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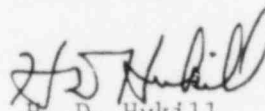
Office of Nuclear Reactor Regulation  
Attn: D. G. Eisenhut  
Division of Licensing  
U. S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Sir:

Three Mile Island Nuclear Station, Unit 1 (TMI-1)  
Operating License No. DPR-50  
Docket No. 50-289  
Fire Protection - Alternate Shutdown Capability

Attached please find Revision 1 of our tabular listing of equipment and operator actions for achieving cold shutdown for a postulated fire in the control and/or relay rooms at TMI-1. The original table was provided to the NRC Staff in our letter 82-270, dated November 15, 1982. We are providing this revised table as a result of our verbal commitment to members of the NRC Staff on December 10, 1982.

Sincerely,

  
H. D. Hukill  
Director, TMI-1

HDH:CJS:vjf  
Attachment  
cc: J. Van Vliet  
R. C. Haynes, w/o Attachment  
R. Conte, w/o Attachment

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## INTRODUCTION

The attached table provides the actions required to successfully complete the remote shutdown of TMI-1 in the event of a fire in the cable spreading room or control room. The following assumptions were made in the development of this procedural guideline:

1. No credit is taken for any actions from the control room except reactor trip.
2. Evolution must be carried out with or without offsite power available. Loss of offsite power may occur at anytime.
3. Any or all automatic signals may fail to actuate.
4. A single spurious actuation may occur at anytime during the evolution.
5. There are five available operations personnel:
  - a. Shift supervisor
  - b. Two control room operators
  - c. Two auxiliary operators
6. Spurious actuation which might result in a rapid reactor transient will be dealt with directly from the remote shutdown station.
7. This is written for "A" side components, but may be changed to "B" side at later date.

Assuming only the minimum condensate storage tank volume of 150,000 gallons per tank will allow at least 36 hours of sustained hot shutdown conditions prior to beginning a cooldown, cooldown will be accomplished in less than 72 hours from the start of the fire. Additional water sources are available in the condenser hot well and demineralized water storage tank which were conservatively ignored in this evaluation.

The term "cut and jumper" refers to a procedure which shall be developed for each component identified as requiring this operating mode. The procedure will identify those control wires which must be disconnected or cut in order to remove any possible maintained command signals. It will also identify terminals which must be jumpered in order to energize the appropriate motor contractor or relay. It is intended that the "cut and jumper" activity for each component will be performed at the component's power source.

Pressurizer depressurization, which is necessary to utilize the decay heat removal (DHR) system, can be accomplished without the use of the pressurizer vent or relief valve during loss of offsite power conditions. Ambient losses to the reactor building are sufficient.

Section 2.1.1.3 of the TMI-1 Restart Report indicates that 107KW of the heater capacity is required to equal ambient losses and maintain pressurizer pressure at a steady state value. This is thus a measure of ambient heat loss. Using this value, calculations show that the system will depressurize to less than 300 psig in about 40 hours. The DHR system will require about 14 hours to achieve cold shutdown conditions. The remaining time, approximately 18 hours, can be in hot shutdown. Thus, pressurizer depressurization via ambient heat loss will not preclude reaching cold shutdown within 72 hours.

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
1	Isolate Communications system from relay room (Announce fire and dispatch personnel to stations)		X				A. Required quickly  B. This capability does not presently exist.
2	Transfer control of EF-V-30 A/B and MS-V-4A/B to RSDS and take manual control (Notes 7, 8 and 9)	X			OTSG level and OTSG pressure on RSDP. Also RCS temp, PZR level and RCS pressure on RSDP	EFW and ADV valve control on RSDP	A. Local switches in vicinity of remote shutdown panel for transfer on one channel and on CB elev. 338 for the other channel.  B. Spurious opening of valves will be overridden)
2a	De-energize pressurizer heaters			X	PZR level on RSDP	Local Breaker	A. Heaters should be de-energized to prevent damage if auto trip on level falls.  B. Open breakers at 1E & 1F Reactor Bldg. Htg. Swgr. on TB elev. 322'.
3	Close valves MS-V-8A and MS-V-8B to deal with stuck open TBP valves	X			OTSG pressure, RCS temp and RCS pressure on RSDP		A. TBP valves open results in rapid overcooling. Isolation required to prevent potential thermal shock.

GUIDELINES FOR SHUTDOWN

EQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
4	<p>TRIP REACTOR (Turbine trip will occur automatically on reactor trip. This will be a protected circuit to assure function)  (Turbine normally trips on reactor trip or LOOP)</p>			<p align="center">X Trip from Control Room</p>	<p>SRM on RSLP</p>		<p>A. Reactor may be tripped from 1G and 1L SWGR (CB elev. 322)  B. Letdown may or may not isolate automatically on reactor trip.</p>
5	<p>TRIP MFW pumps FW-P-1A/B  (See Notes 1, 2, 3, 4 and 5)</p>	<p align="center">X</p>			<p>OTSG level on RSDP</p>		<p>A. Spurious failure of FW Reg valve would result in rapid overfill of OTSG  B. Auto trip on LOOP</p>
6	<p>Verify power available to "D" Bus</p>				<p>Bus energized lights at RSDS for Buses: 1D, 1P, 1R, 1A ES MCC, 1A ES V MCC, 1A ES Screen House MCC, 1C ES V MCC</p>		

GUIDELINES FOR SHUTDOWN

EQ.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
6a	Start motor driven pumps EF-P-2A  (Normally start on LOFW) (If offsite power is lost, diesels would be started prior to this step)		X		075G level and pressure on RSDP. Also, RCS temp, PZR level and RCS pressure on RSDP		A. Close breaker on 4150V AC ES-SWGR-1D (CB elev. 338)  B. Potential spurious failure could prevent EF-P-2A from starting
7	a) Electrically close DH-V-6A and b) DH-V-6B		X  X	X*	BWST level on RSPD.  Valve position at Valve location		A. Spurious failure of these valves would result in rapid drainage of BWST to Reactor Building sump  B. Key locks at 1A-ESV-MCC and 1B-ESV-MCC on AB elev. 305
8	Verify that MU-V-3 has closed (Letdown Isolation) Close MU-V-97B, MU-V-99 and MU-V-109B if required.			X manually close valve	Pressurizer level and MU tank level on RSDP		A. Manual letdown isolation valves are in auxiliary building elevation 281 ft.

\* DH-V-6A is powered off the protected diesel generator "1A" and will be provided with positive control at 1A ESV MCC independent of the fire area circuits. DH-V-6B is powered from diesel generator "1B" which is not protected for alternate shutdown use. If offsite power is available, DH-V-6B may be operated at the fire area circuits. With loss of offsite power, DH-V-5B will be manually closed and it's circuit breaker manually opened at the 1B-ESV-MCC to isolate the line containing DH-V-6B.

GUIDELINES FOR SHUTDOWN

REQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
9	Electrically open MU-V-36 and MU-V-37, or verify and open MU-V-37 manually if needed.		X	X (Manual) valve stroke MU-V-37 if loss of off-site power	Valve position at valve location		A. Key locks at 1A and 1B ESV-MCC (AB elev. 305 ft.) B. Manually close at AB elev. 281 ft.
10	Electrically close MU-V-212 and manually close if LOOP		X	X (LOOP)	Local at valve		A. Valve on AB elev. 281 ft. B. Not powered from ES bus
11	Isolate MU-V-37 by closing MU-V-91A or B			X manual valve stroke	At valve		A. MU-V-17 is an air operated valve which is unprotected. B. Valves on AB elev. 281 ft.
12	Control MU flow with MU-V-16B (Jog Control) Close MU-V-16A if it opens spuriously	X X			PZR level and MU in normal range PZR level on RSDP		A. MU-V-16B is an ES powered valve and is the preferable control for MU (MU-V-16B also minimizes nozzle thermal shock) B. Closure of MU-V-16A is required to prevent PZR filling
12a	Start NS-P-1A	X			Periodically check NSCC temp in AB	6900 V Switchgear	A. RC pump motor cooling via nuclear services closed cooling water
12b	TRIP RC pumps if req'd after checking Nuclear Services closed cooling water temp.		X				

GUIDELINES FOR SHUTDOWN

REQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
12c	NR-PIA (Start) NR-VIA (Open)		X X			Panel in Plant Panel in Plant	
13	Start D/G: Offsite power is unavailable and diesel fails to start automatically				D/G Status Lamps for "Cranking" "Running" at RSDS		Ign of LOOSP Bus ID status lamp is not lit. D/G "cranking" or "running" lamps are lit.
a)	Isolate circuits and secure D/G feeder Ckt. breaker in open position		X ID 4160V SWGR Cubicle ID2				
b)	Isolate circuits and secure bus 1E incoming breaker ISB-D2 in open position		X ID SWGR Cubicle ID2				
c)	Isolate circuit and Secure bus 1E incoming breaker ISA-D2 in open position		X ID SWGR Cubicle ID15				
d)	Isolate External CKTS and command D/G to start		X at D/G panel (D/G room)		ID 4160V switch-gear room	Start/Stop at ID 4160V Switchgear room	

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
13	Continued						
e)	Isolate Breaker control circuits for following bus ID load and open breakers:  A EFW pump (EP-P-2A) MU-P-1B RR-P-1A DH-P-1A		X at Cubicle				
			X(1D3) X(1D8) X(1D10) X(1D6)				
f)	Close D/G Breaker		X Cubicle 1D2		"ready to load" indication light at ID SWGR Bus ID volts and amps at ID SWGR		Operator observes "ready to load" indicator at SWGR ID prior to closing D/G breaker
g)	Reclose EFW motor breaker		X 4160V SWGR Cubicle 1D3				
	Re-close breakers (if opened) feeding:						
	Transformer 1P		Cubicle 1D5				
	Transformer 1R		Cubicle 1D11				
							NOTE:  D/G may start due to spurious signal at any time - See Note 1



GUIDELINES FOR SHUTDOWN

EQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
4a	If seal injection is lost, manually trip reactor coolant pumps		X		Indication of seal injection flow on RSDP		A. 6900V SWGR on Turbine Bldg. elev. 322 ft.
4b	Verify instrument air available Restart instrument air compressor 1A-P-1A if necessary		X		Indication of operation on RSDP.	N/A	B. 480V 1A ES MCC on Control Building Elevation 322'-0"
5	Reestablish MU flow if LOOP or spurious failure of MU-P-1A: 1. Close MU-V-20 2. Start MU-P-3A 3. Start DR-P-1A 4. Start DC-P-1A 5. Start MU-P-1A 6. Open MU-V-20 7. Throttle MU-V-32 8. Open and close MU-V-12 and 14A as required	X X X X X X X		X X	Local panel will be provided with the following:  Status for the following valves: MU-V-36 MU-V-37 MU-V-12 MU-V-14A MU-V-20 MU-V-32 DR-V-1A  Status for the following pumps: MU-P-1A MU-P-3A MU-P-1A DR-P-1A  Status for MU-V-12 and MU-V-14A on RSDP		A. MU-P-1A or MU-P-1B will be lost on LOOP  B. MU-V-20 closed to prevent RC pump seal damage  C. Local flow gauge will be provided for MU-V-32 throttling

GUIDELINES FOR SHUTDOWN

EQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
6.	Transfer Group 8 Heaters to engineered safeguards bus IP if offsite power is not available.			X Existing Plant Procedure	Local Indiation at bus	NA	A. Manual at 480V-ES-SMGR (Control Building elevation 322 ft.)
7.	Spurious HPI Initiation			X	PZR level and RCS pressure on RSDP		A. Trip MU-P-1C at 4160V SMGR IE (AB elevation 338 ft.)
8.	If MU tank level drops to less than 55 inches, open MU-V-14A and close MU-V-12 until MU tank level is greater than 66 inches.	X			MU tank level and BWST level on RSDP		A. This provides MU alignment from BWST

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
9.	<p>If RCS pressure decreases to less than 2000 psi and PZR level is increasing or stable, then:</p> <p>a. De-energize PORV</p> <p>If this is not effective, then</p> <p>b. Close spray valve</p>	X	X		PZR level and RCS pressure on RDSP		<p>A. PORV (RC-RV2) may spuriously open. Action to de-energize it will result in closure of valve.</p> <p>B. Rapid action would be required to prevent RCS saturation and HP<sub>1</sub> initiation.</p> <p>C. Manual control of spray valve at the 480V-EC-CC-1A (CB elev. 322 ft.)</p> <p>D. Spray valve open depressurization rate of about 1.1 psi/sec.</p>
20.	Reduce number of RC pumps to one per loop. (Trip B & D pumps)		X		Pump power indication adjacent to RSDS		<p>A. Key lock switch on 6900V SWGR on Turbine Building elevation 322 ft.</p>

GUIDELINES FOR SHUTDOWN

ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
1. Proceed with normal cooldown using EFW, ADV and sprays.	X (Except for Spray)	X		RCS pressure, RCS temp, OTSG pressure, OTSG level and PZR level on RSDS	EFW & ADV control on RSDS	A. Manual control of spray valve at the 480V-ES-CC-1A (CB elev. 322')
2. De-energize PZR heaters to reduce pressure.			X	Local at bus	Use Plant Procedures	A. At 480V-ES SMGR-1P on CB elev. 322' Open circuit breaker
3. Re-establish letdown	X			On RSDS	On RSDS	Need to repower from 1A Diesel (MU-V1A, V2A)
IC-P1A	X			On RSDS	On RSDS	Open breaker first (1A RW MCC)
IC-V1A	X			On RSDS	On RSDS	
IC-V2	X			On RSDS	On RSDS	
IC-V3	X			On RSDS	On RSDS	
IC-V4	X			On RSDS	On RSDS	
MU-V1A	X			On RSDS	On RSDS	
MU-V2A	X			On RSDS	On RSDS	
MU-V3	X			On RSDS	On RSDS	
MU-V8			X	On RSDS	Manual at valve	
MU-V70A			X	At valve location	Manual at valve	
MU-V110			X	At valve location	Manual at valve	
MU-V109A, B			X	At valve location	Manual at valve	
MU-V98			X	At valve location	Manual at valve	

GUIDELINES FOR SHUTDOWN

REQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
4.	Establish RB cooling - Supply Nuclear River Water, Nuclear Service & Reactor River Water & Start RB Fan:						
4a.	Open NS-V-52A & NS-V-53A			X		Bleed air supply off	A. Valves NS-V-52A & 53 Open on loss of Inst. air.
4b.	Open breakers for RR-V-3A/4A then manually open valves.  RR-V5			X  X		Handwheels  Handwheel	B. Breakers on 480V ES CC-1A (CB Elev. 322') Valves at IB elev. 295'  C. Open if RR-V6 fail shut.
4c.	Start RR-P-1A		X				D. Manually start from CB elev. 322'
4d.	Start RB cooling fan (AH-E-1A)						E. Manual at 480V-ES-CC 1A (CB Elev. 322')
5a.	Restart air compressor AH-P-8A			X Cut & Jumper			A. Located at 480 V 1A ES MCC Control Building Elevation 322'-0"
5b.	Control Building recirculation fan (AH-F-18A and AH-E-19A)			X Cut & Jumper			B. Located at 480 V 1A ES MCC Control Building Elevation 322'-0"
5c.	Restart Intermediate Building Ventilation Fan AH-E-24A			X Cut & Jumper			C. Located at 480 V 1A ES MCC Control Building Elevation 322'-0"

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
26.	Open CO-V-10A & B (Isolation valves for condensate storage tanks)			X		Handwheels	A. Open breakers at 480-V-TP-CC-1A and 1A Radwaste CC on TB elev. 322' then locally open valves is closed. This assures that adequate condensate storage tank inventory will be available
27.	Stop RCP-1C (normal shutdown procedure if offsite power available)		X				A. 6900V SWGR on turbine building elev. 322 ft.
28.	Bypass HPI Injection when primary $\leq 1750$ psi and $> 1650$ psi			X cut and jumper at E.S. Actuation Cabinets			A. Manually close relays on ES channel relay cabinets 1A, B, C and 2A, B, C (CB elev. 338)
29.	Bypass LPI injection when primary $\leq 900$ psi and $> 500$ psi			X cut and jumper at E.S. Actuation Cabinets			A. Same as above

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
30.	Isolate Core Flood tanks (close valves CF-V-1A,B)			X cut and jumper at 480V ESV- CC-1C			A. Breakers at the 480V ESV-CC-1A (FH elev. 281')
31.	Align DH Removal System: a. Open breakers for the following valves: DH-V-4A, 5A, 7A & BS-V-2A  b. Open breaker for DH-V-3  c. Manually close or check closed DH-V-5A/DH-V-7A/ BS-V-2A  d. Manually open or check open DH-V-3 DH-V-4A DH-V-12			X          X X X		Handwheels          Handwheels Handwheels Handwheels	A. Breakers at 480V ESV-CC-1A (AB-305)  B. Breaker at 480V ESV-CC-1C (FH-281')  C. Aux. Building elevations.  D. Aux. Building elevations.

GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
	e. Open valves DH-V-1 & 2 remotely			X cut & jumper at ESV-CC-1C			E. Breakers at 480V ESV CC-1C (FH 281')  F. Operate with breaker open for DH-V1 or DH-V2 to prevent spurious opening
32.	Open RC-V-4 remotely			X cut & jumper at ESV-CC-1C			A. Breaker at 480V ESC-CC-1C (FH elev. 281')
33.	Close DH-V-19A (throttle valve for decay heat removal flow)			X manually stroke valve			A. Manual valve in AB
34.	Start Decay Heat removal Pump (DH-P-1A)		X		Decay heat flow & temp. on local panel		A. Breaker at 4160V ES-SWGR-1D (CB elev. 338')
35.	Throttle open DH-V-19A (Control cooldown rate)			X manually stroke valve	RCS Temp. on RSDS for cooldown rate		A. Manual valve in AB



GUIDELINES FOR SHUTDOWN

SEQ. NO.	ACTION	RSDS	KEY LOCK	OTHER	INDICATION	CONTROL	DISCUSSION
36.	Throttle open DI-V-64 as desired to decrease RC pressure (spray valve)			X	RCS pressure on RSDS	Handwheel	A. Manual valve in AR
37.	Stop RC-P-1A		X.				A. At 6900V SMGR on TB elev. 322 ft.
38.	When RCS Temp. is less than 100 <sup>o</sup> F and RCS pressure is less than 100 psia secure makeup system & RC seal injection	X			RCS Temp. and pressure on RSDS		
39.	Decrease RCS Temp. to <140 <sup>o</sup> F; Throttle DI-V-19A			X	RCS Temp. on RSDS	Handwheel	A. Manual valve on Aux. Building elev.
					--- COLD SHUTDOWN ACHIEVED ---		

## NOTES ON SPURIOUS ACTUATIONS

1. Spurious stopping at EF-P-1 may occur. This is not a concern since a motor driven EFW pump will be started.
2. Closing of EV-V-1A or B may occur. Suction is still available from 1 (one) condensate storage tank.
3. If EF-V-2A or 2B closes, the unaffected SG is still being fed.
4. MS-V-13A or B are redundant (air operated) steam supply valve to the EFW turbine. Failure of any one in a closed position is inconsequential. Also, MS-V-10A and B would be available.
5. MS-V-10 A or B are the motor driven steam valves to EF-P-1. Failure of any one is inconsequential and MS-V-13 A and B would be available.
6. MU-V-20 and MU-V-32 may spuriously close. These valves are required to provide seal injection. These valves will be monitored from the RSDS and will be reopened locally if required.
7. MS-V-2A or 2B may spuriously close. This will isolate OTSG A or B ADV & TBV. Remaining OTSG can be used for decay heat removal. MS-V-2A or 2B will also isolate OTSG A or B from turbine driven EFW. The remaining valve is sufficient to provide continued turbine driven EFW. Motor driven EFW will be available as well. Further time is available for operator action to open valve.
8. Spurious closure of MS-V-4A or 4B (ADV) will result in adequate decay heat removal capability from the unaffected ADV. Control can be transferred to the remote shutdown panel and the closed valve can be remotely reopened.
9. If reactor coolant pumps trip spuriously or an LOOP, the EFW System can be used to raise the OTSG level to 50% in a controlled manner and a normal transition to natural circulation will result.
10. Diesel Generator may start due to spurious actuation signal. D/G breaker is interlocked with the incoming feeder breakers which will prevent its closure if incoming breakers are closed. The interlock circuits do not run through the relay or control rooms. D/G may remain operating at idle until loss of offsite powers (LOOSP) confirmed. On LOOSP, operator at ID switchgear will take positive control of the incoming and D/G feeder breakers and will manually load the diesel generator.  
If failure of the auto load shedding circuit is concurrent with D/G Start and LOOSP, generator overload protection connected to a separate dedicated set of fuses will trip the D/G breaker. The operator will eventually take manual control of the D/G feeder breakers and of the component feeder breakers and will manually load the diesel generators.
11. The breaker for DH-V1 or DH-V2 will be maintained in the open position during normal operation to preclude spurious opening of both valves.