page 1 of 1

Component	Function	Required for. Hot Shut- Down	Cold Shut- Down	Req'd or Spur- ious?	Remarks
<p>NOTE. Under Appendix R, this system is required to operate only if a reactor building fan cooler is required. Since analysis Shows that no fan cooler is required for Appendix R events, the balance of this table has been deleted.</p>					

003/002
T3-3A 10

Rev. 17

ATTACHMENT 3-3P
SAFE SHUTDOWN EQUIPMENT

REACTOR BUILDING VENTILATION

Page 1 of 1

Component	Function	Required for Hot Shut- Down	Required for Cold Shut- Down	Req'd or Spur- ious?	Remarks
NOTE: Under Appendix R, this system is required to operate only if a reactor building cooling is required. Since analysis shows that no reactor building cooling is required for Appendix R events, the balance of this table has been deleted.					

003/002
T3-3A 11

Rev. 17

ATTACHMENT 3-3Q
SAFE SHUTDOWN EQUIPMENT

REACTOR COOLANT

Page 1 of 4

Component	Function	Required for		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
RC-P-1A RC-P-1B RC-P-1C RC-P-1D	Reactor Coolant Pumps	X X X X		S S S S	No reactor coolant pump (RCP), is required for safe shutdown because natural circulation is used. Tripping of the RC pumps is required to prevent RCP seal damage when RCP seal injection and RCP thermal barrier cooling are not available and cannot be restored within 10 minutes
RC-P-1A Trip RC-P-1B Trip RC-P-1C Trip RC-P-1D Trip	Reactor Coolant Pump Normal Trip	X X X X		R R R R	Normal tripping of RC pumps can be accomplished from the Control Room
RC-P-1A Alt Trip RC-P-1B Alt Trip RC-P-1C Alt Trip RC-P-1D Alt Trip	Reactor Coolant Pump Alternate Trip	X X X X		R R R R	Alternate tripping of RC pumps can be accomplished at 6.9kV switchgear located in the Turbine Building
RC-G-8 RC-G-9	Pressurizer Htr. Group 8 Pressurizer Htr. Group 9	X X	X X	R R	At least one group of pressurizer heaters are required for RCS Pressure control. If pressurizer heaters are not available, makeup and letdown may be used for reactor coolant pressure control. During normal operation, both groups of pressurizer heaters are aligned to MCC PHCC 1B. On loss of off-site power, the heaters are realigned to the diesel generators.
RC-V-1	Pressurizer Spray Valve	X		S	This motor-operated valve is normally closed and opens on reactor coolant pressure above 2205 psig. Main turbine trip will result in a pressure rise and automatic opening of this valve. Spurious operation with reactor coolant pumps operating would result in rapid depressurization. Spurious opening can be mitigated by closing RC-V-3 or by tripping the reactor coolant pumps from the control room or at the 6900V switchgear. Emergency feedwater must be operating and steam generator level must be above 50% before tripping reactor coolant pumps

003/002
T3-3A 12

Rev. 20

ATTACHMENT 3-3Q
SAFE SHUTDOWN EQUIPMENT

REACTOR COOLANT

Page 2 of 4

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
RC-RV-2	Pressurizer Relief Valve (Power Operated Relief Valve-PORV)	X	X	S	This solenoid-operated valve is normally closed and deenergized. The valve can be automatically controlled by instruments RC3A-PT1, RC3A-PT3, RC5A-TE2 and RC5A-TE4. It also has a push button which bypasses the automatic logic and opens the valve. Spurious opening will cause depressurization of the RC system. RC-V-2 is available to mitigate the opening.
RC-V-2	Pressurizer Relief Block Valve	X	X	R	This motor-operated valve is normally open. It is used only to mitigate spurious opening of RC-RV-2. The valve can be controlled from the RSP "B".
RC-V-3	Pressurizer Spray Valve	X	X	R	This motor operated valve is normally open. It may be required to be closed to mitigate spurious opening of RC-V-1.
RC-V-4	Pressurizer Quench Valve		X	R	For remote shutdown, the valve can be controlled from the RSP "B".
RC-V-28 RC-V-44	Pressurizer Vent Valve Pressurizer Vent Valve	X X	X X	R R	This motor operated valve is normally closed. It can be manually operated. It is required to be opened during cold shutdown to allow water from the decay heat removal system into the pressurizer spray line. These high-low pressure valves are normally closed. RC-V-28 is a motor operated valve while RC-V-44 is pneumatic operated. Spurious opening due to any one hot short is prevented by placing a short across the operating coil of RC-V-44. However, opening of both valves due to a combination of cable failures during a fire does not jeopardize plant capability to achieve and maintain cold shutdown conditions.

003/002
T3-3A 13

Rev 19

ATTACHMENT 3-3Q
SAFE SHUTDOWN EQUIPMENT

REACTOR COOLANT

Page 3 of 4

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
RC-V-28 RC-V-44 (Cont)					The vent function must be available to vent excess reactor coolant, when letdown flow path is not available. Other reactor coolant high point vents can be used for this purpose. The PORV (RC-RV-2) can also be used
RC-V-40A RC-V-41A	Reactor Coolant Loop A High Point Vent to RC Drain Tank	X X	X X	R R	These solenoid operated valves are normally closed and deenergized. Spurious opening due to any one hot short is prevented by placing a short across the operating coil of RC-V-41A and 41B. See the discussion above under RC-V-28 and 44 for opening of both valves and venting excess reactor coolant
RC-V-40B RC-V-41B	Reactor Coolant Loop B High Point Vent to RC Drain Tank	X X	X X	R R	
RC-V-42 RC-V-43	Reactor Vessel Vent Reactor Vessel Vent	X X	X X	R R	These solenoid operated valves are normally closed and deenergized. Spurious opening due to any one hot short is prevented by placing a short across the operating coil of RC-V-43. See the discussion above under RC-V-28 and 44 for opening of both valves and venting excess reactor coolant

003/002
T3-3A.14

Rev. 17

ATTACHMENT 3-3Q
SAFE SHUTDOWN EQUIPMENT

REACTOR COOLANT

Page 4 of 4

Component	Function	Required for.		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
CA-V-1	Pressurizer Steam Sample CIV	-	-	-	CA-V-2 is air-operated. The other three sample valves are motor-operated. Uncontrolled reactor coolant loss due to spurious opening of these valves is prevented by normally-closed manual valves in the sampling system.
CA-V-3	Pressurizer Water Sample CIV	-	-	-	
CA-V-13	R.C. Letdown Sample CIV	-	-	-	
CA-V-2	Reactor Sample CIV	-	-	-	

003/002
T3-3A 15

Rev 17

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Page 1 of 6

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
ED-SGES-1D	4160V 1D Engd Sfgds Switchgear	X	X	Reqd	This 4160V switchgear supplies power to the 480 V switchgear EE-SGES-1P and EE-SGESSH-1R and pumps EF-P-2A, MU-P-1A, MU-P-1B, and DH-P-1A.
ED-SGES-1E	4160V 1E Engd Sfgds Switchgear	X	X	Reqd	This 4160V switchgear supplies power to the 480 switchgear EE-SGES-1S and EE-SGESSH-1T and pumps EF-P-2B, MU-P-1B, MU-P-1C and DH-P-1B.
EG-Y-1A	Diesel Generator A	X	X	Reqd	This diesel generator is the source of train "A" AC power when off-site power is lost
EG-Y-1B	Diesel Generator B	X	X	Reqd	This diesel generator is the source of train "B" AC power is lost
EE-SGES-1P	480V 1P Engd Sfgds Switchgear	X	X	Reqd	This 480V switchgear supplies power to MCCs EG-CCES-1A, EG-CCESV-1A and EG-CCESV-1C, pumps NS-P-1A, NS-P-1B and DC-P-1A, and group 8 Pressurizer Heaters.
EE-SGES-1S	480V 1S Engd Sfgds Switchgear	X	X	Reqd	This 480V switchgear supplies power to MCCs EG-CCES-1B, EG-CCESV1B, and EG-CCESV-1C, pumps NS-P-1B, NS-P-1C and DC-P-1B, and group 9 Pressurizer Heaters.
EE-SGESSH-1R	480V 1R Engd Sfgds Screen House Switchgear	X	X	Reqd	This 480V switchgear supplies power to MCCs EG-CCESSH-1A, pumps and NR-P-1A, NR-P-1B and DR-P-1A.
EE-SGESSH-1T	480V 1T Engd Sfgds Screen House Switchgear	X	X	Reqd	This 480V switchgear supplies power to MCCs EG-SSESSH-1B, pumps and NR-P-1B, NR-P-1C and DR-P-1B.
EG-CCES-1A	480V 1A Engd Sfgds MCC	X	X		This MCC supplies power to the 1A, 1C and 1E inverters, 1A, 1C and 1E battery chargers, distribution panel EG-DP-CT5, Ltg Panel EG-DPO-CT2 (upper), pumps IC-P-1A and MU-P-3A, and some train A valves for the EF System

003/002
T3-3A 16

Rev 17

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Page 2 of 6

Component	Function	Required for		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
EG-CCES-1B	480V 1B Engd Sfgds MCC	X	X	Reqd	This MCC supplies power to the 1B and 1D inverters, 1B, 1D and 1F battery chargers, distribution panel EG-DP-CTE, Ltg Panel EG-DP-CT2 (lower); EG-CCES-1B-XT-RSP-B pumps IC-P-1B and MU-P-3C and some train B valves for the EF system
EG-CCES-1B-XT-RSP-B	480/120 VAC Control Transformer	X	X	Reqd	Supplies power to remote shutdown transfer switch panel "B".
EG-CCESV-1A	480V 1A Engd. Sfgds Valve MCC	X	X	Reqd	This MCC supplies power to pumps MU-P-2A and MU-P-2B and some train A valves of the NR, DH, BS, IC and MU systems
EG-CCESV-1B	480 1B Engd Sfgds Valve MCC	X	X	Reqd	This MCC supplies power to pumps MU-P-2C and MU-P-3B and some train B valves of the NR, DH, BS, IC and MU Systems.
EG-SEC-1C	1C ES Valves MCC Transfer Switch	X	X	Reqd	This transfer switch aligns the 1C ES valves MCC to EE-SGES-1P (train A switchgear) or EE-SGES-1S (train B switchgear).
EG-CCESV-1C	480V 1C Engd Sfgds Valve MCC	X	X	Reqd	This MCC supplies power to distribution panel EG-DP-ABE, and some valves of the MS, DH, RC, MU and NR systems.
EG-CCESH-1A	480V 1A Engd Sfgds Screen House MCC	X	X	Reqd	This MCC supplies power to AH-E-27A and some train A valves of the DR and NR systems
EG-CCESH-1B	480V 1B Engd Sfgds Screen House MCC	X	X	Reqd	This MCC supplies power to the AH-E-27B and some train B valves of the DR and NR systems
EG-DP-ATA	120 VAC 10 Computer Dist Pnl ATA	X	X	Reqd	This distribution panel supplies hand nex and ney power to the non-safety instruments and components responsible for monitoring and controlling the safe shutdown process. It also supplies power to the Main Steam Valves MS-V-3A,B,C,D,E,F and Remote Shutdown Transfer Switch Panel "A". Panel ATA is a back-up supply of auto power to NNI/ICS cabinets.

003/002
T3-3A 17

Rev. 20

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Page 3 of 6

Component	Function	Required for:		Req'd Or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
EG-DP-ATB	120 VAC 10 Computer Dist. Pnl ATB	X	X	Reqd	This distribution panel supplies power to the Remote Shutdown Transfer Switch Panel B. It also supplies auto power to the non-safety instruments and components responsible for monitoring and controlling the safe shutdown process. Panel ATB is a back-up supply of hand power to the NNI/ICS cabinets.
EG-DP-VBA	1A 120V 10 Vital AC Dist. Pnl VBA	X	X	Reqd	This distribution panel supplies power to the HSPS Cabinet A, Remote Shutdown Transfer Switch Panel A, Remote Shutdown Panel A, Signal Conditioning Cabinet A, and EG-DP-ATA.
EG-DP-VBB	1A 120V 10 Vital AC Dist Pnl. VBB	X	X	Reqd	This distribution panel supplies power to the HSPS Cabinet B, Signal Conditioning Cabinet B and Remote Shutdown Panel B and MS-V-4A and 4B manual loader.
EG-DP-VBC	1A 120V 10 Vital AC Dist Pnl. VBC	X	X	Reqd	This distribution panel supplies power to the HSPS Cabinet C, Remote Shutdown Transfer Switch Panels B and C, and instruments FT-779 and FT-791.
EG-DP-VBD	1A 120V 10 Vital AC Dist Pnl VBD	X	X	Reqd	This distribution panel supplies power to the HSPS Cabinet D.
EG-DP-ABE EG-DP-CTE EG-DP-CT5	120/208V AC Dist. Panel 120/208V AC Dist. Panel 120/208V AC Dist. Panel	-	-	Reqd	These distribution panels are required to control the control building air dampers. Since analysis shows that control building ventilation is not required, they are not needed for safe shutdown.
EG-DP-CT2	277/480 V Ltg Panel	X	-	Reqd	Supplies power to the Ac Control Room lights.
EH-INV-1A	Inverter 1A	X	X	Reqd	Inverter 1A supplies power to panel EG-DP-VBA.
EH-INV-1B	Inverter 1B	X	X	Reqd.	Inverter 1B supplies power to panel EG-DP-VBB.
EH-INV-1C	Inverter 1C	X	X	Reqd	Inverter 1C supplies power to panel EG-DP-VBC.
EH-INV-1D	Inverter 1D	X	X	Reqd.	Inverter 1D supplies power to panel ED-DP-VBD.

003/002
T3-3A 18

Rev. 17

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Page 4 of 6

Component	Function	Required for:		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
EH-INV-1E	Inverter 1E	X	X	Reqd	Inverter 1E is an alternate source of power to panels EG-DP-VBA, EG-DP-VBB, EG-DP-VBC, and EG-DP-VBD. It also supplies power to panel EG-DP-ATB.
EH-BA-1A EH-BA-1C	A Battery C Battery	X X	X X	Reqd Reqd	These 125V/250V batteries supply dc power to EH-DP-1A. "A" train distribution panel.
EH-BA-1B EH-BA-1D	B Battery D Battery	X X	X X	Reqd Reqd	These 125V/250V batteries supply dc power to EH-DP-1B. "B" train distribution panel.
EH-BC-1A	Battery Charger 1A	X	X	Reqd	This battery charger recharges EH-BA-1A.
EH-BC-1B	Battery Charger 1B	X	X	Reqd	This battery charger recharges EH-BA-1B.
EH-BC-1C	Battery Charger 1C	X	X	Reqd.	This battery charger recharges EH-BA-1C.
EH-BC-1D	Battery Charger 1D	X	X	Reqd	This battery charger recharges EH-BA-1D.
EH-BC-1E	Battery Charger 1E	X	X	Reqd	This battery charger recharges both EH-BA-1A and EH-BA-1C.
EH-BC-1F	Battery Charger 1F	X	X	Reqd	This battery charger recharges both EH-BA-1B and EH-BA-1D.
EH-DP-1A	125/250V D C Main Dist. Pnl.	X	X	Reqd	This distribution panel supplies power to EH-DPES-1E, EH-DP-1C, EH-DP-1M, EH-INV-1A, EH-INV-1C, and EH-INV-1E.
EH-DP-1B	125/250V D C Main Dist. Pnl	X	X	Reqd	This distribution panel supplies power to EH-DPES-1F, EH-DP-1D, EH-DP-1M, EH-INV-1B and EH-INV-1D.
EH-DP-1C	125/250V D C Dist Pnl	X	X	Reqd	This distribution panel supplies power to valve MS-V-10A.
EH-DP-1D	125/250V D C. Dist. Pnl	X	X	Reqd	This distribution panel supplies power to valve MS-V-10B.

003/002
T3-3A 19

Rev. 17

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Component	Function	Required for:		Req'd Or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
EH-DP-1M	ES125/250V D C Dist Pnl	X	X	Reqd	This distribution panel supplies power to some of the safe shutdown valves of the NS, IC, and MU System, Remote Shutdown Transfer Switch Panel "B" (for IC-V-4, MU-V-18 and MU-V-20) and DC Control Room lighting
EH-SEC-1M	1M DC Panel Transfer Switch	X	X	Reqd	This transfer switch aligns the 1M DC panel to EH-DP-1A when EH-DP-1B is unavailable or vice versa.
EH-DPES-1E	125/250V D C Engd Sfgds Dist Panel	X	X	Reqd	This distribution panel supplies DC power to the 4160V Switchgear ED-SGES-1D, 480V Switchgear, EE-SGES-1P and 480V Switchgear EE-SGESSH-1R breakers' control circuit, panel EH-DPESDG-1P, Relay Panel XCC, and Remote Shutdown Transfer Switch Panel "A" (for IC-V-3 and MU-V-3)
EH-DPES-1F	125/250V D C Engd Sfgds Dist Panel	X	X	Reqd	This distribution panel supplies DC power to the 4160V switchgear ED-SGES-1E, 480V switchgear EE-SGES-1S and 480V switchgear EE-SGESSH-1T breakers' control circuit panel EH-DPESDG-1Q and Relay Panel XCL.
EH-DPESDG-1P	ES D G A 125/250V D C Dist Panel 1P	X	X	Reqd	This distribution panel supplies DC power to the emergency diesel generator A system
EH-DPESDG-1Q	ES D.G A 125/250V D C. Dist Panel 1Q	X	X	Reqd	This distribution panel supplies DC power to the emergency diesel generator B system.
RP-XCL RC-XCR RP-XCC	Relay Panel -XCL Relay Panel-XCR Relay Panel-XCC	-	-	-	These relay panels supply DC power to NS-V-52A/B/C & NS-V-53A/B/C. Since analysis shows that reactor building cooling is not required, the valves and the relay panels are not required. They also supply DC power to DC-V-2A/B and DC-V-65A/B. Since these valves can be manually operated for cold shutdown, the relay panels are not required
NNIS/ICS	NNI/ICS Cabinet	X	X	Reqd	This cabinet supplies power to the train "X" instruments
EQ-SEC-NNI/ICS	NNI/ICS Power Supply Knife Switch Enclosure	X	X	Reqd	This transfer switch aligns the NNS/ICS auto power to panel ATB. Its backup supply is from panel ATA. This transfer switch also aligns the NNI ICS hand power to panel ATA. Its back-up supply is from ATB

ATTACHMENT 3-3R
SAFE SHUTDOWN EQUIPMENT

ELECTRICAL

Page 6 of 6

Component	Function	Required for		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
RS-SCC-A	Remote Shutdown Signal Conditioning Cabinet A	X	X	Reqd.	This cabinet supplies power to the train "A" remote shutdown instruments.
RS-SCC-B	Remote Shutdown Signal Conditioning Cabinet B	X	X	Reqd.	This cabinet supplies power to the train "B" remote shutdown instruments
RS-PA	Remote Shutdown Panel A	X	X	Reqd	This panel provides control facilities for the train "A" remote shutdown components. This panel is required only for remote shutdown.
RS-PB RS-PBX	Remote Shutdown Panel B Aux Remote Shutdown Panel B	X	X	Reqd	These panels provide control facilities for the train "B" remote shutdown components. These panels are required only for remote shutdown.
RS-TSP-A	Remote Shutdown Transfer Switch Panel A	X	X	Reqd	These panels provide transfer switches to isolate control circuits of components included in the Remote Shutdown System. They are required only for remote shutdown.
RS-TSP-B	Remote Shutdown Transfer Switch Panel B	X	X	Reqd	
RS-TSP-C	Remote Shutdown Transfer Switch Panel C	X	X	Reqd	
ESAS Bistable Cabinets	ESAS	X		S	These cabinets contain the electronics for the Engineered Safeguards Actuation System. The system monitors parameters to detect loss of integrity in the Reactor Coolant pressure boundary and initiates operation of the high and low pressure injection systems (HPI, LPI), Reactor Building (Containment) Isolation (RBI), Reactor Building Cooling, and Reactor Building Spray Systems. Loss of two vital power supplies to an ES instrument string can lead to spurious operation of HPI and RBI. Loss of two vital power supplies to the "A" train ES logic system can cause spurious actuation of "A" train ESAS. Loss of two vital power supplies to the "B" train ES logic system can cause spurious actuation of "B" train ESAS.
ESAS Relay Cabinets "A"	ESAS	X		S	
ESAS Relay Cabinets "B"	ESAS	X		S	

003/002
T3-3A 21

Rev. 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 1 of 13

Component	Function	Required for		Req'd or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
A. <u>Reactivity Monitoring</u>					
NI-11	RG 1 97 Full Range Flux (Train A)	X	X	Reqd	These instruments provide information about the reactor neutron flux level. This allows the operation to monitor the reactivity level of the core. They are utilized to verify reactor scram and to indicate if core reactivity is increasing or decreasing as a result of boron concentration, void formation or steam formation. Only one instrument is required for safe shutdown. In addition to control room indication, NI-12 provide reactor neutron flux level indication on the RSP "B".
NI-12	RG 1 97 Full Range Flux (Train B)	X	X	Reqd	
B. <u>Reactor Coolant System Temp Monitoring</u>					
B.1 RC Outlet (Hot Leg) Temperature					
RC4A-TE1	RC Outlet Temp Narrow Range (Loop A)	X	X	Reqd	These instruments provide indication of the reactor coolant inlet and outlet temperature. Monitoring of these parameters is required to verify that natural circulation has been achieved and to maintain primary system subcooling margin and cooling rate. Only one set of inlet/outlet RTDs is required for shutdown.
RC4A-TE4	RC Outlet Temp Narrow Range (Loop A)	X	X	Reqd	
RC4B-TE1	RC Outlet Temp Narrow Range (Loop B)	X	X	Reqd	In addition to control room indication, TE-958 and TE-960 provide outlet temperature indication on the RSP "A" and "B", respectively. Similarly, TE-959 and TE-961 provide RC inlet temperature indication on the RSP "A" and "B", respectively.
RC4B-TE4	RC Outlet Temp Narrow Range (Loop B)	X	X	Reqd	
TE-958	RC Outlet Wide Range (Loop A)	X	X	Reqd	
TE-960	RC Outlet Temp Wide Range (Loop B)	X	X	Reqd	

003/002
T3-3A 22

Rev 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Component	Function	Required for:		Req'd Or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
B 2 RC Inlet (Cold Leg) Temperature					
RS5A-TE2	RC Inlet Temp. Wide Range (Loop A)	X	X	Reqd	(See remarks for 2a "RC Outlet (Hot Leg) Temperature")
RC5A-TE4	RC Inlet Temp Wide Range (Loop A)	X	X	Reqd	
RC5B-TE2	RC Inlet Temp Wide Range (Loop B)	X	X	Reqd	
RC5B-TE4	RC Inlet Temp Wide Range (Loop B)	X	X	Reqd	
TE-959	RC Inlet Temp. Wide Range (Loop A)	X	X	Reqd	
TE-961	RC Inlet Temp. Wide Range (Loop B)	X	X	Reqd	
B 3 RC (In-Core) Temperature					
04E-TC;07B-TC; 09E-TC;13C-TC	Backup In-core Thermocouple (Train A)	X	X	Reqd.	In-core thermocouples of the backup incore thermocouple display system are required for HPI cooling. Two out of four thermocouples in each quadrant (a total of eight out of sixteen) must be in service.
05G-TC;08F-TC; 09G-TC;12F-TC	Backup In-core Thermocouple (Train B)	X	X	Reqd.	
02L-TC;06L-TC; 07M-TC;13M-TC	Backup In-core Thermocouple (Train C)	X	X	Reqd	
050-TC;10M-TC, 120-TC;14M-TC	Backup In-core Thermocouple (Train D)	X	X	Reqd	
C. Reactor Coolant System Pressure Monitoring (Wide Range)					
RC3A-PT3	RC Pressure Wide Range (Loop A)	X	X	Reqd.	These instruments provide indication of the reactor coolant pressure. Monitoring of this parameter is required to maintain primary system subcooling margin and cooling rate. Only one pressure transmitter must be available for shutdown. In addition to control room indication, PT-949 provides RC pressure indication on the RSP "B". PT-963 provides indication on RSP "A".
PT-963	RC Pressure Wide Range (Loop A)	X	X	Reqd	
PT-949	RC Pressure Wide Range (Loop B)	X	X	Reqd	

003/002
T3-3A.23

Rev. 17

Component	Function	Required for:		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
D. <u>Pressurizer Level Monitoring</u>					
D.1 <u>Level Transmitter</u>					
RC1-LT1	Pressurizer Level (Temp Comp)	X	X	Reqd	These instruments monitor the water level of the pressurizer. Only one level transmitter and RTD are required for shutdown In addition to control room indication, LT-777 and RC2-TE2 provide temperature compensated pressurizer level indication on RSP "B"
RC1-LT3	Pressurizer Level (Temp Comp)	X	X	Reqd.	
LT-777	Pressurizer Level (Temp Comp)	X	X	Reqd	
D.2 <u>Temperature RTD</u>					
RC2-TE1	Pressurizer Temperature	X	X	Reqd	Required for temperature compensation for 3 level transmitters, above Manual calculation of temperature compensation is allowed if adequate indication of RC pressure is available (See Emergency Procedure EP-1202-29) Such manual calculation will be used for a fire in RB-FZ-1d
RC2-TE2	Pressurizer Temperature	X	X	Reqd	
E. <u>Steam Generator Level Monitoring</u>					
E.1 <u>SG-A Level Transmitters</u>					
LT-775	SG-A Level (Full Range-Train A)	X	X	Reqd	These instruments provide indication of the steam generator A water level. This is required to assure SG level is being maintained by the main steam and emergency systems, or for manual level control. At least one level transmitter must be available for shutdown In addition to control room indication, LT-775 and LT-789 provide steam generator A water level indication on RSP "A" and RSP "B", respectively
LT-789	SG-A Level (Full Range-	X	X	Reqd	

003/002
T3-3A 24

Rev. 17

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
E.2. SG-B Level Transmitters					
LT-788	SG-A Level (Full Range-Train A)	X	X	Reqd	These instruments provide indication of the steam generator B water level. This is required to assure SG level is being maintained by the main steam and the emergency feedwater systems, or for manual level control. At least one level transmitter must be available for shutdown. In addition to control room indication, LT-788 and LT-776 provide steam generator B water level indication on RSP "A" and RSP "B", respectively.
LT-776	SG-A Level (Full Range-Train B)	X	X	Reqd	
F. Steam Generator Pressure Monitoring					
F.1 SG-A Pressure Transmitters					
SP6A-PT1	SG-A Pressure	X	X	Reqd	These instruments provide indication of the steam generator A pressure which is the basis for the atmospheric dump valve MS-V-4A operation. Only one pressure transmitter is required for shutdown. In addition to control room indication, PT-950 provides steam generator A pressure indication on RSP "A".
SG6A-PT2	SG-A Pressure	X	X	Reqd	
PT-950	SG-A Pressure	X	X	Reqd	
PT-1180	SG-A Pressure	X	X	Reqd	
F.2. SG-B Pressure Transmitters					
SP6B-PT1	SG-B Pressure	X	X	Reqd	These instruments provide indication of the steam generator B pressure which is the basis for the atmospheric dump valve MS-V-4B operation. Only one pressure transmitter is required for shutdown. In addition to control room indication, PT-951 provides steam generator B pressure indication on RSP "B".
SG6B-PT2	SG-B Pressure	X	X	Reqd	
PT-951	SG-B Pressure	X	X	Reqd	
PT-1184	SG-B Pressure	X	X	Reqd	

003/002
T3-3A.25

Rev. 17

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
G. Decay Heat Removal Flow Monitoring					
DPT-802 DPT-803	RG 1.97 DH Flow (Loop A) RG 1 97 DH Flow (Loop B)		X X	- -	These instruments provide indication of the decay heat removal system flow. This verifies the primary system flow through the core once the DH system is in service. Only one instrument is required for shutdown. The instrument need not be available, local indication can be used. In addition to control room indication, DPT-802 and DPT-803 provide DH flow indication on RSP "A" and RSP "B", respectively.
H Decay Heat Removal Temperature Monitoring					
H.1 Outlet Temperature Instruments					
DH-2-TE1 DH2-TE2	DH Cooler 1A Outlet Temperature DH Cooler 1B Outlet		X X	- -	These instruments provide indication of the decay heat removal system temperature. They are required to monitor the coolant temperature when the DH System is in service. Only one set of inlet/outlet temperature indications is needed for safe shutdown.
H.2 Inlet Temperature Instruments					
DH6-TE1 DH6-TE2	DH Pump 1A Inlet Hdr Temperature DH Pump 1B Inlet Hdr Temperature		X X	- -	In addition to control room indication, DH2-TE1 and DH6-TE1 provide DH temperature indication on RSP "A". Similarly, DH2-TE2 and DH6-TE2 provide DH temperature indication on RSP "B". These instruments need not be available for safe shutdown. Local indication on the DC system can be relied upon to indicate DH system heat removal. RC hot leg temperature is also available to indicate DH inlet temperature.

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
I. Tank Level Monitoring					
I 1	Condensate Storage Tank				
LT-1060	CST A Level (Train A)	X	X	-	These instruments provide indication of condensate storage tank level. One indication for each tank is desirable. These instruments are backed up by local indicators LI-1004 and LI-1005
LT-1061	CST A Level (Train B)	X	X	-	
LT-1062	CST B Level (Train A)	X	X	-	
LT-1063	CST B Level (Train B)	X	X	-	
I 2	Makeup Tanks				
MU14-LT	Makeup Tank Level	-	-	-	These instruments monitor the water of the makeup tank. This is required when the makeup system is taking suction from this tank and before suction is aligned to the BWST. This is also required to inform the operator when the letdown system should be switched over the Bleed Tanks
LT-778	Makeup Tank Level	-	-	-	
					In addition to Control Room indication, LT-778 provides level indication on RSP "B". Since the makeup tank is not relied upon for safe shutdown, the instrument need not be available.
I 3	Borated Water Storage Tank				
LT-808	BWST Level (Train A)	X	X	Reqd	These instruments provide indication of the BWST water level. This is required to ensure availability of the primary source of makeup water for RC inventory and reactivity control. It is also required to warn the operator that the content of the tank is draining to the RB sump due to the spurious operation of DH-V-6A or B. Only one is required for shutdown. In addition to control room indication, LT-809 provides BWST level indication on RSP "B".
LT-809	BWST Level (Train B)	X	X	Reqd	

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 7 of 13

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
I 4	Local Instruments				
LI-1004	CST A Tank Level	X	X	Reqd	This instrument gives local indication of the condensate storage tank A water level
LI-1005	CST B Tank Level	X	X	Reqd	This instrument gives local indication of the condensate storage tank B water level
LI-152	Diesel Fuel Tank Level	X	X	Reqd	This instrument gives local indication of the diesel fuel tank fuel level.
J	<u>Emergency Feedwater Flow Monitoring</u>				
FT-788	EF Flow SG-A Train B	-	-	-	These instruments monitor the flow of feedwater to the steam generators. Only one instrument is required for each steam generator. OTSG level indication is an acceptable alternative. Emergency feedwater flow monitoring will be used when available. Protection is not required. In addition to Control Room indication, FT-788 and FT-782 provide flow indication on RSP "B" and FT-779 and FT-791 provide flow indication on RSP "A".
FT-779	EF Flow SG-A Train C	-	-	-	
FT-782	EF Flow SG-B Train B	-	-	-	
FT-791	EF Flow SG-B Train C	-	-	-	

003/002
T3-3A 28

Rev 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 8 of 13

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
K	<u>Heat Sink Protection System</u>				
LT-1044	SG-A Level-Operate Range Train A	-	-	-	<p>These instruments constitute the HSPS system. They are required to automatically control emergency feedwater control valves EF-V-30A,B,C and D. Except for the condensate storage tank A and B level transmitters, two out of four instruments for each parameter must be available to operate one train of emergency feedwater valves.</p> <p>LT-1040, LT-1042, LT-1048, LT-1050 provide control room indication of OTSG level LT-1040, LT-1044, LT-1046, LT-1048, LT-1052, LT-1054 provide control room OTSG level indication via level recorders PT-1180 and PT-1184 provide control room indication of OTSG pressure</p>
LT-1040	SG-A Level-Operate Range Train B	-	-	-	
LT-1045	SG-A Level-Operate Range Train C	-	-	-	
LT-1041	SG-A Level-Operate Range Train D	-	-	-	
LT-1046	SG-A Level-Startup Range Train A	-	-	-	
LT-1042	SG-A Level-Startup Range Train B	-	-	-	
LT-1047	SG-A Level-Startup Range Train C	-	-	-	
LT-1043	SG-A Level-Startup Range Train D	-	-	-	
LT-1052	SG-A Level-Operate Range Train A	-	-	-	
LT-1048	SG-A Level-Operate Range Train B	-	-	-	
LT-1053	SG-A Level-Operate Range Train C	-	-	-	
LT-1049	SG-A Level-Operate Range Train D	-	-	-	
LT-1054	SG-B Level-Startup Range Train A	-	-	-	
LT-1050	SG-B Level-Startup Range Train B	-	-	-	
	(Continued next page)				

003/002
T3-3A 29

Rev 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 9 of 13

Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
K. <u>Heat Sink Protection System (Cont'd)</u>					
LT-1055	SG-B-Level-Startup Range Train C	-	-	-	
LT-1051	SG-B Level-Startup Range Train D	-	-	-	
LT-1060	CST A Level Train A	-	-	-	
LT-1061	CST A Level Train B	-	-	-	
PT-1186	Containment Pressure Train A	-	-	-	
PT-1187	Containment Pressure Train B	-	-	-	
PT-1188	Containment Pressure Train C	-	-	-	
PT-1189	Containment Pressure Train D	-	-	-	
PT-950	SG-A Pressure Train A	-	-	-	
PT-1180	SG-A Pressure Train B	-	-	-	
PT-1182	SG-A Pressure Train C	-	-	-	
PT-1181	SG-A Pressure Train D	-	-	-	
PT-1184	SG-B Pressure Train A	-	-	-	
PT-951	SG-B Pressure Train B	-	-	-	
PT-1185	SG-B Pressure Train C	-	-	-	
PT-1183	SG-B Pressure Train D	-	-	-	
LT-1062	CST B Level Train A	-	-	-	
LT-1063	CST B Level Train B	-	-	-	
TE-1046	SG-A Temperature Train A	-	-	-	
TE-1044	SG-A Temperature Train B	-	-	-	
TE-1047	SG-A Temperature Train C	-	-	-	
	(Continued next page)				

003/002
T3-3A 30

Rev 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 10 of 13

Component	Function	Required for		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
K. <u>Heat Sink Protection System (Cont'd)</u>					
TE-1045	SG-A Temperature Train D	-	-	-	
TE-1050	SG-B Temperature Train A	-	-	-	
TE-1048	SG-B Temperature Train B	-	-	-	
TE-1051	SG-B Temperature Train C	-	-	-	
TE-1049	SG-B Temperature Train D	-	-	-	
L. <u>Spurious Operation of Instrumentation</u>					
<u>NOTE</u> The following instrumentation is protected only if the components served required protection for a particular fire event					
IC5-DPT	ICCC Return Flow	-	-	-	This instrument is part of the IC pump control logic. It automatically starts the stand by pump when the suction header flow is low. Since spurious operation of the instrument will not prevent the pump from starting, cables pertaining to this instrument do not require evaluation.
IC9-TE	CRD Cooling Outlet Temp	X	X	Spur.	This instrument is part of the letdown valve MU-V-1A/B control logic. MU-V-1A/B will be manually controlled. Instrument circuits need no protection.
MU5-TE	Letdown Cooler Outlet Temp	X	X	Spur.	This instrument is part of the letdown valve MU-V-3 close logic. MU-V-3 will be manually controlled. Instrument circuits need no protection.
MU14-LT	Makeup Tank Level	X	X	Spur.	This instrument is part of the bleed and feed controls. The letdown valves will be manually controlled. Instrument circuits need no protection.

003/002
T3-3A 31

Rev. 17

Component	Function	Required for:		Req'd or Spur-ious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
L. Spurious Operation of Instrumentation (Cont'd)					
MU42-DPT	RC Pump Seal Injection Flow Control	X	X	Spur.	This instrument is part of the makeup valve MU-V-32 logic. Manual control will override auto control. Instrument circuits need no protection.
		X	X	Spur.	
RC3A-PT1	RC Pressure Narrow Range	X	X	Spur.	These instruments are part of the RC valve RC-RV-2 control logic.
RC3A-PT3	RC Pressure Wide Range	X	X	Spur.	
RC5A-TE2	RC Inlet Temp Wide Range	X	X	Spur.	
RC5A-TE4	RC Inlet Temp Wide Range	X	X	Spur.	
RM-L1	Letdown Flow Rad. Monitor	X	X	Spur.	This instrument is part of the letdown valve MU-V-2A/B control logic. MU-V-2A/B will be manually controlled or controlled from RSD. Instrument circuits need no protection.
SP6A-PT1/2	Steam Gen. A Pressure	X	X	Spur.	These instruments are part of the main steam valves MS-V-4A and MU-V-3D,E,F, control logic.
SG10A-PT1/2	Turbine Throttle Pressure	X	X	Spur.	
SG6B-PT1/2	Steam Gen B Pressure	X	X	Spur.	These instruments are part of the main steam valves MS-V-4B and MS-V-3A,B,C control logic.
SP10B-PT1/2	Turbine Throttle Pressure	X	X	Spur.	
TC-734	CB Intake Temperature	-	-	-	These instruments control, control building and EFP room HVAC components. Since analysis shows that these HVAC systems are not required, these instruments are not required for safe shutdown.
TS-766B	EFP Room Firestat	-	-	-	
TS-727	CB Vent Supply Fan A Discharge	-	-	-	
TS-728	CB Vent Supply Fan B Discharge	-	-	-	
TC-857	EF Room Thermostat	-	-	-	

003/002
T3-3A 32

Rev 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 12 of 13

Component	Function	Required for		Req'd or Spur- ious?	Remarks
		Hot Shut- Down	Cold Shut- Down		
L. <u>Spurious Operation of Instrumentation (Cont'd)</u>					
LS-244A	DG Day Tank Level Control	X	X	Spur	This instrument controls the diesel generator A day tank pump operation
LS-244B	DG Day Tank Level Control	X	X	Spur.	This instrument controls the diesel generator B day tank pump operation
M <u>Engineered Safeguard Actuation System</u>					
RC3A-PT3 RC3A-PT4 RC3B-PT3		X X X	X X X		These instruments measure the Reactor Coolant pressure Degradation of at least two instruments could lead to "A" and "B" train HPI actuation
PT-282 PT-285 PT-288		X X X	X X X		These instruments measure Reactor Building pressure. Degradation of at least two instruments could lead to "A" and "B" train HPI actuation
PS-932 PS-933 PS-934		X X X	X X X		These instruments measure high-high Reactor Building pressure Degradation of at least two instruments could cause actuation of the Reactor Building isolation for "A" train components (Included IC-V-3 and IC-V-4)
PS-935 PS-936 PS-937					These instruments measure high-high Reactor Building pressure Degradation of at least two instruments could cause actuation of the Reactor Building Isolation for "B" train components (Included IC-V-2 and IC-V-4)
LI-802					This instrument measures the ICCW tank level Degradation of this instrument coincidental with an HPI actuation could cause actuation of the RB isolation of "A" train components (Included IC-V-3 and IC-V-4)

003/002
T3-3A 33

Rev. 17

ATTACHMENT 3-3S
SAFE SHUTDOWN EQUIPMENT

INSTRUMENTATION

Page 13 of 13

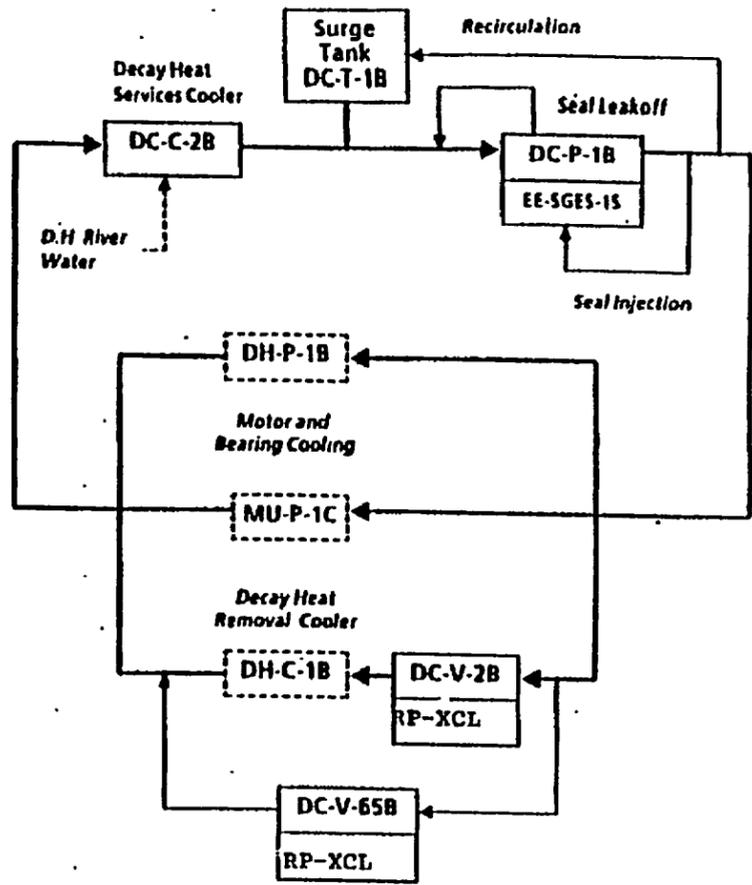
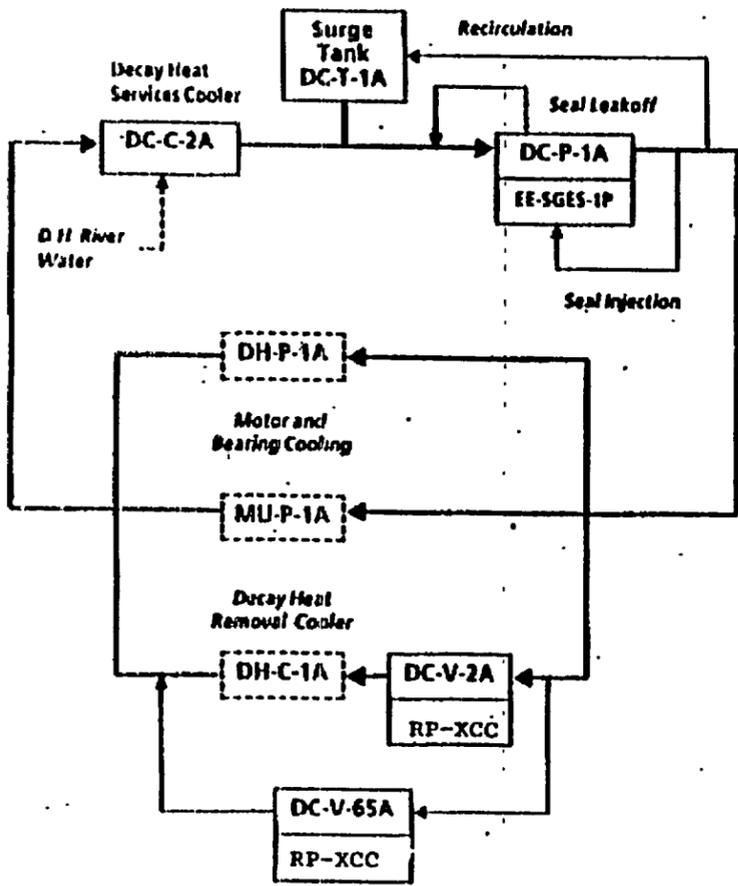
Component	Function	Required for.		Req'd or Spurious?	Remarks
		Hot Shut-Down	Cold Shut-Down		
LI-803	ICCW Surge Tank Level	X		S	This instrument measures the ICCS tank level. Degradation of this instrument coincidental with an HPI actuation could cause actuation of the RB isolation of "B" train components (Included IC-V-2 and IC-V-4). These instruments measure high-high Reactor Building pressure. Degradation of at least two instruments coincidental with an HPI actuation will start BS-P-1A. These instruments measure high-high Reactor Building pressure. Degradation of at least two instruments coincidental with an HPI actuation will start BS-P-1B.
PS-283	RB Pressure	X		S	
PS-286	RB Pressure	X		S	
PS-289	RB Pressure	X		S	
PS-284	RB Pressure	X		S	
PS-287	RB Pressure	X		S	
PS-290	RB Pressure	X		S	
N	<u>Makeup Flow Monitoring</u>				
FT-1126	Makeup Flow (MU-V-16A)	X		Reqd	
FT-1127	Makeup Flow (MU-V-16B)	X		Reqd	
FT-1128	Makeup Flow (MU-V-16C)	X		Reqd	
FT-1129	Makeup Flow (MU-V-16D)	X		Reqd	

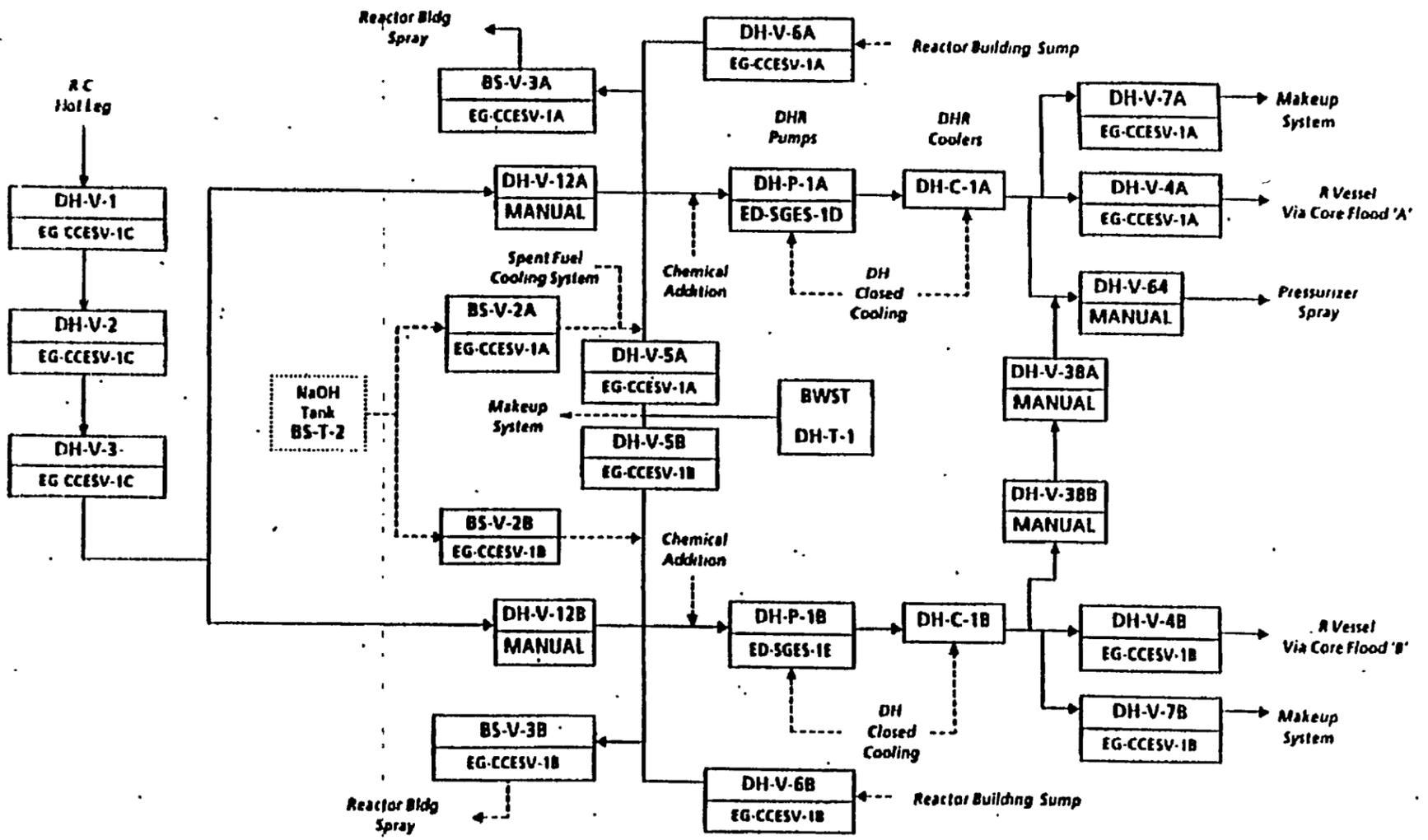
003/002
T3-3A 34

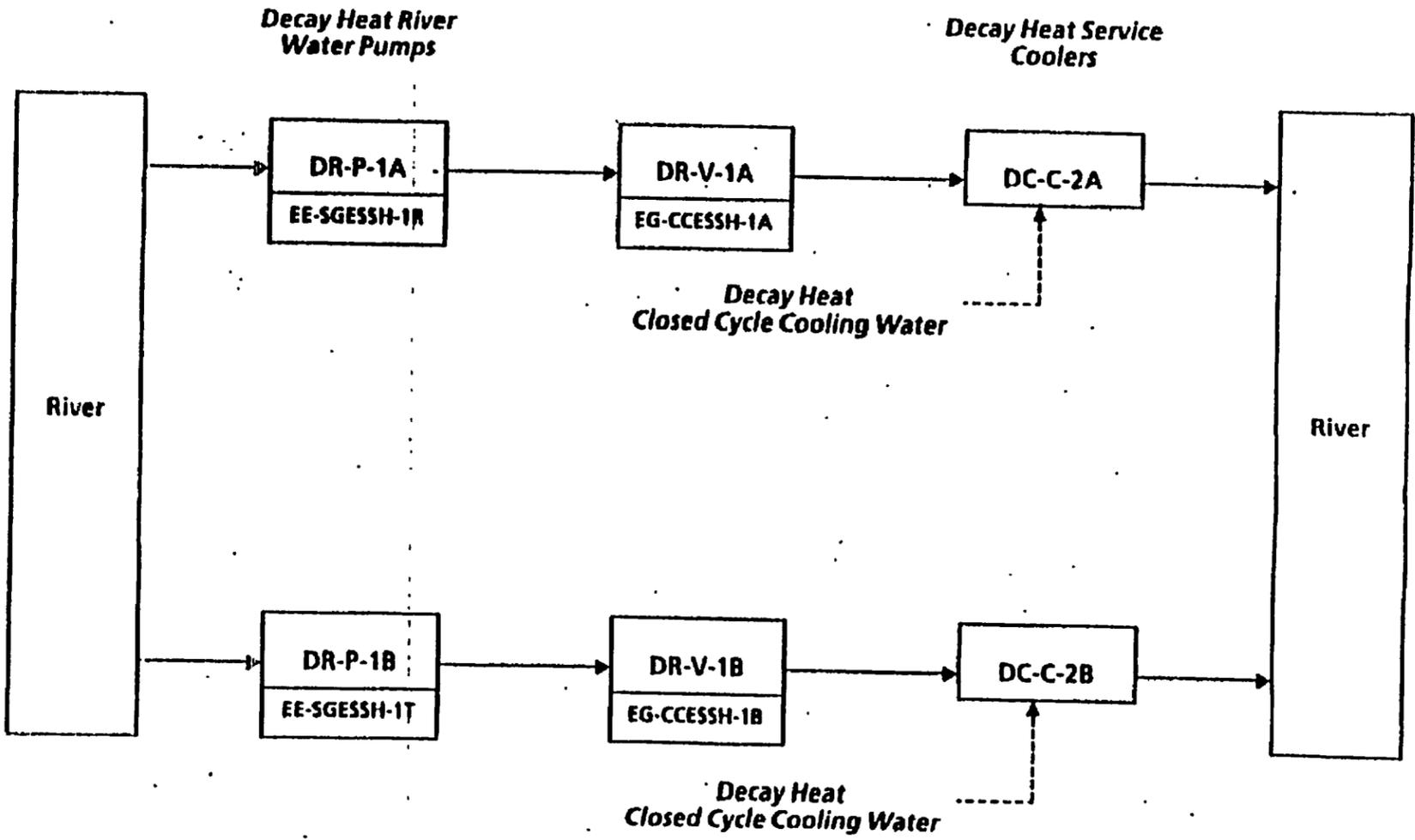
Rev. 17

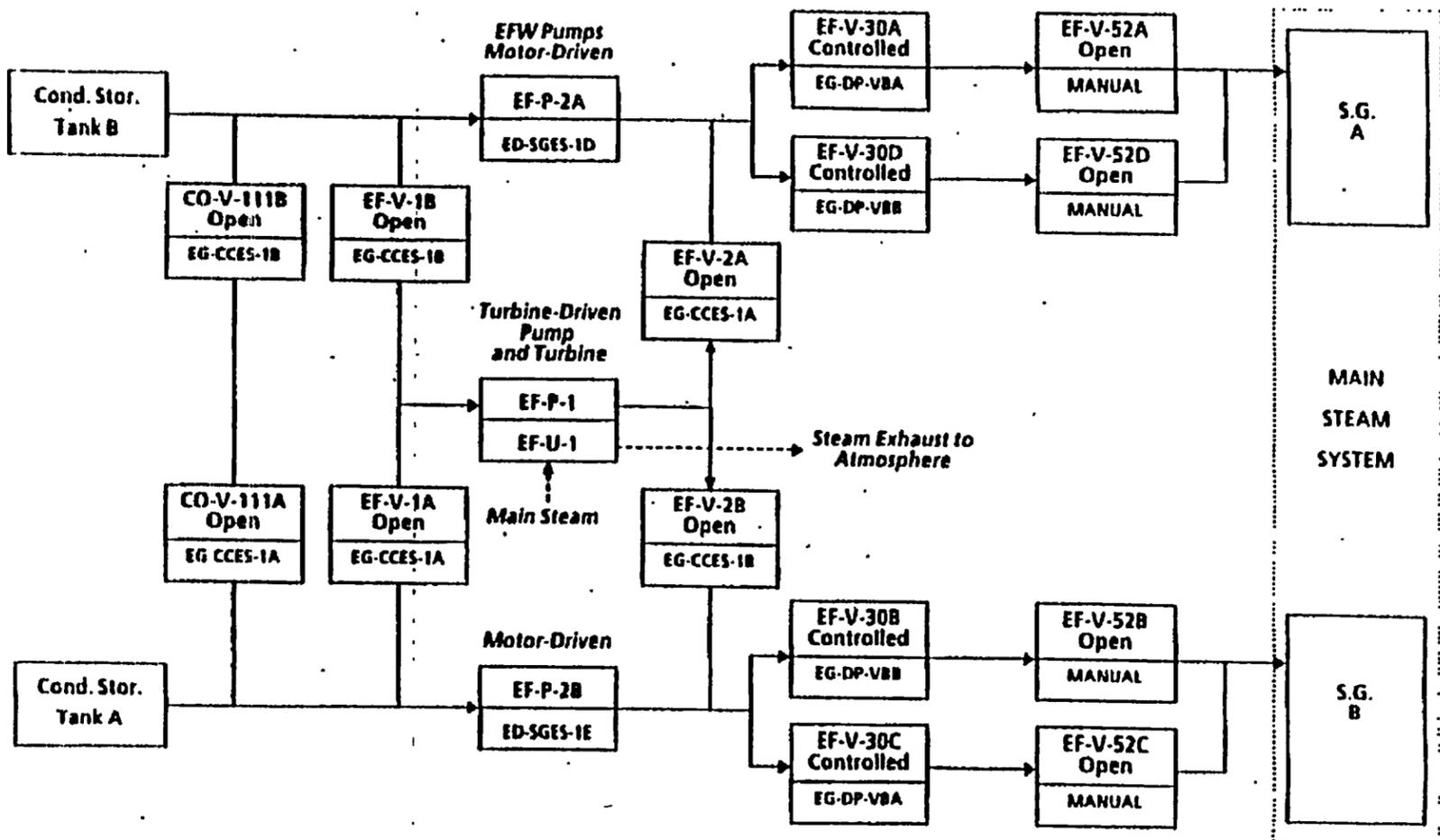
ATTACHMENT 3-4 CONTROL BUILDING VENTILATION

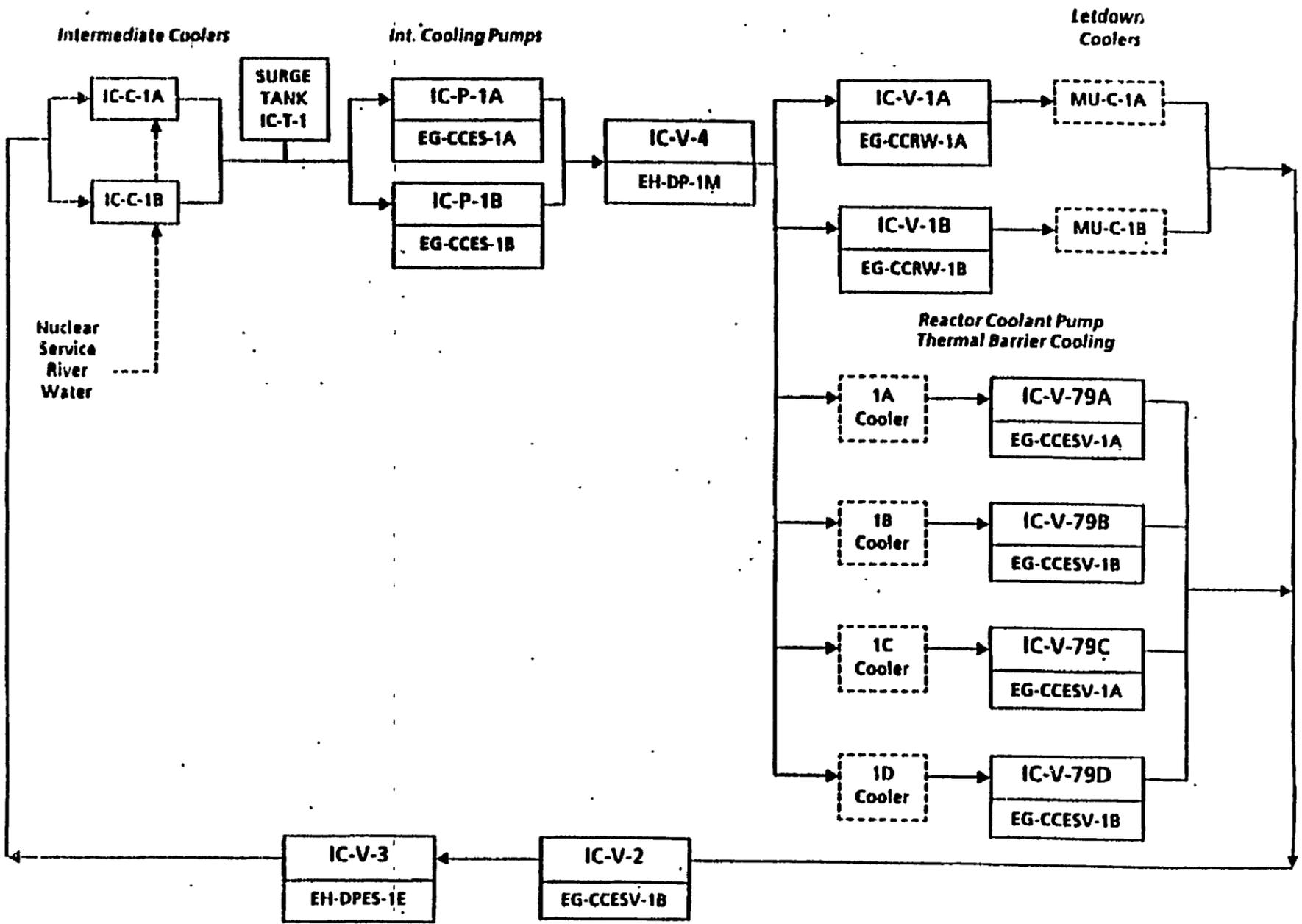
DELETED

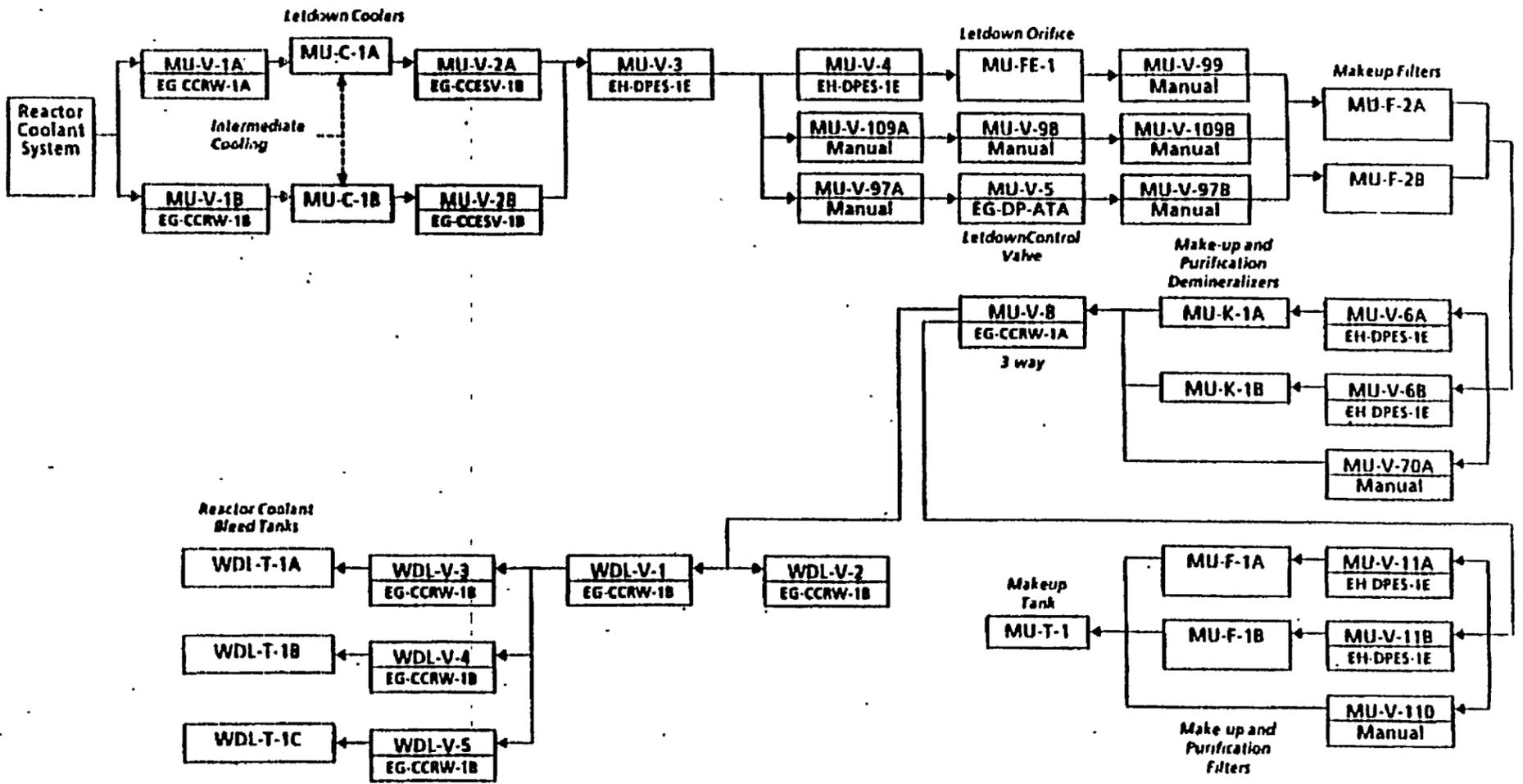


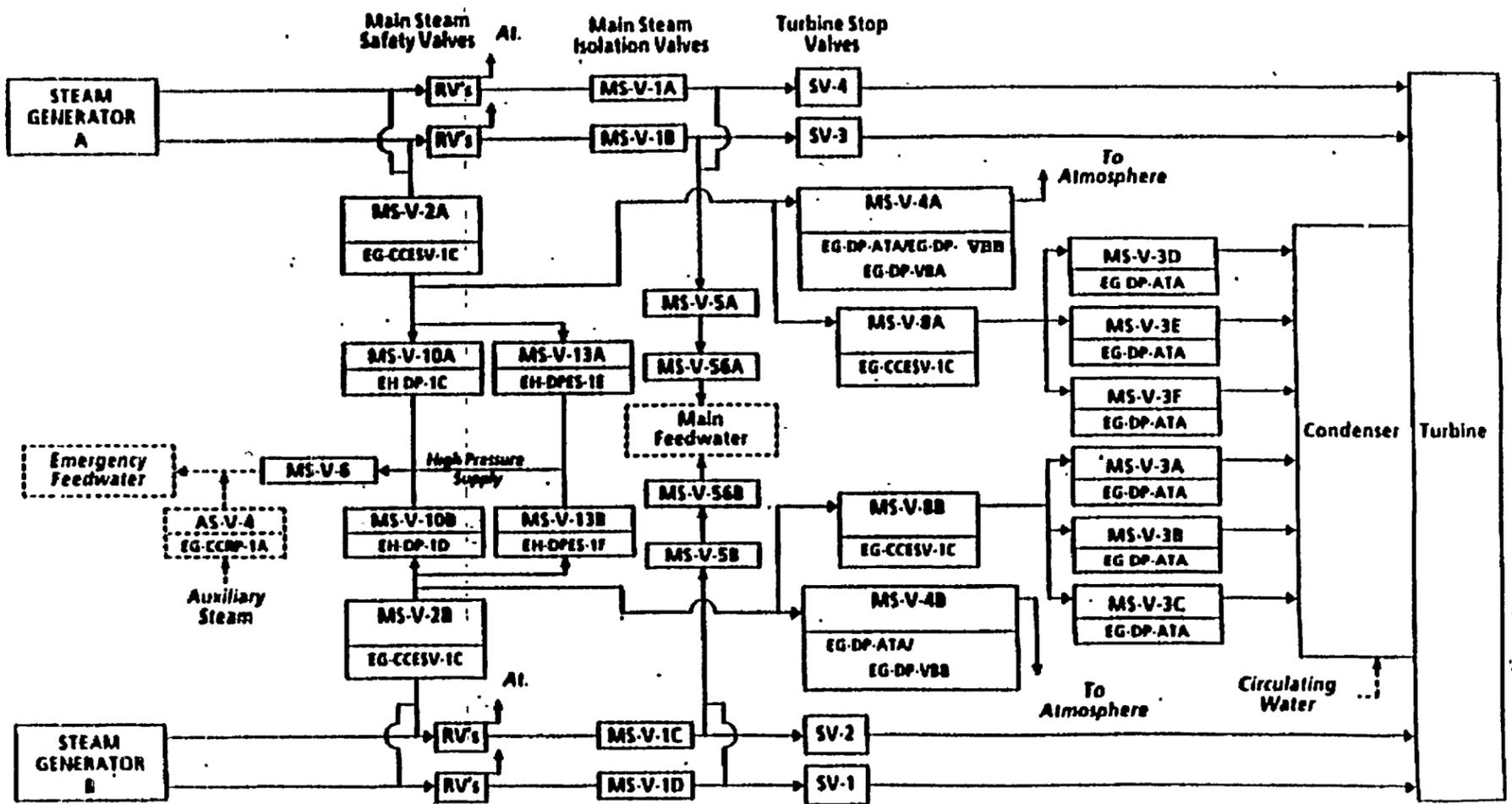




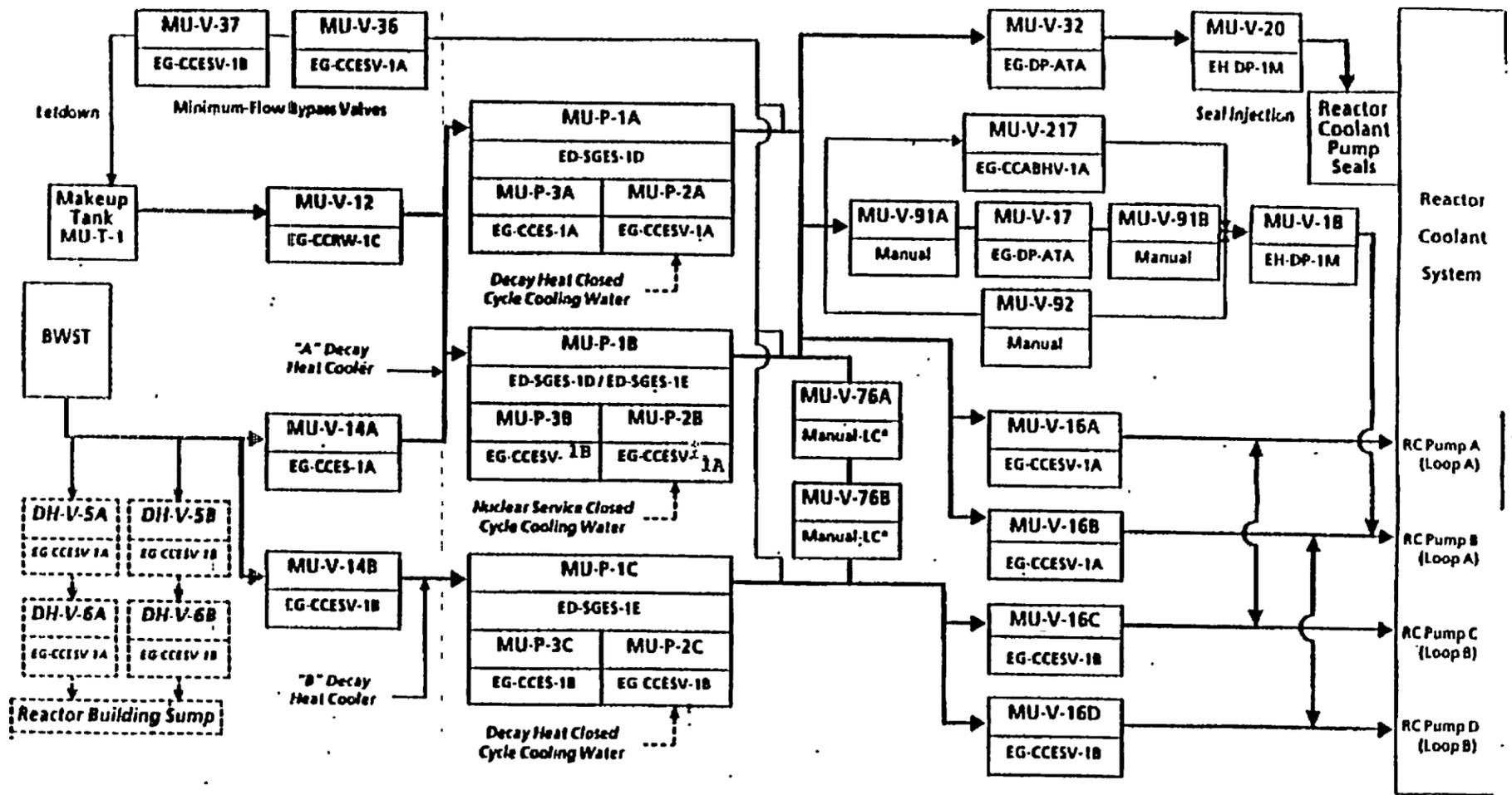




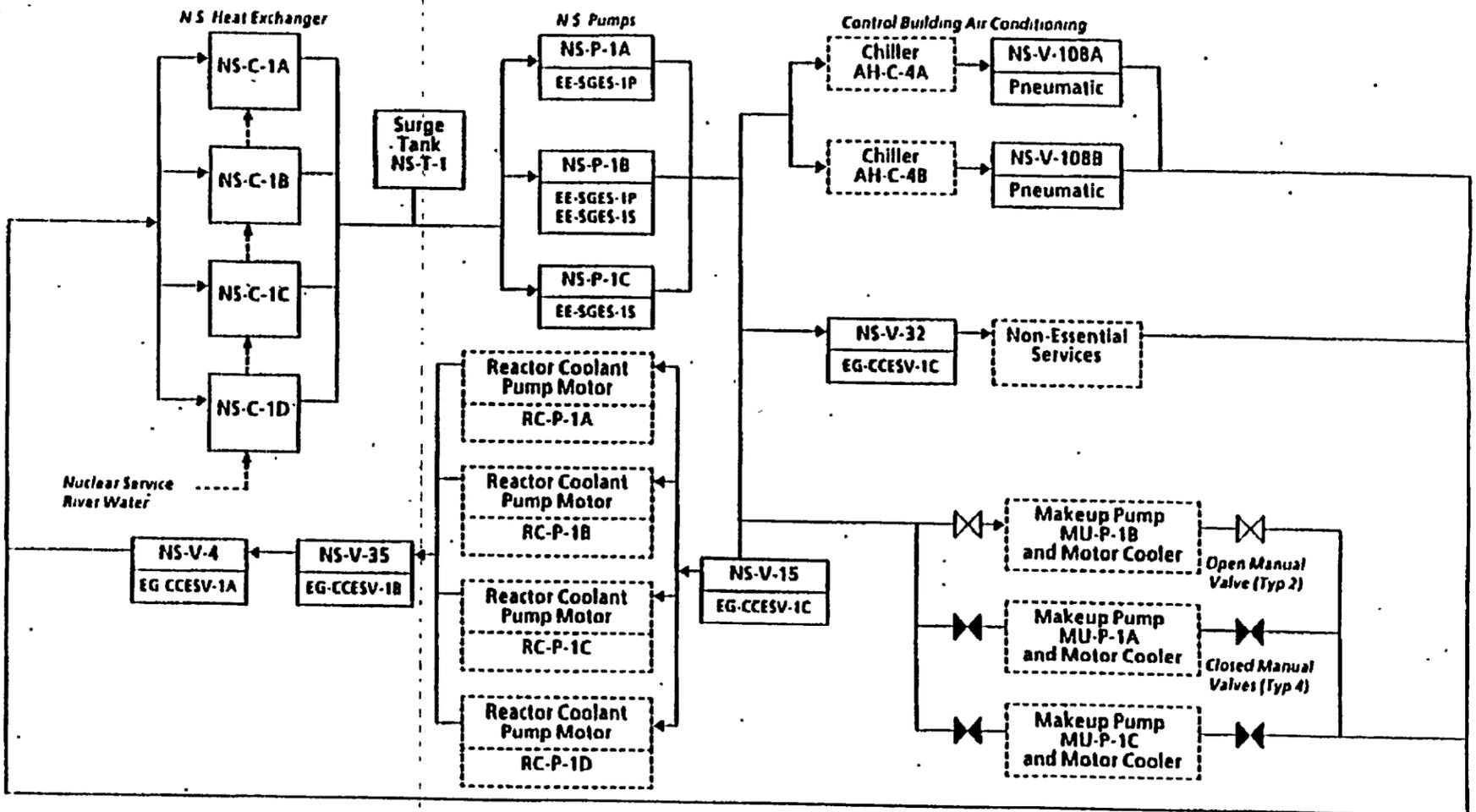


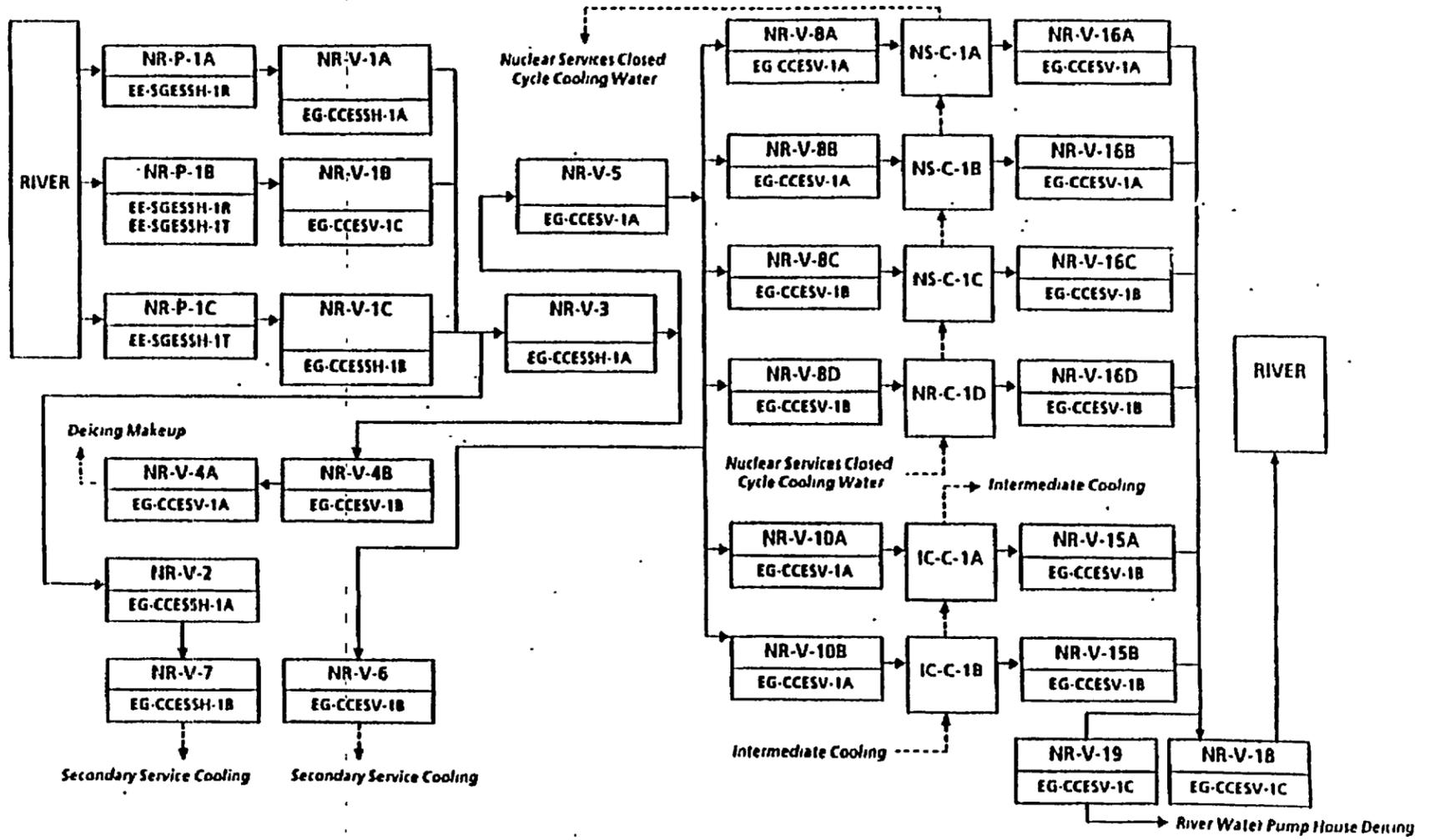


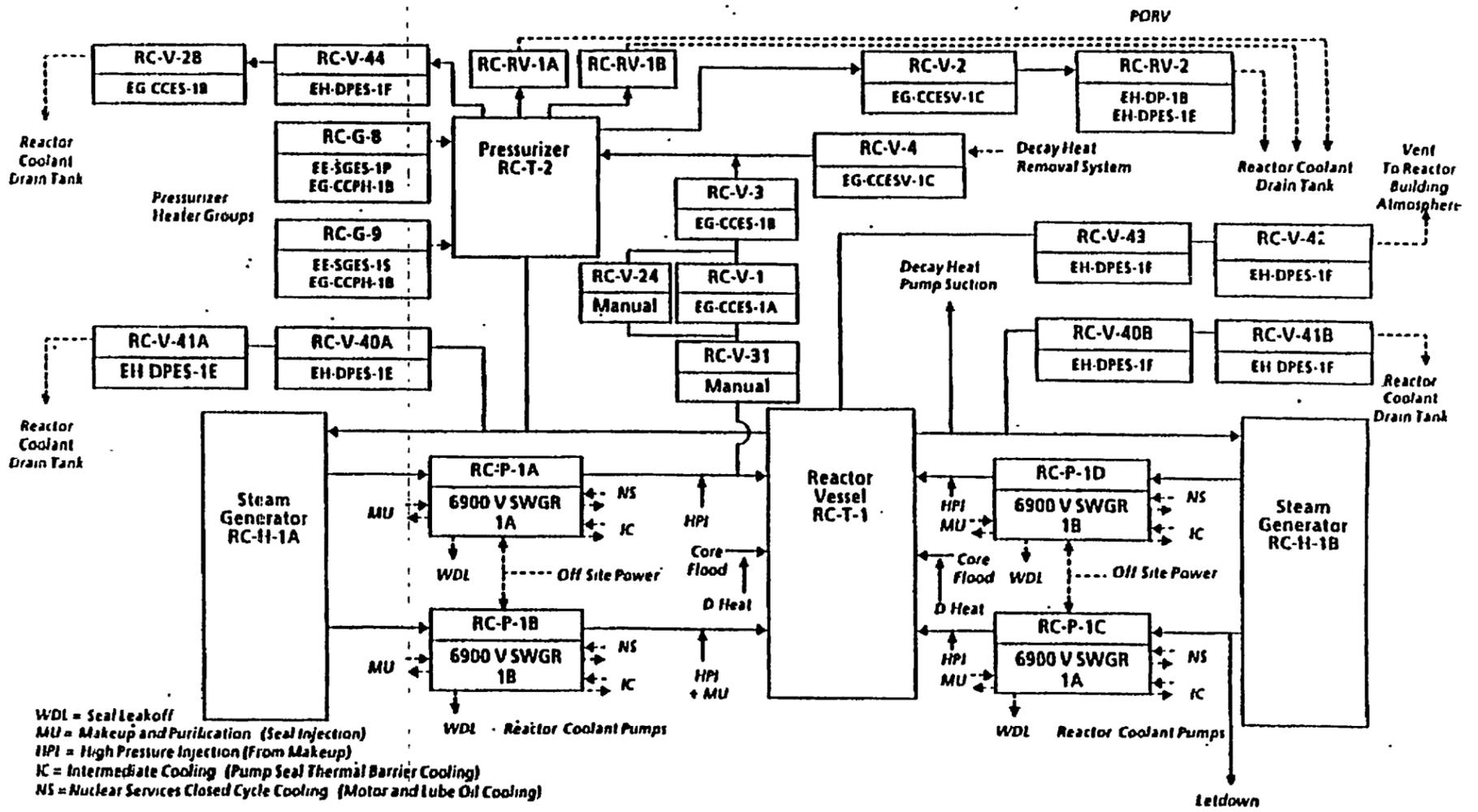
REV. 10



*LC - Locked closed







APPENDIX R EVALUATION REPORT – THREE MILE ISLAND UNIT 1
 COMPONENT AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

ATTACHMENT 3-5F
 SHEET 1b

H S P S / EMERGENCY FEEDWATER

COMPONENTS	D	D	F	F	F	F	F	F	I	I	I	I	I	I	I	I	I	I	R	R	R	R	R	R	R	T	REMARKS		
	G	G	H	H	H	H	H	H	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B			
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F			
	A	A	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	A			
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8													
EF-HSPS-A			S				X					S	S					S					S	S	S	S	S	S	Train A
EF-HSPS-B			S	S			X						S					S					S	S	S	S	S		Train B
EF-HSPS-C			S				X					S			S			S					S	S	S	S	S		Train C
EF-HSPS-D			S				X				S	S			S			S					S	S	S	S	S		Train D
					</																								

APPENDIX R EVALUATION REPORT – THREE MILE ISLAND UNIT 1
 COMPONENT AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

ATTACHMENT 3-5G
 SHEET 1a

FEEDWATER (FOR PREVENTION OF OVERFEEDING STEAM GENERATORS)																																			
COMPONENTS	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	REMARKS					
	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B						
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F						
	A	A	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z					
	1	2	1	2	2	2	3	4	5	6	6	7	8	9	10	11	11	a	1	2	2	2	2	2	2	3	3	3	d	a	b	a	b		
FW-P-1A																						S	S	S	X	X		X					Train X		
FW-P-1B																						S	S	S	X	X		X					Train X		
FW-V-1A																								X	X		X							Train X	
FW-V-1B																								X	X		X							Train X	
FW-V-5A							X		X								X	X	X		X		X		S		X	X						Train A	
FW-V-5B							X	X		X								S	S		S		S		X		X							Train B	
FW-V-92A							X		X								X	X	X		X		X		S		X	X						Train A	
FW-V-92B							X	X		X								S	S		S		S		X		X							Train B	
FW-V-17A																																			Train B
FW-V-17B																	X	X			X														Train A
FW-V-16A																																			Train B
FW-V-16B																	X	X			X														Train A

LEGEND
 X – Component Not Available
 S – Support Not Available
 P – Available-Cable Protected
 M – Available-Manual Operation
 A – Manual Op Due To Loss of Inst Air

D – Design Modification
 RSD – Remote Shut Down
 O – Open Switch or Breaker
 R – Repair
 J – Cut & Jumper

APPENDIX R EVALUATION REPORT - THREE MILE ISLAND UNIT 1
 COMPONENT AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

ATTACHMENT 3-5H
 SHEET 1a

COMPONENTS	MAIN STEAM																												REMARKS		
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	
	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B		B	B
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F		
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	
	1	2	1	2	2	2	3	4	5	6	6	7	8	9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
MS-V-3A,3B,3C,3D,3E,&3F																															
MS-V-8A																															
MS-V-8B																															
MS-V-4A	A	A					A	A	A	A		A	A																		Valve closes on loss of air
MS-V-4B	A	A					A	A	A	A		A	A																		Valve closes on loss of air
MS-V-2A																															
MS-V-2B																															
MS-V-10A																															
MS-V-10B																															
AS-V-4																															
MS-V-13A																															Fail Open
MS-V-13B																															Fail Open

LEGEND
 X - Component Not Available
 S - Support Not Available
 P - Available-Cable Protected
 M - Available-Manual Operation
 A - Manual Op Due To Loss of Inst. Air

D - Design Modification
 RSD - Remote Shut Down
 O - Open Switch or Breaker
 R - Repair
 J - Cut & Jumper

APPENDIX R EVALUATION REPORT - THREE MILE ISLAND UNIT 1
COMPONENT AVAILABILITY FOR A FIRE IN FIRE AREA/ZONE

ATTACHMENT 3-5H
SHEET 1b

COMPONENTS	LETDOWN																								REMARKS			
	D	D	F	F	F	F	F	I	I	I	I	I	I	I	I	I	S	S	S	S	R	R	R	R		R	R	T
	G	G	H	H	H	H	H	B	B	B	B	B	B	B	B	B	SP	SP	SP	SP	B	B	B	B		B	B	B
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	
	A	A	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z	A	A	A	A	F	F	F	F	F	F	A	
	1	2	1	2	3	4	5	6	1	2	3	4	5	6	7	8	2	1	2	3	a	b	c	d	e	2	3	1
MS-V-3A,3B,3C,3D,3E,&3F																											X	
MS-V-8A			X	X			X				X	X					X											
MS-V-8B			X	X			X				X	X					X											
MS-V-4A			A	A	A	A	A				A	M	A	A	A	M	A			A	A	A					M	
MS-V-4B			A	A	A	A	M				A	M	M	A	A	M	A			A	A	A					M	
MS-V-2A			M				M	M			M	M				M	M										M	
MS-V-2B			M				M	M			M	M				M	M										M	
MS-V-10A											X	M				X	X											
MS-V-10B											X	M																
AS-V-4							X				X					X											X	
MS-V-13A							X				X	X				X	X										X	
MS-V-13B							X				X	X																

LEGEND

X - Component Not Available
S - Support Not Available
P - Available-Cable Protected
M - Available-Manual Operation
A - Manual Op Due To Loss of Inst Air

D - Design Modification
RSD - Remote Shut Down
O - Open Switch or Breaker
R - Repair
J - Cut & Jumper