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THREE MILE ISLAND NUCLEAR STATION

UNIT #2 EMERGENCY PROCEDURE 2202-1.3

LOSS OF REACTOR COOLANT/REACTOR COOLANT SYSTEM PRESSURE

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Cognizant Dept. Head

Unit 2 Staff Recommends Approval

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Unit 1 PORC Recommends Approval

RAA Date —

Chairman of PORC

Unit 2 PORC Recommends Approval

R D Warren Date 10/6/78

V. Chairman of PORC

Unit 1 Superintendent Approval

RAA Date —

Unit 2 Superintendent Approval

J J Barley Date 10/6/78

Manager Generation Quality Assurance Approval RAA Date —

THREE MILE ISLAND NUCLEAR STATION

UNIT #2 EMERGENCY PROCEDURE 2202-1.3

LOSS OF REACTOR COOLANT/REACTOR COOLANT SYSTEM

PRESSURE

A. Leak or Rupture Within Capability of System Operation.

1.0 SYMPTOMS

1.1 Initial loss of reactor coolant pressure & decrease in pressurizer level becoming stable after short period of time.

1.2 Possible reactor building high radiation and/or temp. alarm.

1.3 Possible reactor building sump high level alarm.

1.4 Make-up tank level decreasing > 1" in 3 min.

1.5 Possible makeup line high flow alarm.

1.6 RB Fan Drip Pan Level Hi Alarms.

NOTE: The operator may distinguish between a loss of coolant inside containment, an OTSG tube rupture and a steam line break by the following symptoms which are unique to the aforementioned accidents.

1. Loss of coolant inside Rx Bldg. - particulate, iodine & gas monitor alarm on HP-R-227 "Reactor Building Air Sample".
2. OTSG tube rupture - gas monitor alarm on VA-R-748.
3. Steam line break
   (1) Low condensate storage tank level alarm - and or low hot well level alarm.
   (2) FW Latch System Actuation.

2.0 IMMEDIATE ACTION

2.1 Automatic Action:

2.1.1 MU-V17 will open to compensate for reduced pressurizer level.

2.1.2 Additional pressurizer heaters will come on in response to reduced reactor coolant pressure.

2.2 Manual Action

2.2.1 Verify MU-V17 open and pressurizer heaters on.

2.2.2 "CLOSE" MU-V376 letdown isolation valve, & "START" the backup MU pump, if required.

2.2.3 Reduce load at 10% minute & proceed with normal shutdown.

2.2.4 "LINE-UP" waste transfer pump from a R.C. Bleed Holdup Tank & pump to the makeup tank to maintain required level.

2.2.5 If for any reason the operator cannot maintain Make-up Tank and Pressurizer levels above their respective low level alarm setpoints, "TRIP" the reactor, "INITIATE" Safety Injection manually (push buttons on panel 3), & then "Close" MU-V12.

3.0 FOLLOW UP ACTION

3.1 Safety Injection Not Initiated.

3.1.1 Initiate unit shutdown & cooldown per 2102-3.1 and 2102-3.2 respectively.

3.2 Safety Injection Manually Initiated (HPI and LPI).

3.2.1 Verify that the Makeup Pumps & Decay Heat Removal Pumps start satisfactorily.

3.2.1.1 Close MU-V12 and MU-V18.

3.2.2 Bypass the SAFETY INJECTION by DEPRESSING the Group Reset Pushbuttons & "THROTTLE" MU-V16A/B/C/D as necessary to maintain 220" pressurizer level and not exceed 250 GPM/HPI flow leg.

3.2.3 If MU pump flow drops below 95 GPM, trip excess MU pumps.

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NOTE: HPI String A flow is the sum of MU 23 FE1&2. HPI String B flow is the sum of MU23 FE 3&4.

3.2.4 Verify that Safety Injection equipment is in its ESF position as shown in Table A-1.

3.2.5 CAUTION: Continued operation depends upon the capability to maintain pressurizer level and RCS pressure above the 1640 PSIG Safety Injection Actuation setpoint.

1. If pressurizer level can be maintained above the low level alarm point and the RCS pressure above the Safety Injection Actuation point, then proceed to step 3.2.6.
2. If pressurizer level cannot be maintained above the low level alarm point and the RCS pressure above the Safety Injection Actuation point, then the plant has suffered a major rupture and operation should continue according to Part B - Leak or Rupture of Significant Size Such that Engineered Safety Features Systems are Automatically Initiated.

3.2.6 With the pressurizer level and RCS pressure being maintained within allowable limits, initiate plant shutdown and cooldown per 2102-3.1 and 2102-3.2, respectively.

NOTE: The HPI System is being used for makeup control and valves MU-V16A/B/C/D will have to be throttled to maintain pressurizer level. As RCS pressure decreases, it may be possible to return to the normal makeup flowpath and secure HPI. If MU pump flow drops below 95 GPM as a result of throttling, "Open" MU-V36 & 37 to provide MU pump recirculation path to MU Tank. Monitor MU Tank level and open MU-V12 as required.

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3.2.7 At the time the DH System is to be brought on line for normal cooling only one DH string should be used for decay heat removal (i.e. - recirculation from the RC System). The other DH string should be maintained on standby for use in recirculating water from the RB sump to the RC system.

NOTE: Trip Reactor Coolant Pumps before R.C. Pressure decreases below pump NPSH (See figure 1 of 2102-3.1/3.2.

3.2.8 When the Borated Water Storage Tank level decreases to 12' as indicated on panel 8, Shift the MU/HPI pump(s) suction from the BWST to the RB sump if RCS Pressure is greater than 200 psig as follows: (assume DH string A(B) is being used for decay heat removal and DH string B(A) is being maintained on standby):

3.2.8.1 If not already done, "THROTTLE" HPI string(s) flow rate to at least 500 gpm each < 250 gpm per leg) using control valves MU-V16A/B/C/D (or MU-V17 if flow has been returned to the normal makeup flow path). Flow rate indication and valve control in control room on Panel 8 and 3, respectively.

3.2.8.2 "OPEN" valve DH-V78(A) in crossover line from LPI String B(A) to HPI string B(A) (suction of HPI pumps)..
"REPOSITION" HPI flow control valves MU-V16A/B/C/D (or MU-V17 if flow has been returned to the normal makeup flowpath). HPI flow would increase because of increased HPI pump suction pressure.

3.2.8.3 When the BWST level decreases to 7', verify automatic transfer to the RB sump is initiated. Verify OPEN suction valve for string B(A), DH-V68(A) from the RB sump.

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3.2.8.4 When the suction valve from the RB sump DH-V6 B(A), is fully open, then "CLOSE" the ECCS suction valve, DH-V5B(A), from the BSWT (valve controls and position indication in control room). The ECCS B(A) string is now in "piggy-Back" operation providing makeup to the RCS from the RB sump as required.

3.2.9 After R.C.S. pressure decreases to = 200 psig, throttle HPI discharge flow by throttling MU-V16A/B/C/D. Observe that LPI pumps now deliver water to RCS via DH-V4A/B.

3.2.10 When MU-V16A/B/C/D (HPI flow valves) are closed, stop the Hi pressure injection pumps & close DH-V7A & 7B from the LPI pump discharge. Injection flow path is now as follows:

Spill coolant to RB sump, RB sump to LPI pumps, LPI pumps to RCS via DH-V4A/B.

3.2.11 Throttle DH-V128A & B as required to maintain 220" pressurizer level and max. LPI pump flow of 3000-3300 gpm. Within about 24 hours, establish a long-term cooling circulation mode as described in 2104-1.3 and listed below.

Mode 1 Forced circulation using decay Heat drop line.

Mode 2 Gravity draining reactor coolant hot leg to the Reactor Building sump via the D.H. drop line.

Mode 3 Hot leg injection using Pressurizer Auxiliary Spray Line.

Mode 4 Reverse flow through the Decay Heat Drop line into "B" Reactor Coolant Loop Hot Leg.

3.2.12 Evaluate radiation levels & initiate action for Site Emergency as outlined in the TMI radiation emergency plan.

3.2.13 Reactor Building Isolation Initiated

1. Refer to Section B, 3.0 & complete all steps.

B. LEAK OR RUPTURE OF SIGNIFICANT SIZE SUCH THAT ENGINEERED SAFETY FEATURES SYSTEMS ARE AUTOMATICALLY INITIATED.

1.0 SYMPTOMS

1.1 Rapid continuing decrease of reactor coolant pressure.

(1) Lo alarm 2055 psig.

(2) Lo-Lo-alarm 1700 psig.

(3) Safety Injection actuation at 1640 psig.

1.2 Rapid continuing decrease of pressurizer level.

(1) Lo alarm 200".

(2) Lo-Lo alarm 80" (Interlock heater shutoff).

1.3 Hi radiation alarm in Reactor Building.

1.4 Reactor Building Ambient Temperature Alarm.

1.5 Hi Reactor Building Sump level.

1.6 Hi Reactor Building pressure (R.C.S or main steam line rupture).

1.7 Rapidly decreasing make-up tank level.

1.8 Both core flood tanks levels & pressures are decreasing.

NOTE: The operator may distinguish between a loss of coolant inside containment, an OTSG tube rupture and a steam line break by the following symptoms which are unique to the aforementioned accidents.

1. Loss of coolant inside Rx Bldg. - particulate, iodine gas monitor alarm on HP-R-227 "Reactor Building Air Sample."

2. OTSG tube rupture - Gas monitor alarm on VA-R-748.

3. Steam break inside Rx Bldg:

(1) Low condensate storage tank level alarm - and or low hot well level alarm.

(2) FW Latch System Actuation.

2.0 IMMEDIATE ACTION

2.1 Automatic Action.

2.1.1 Reactor trip 1900 psig.

2.1.2 Turbine Trip.

2.1.3 Safety Injection initiated @ 1600 psig R.C.S pressure, or 4 psig Reactor Building pressure.

2.1.4 Both Core Flood Tank levels & pressures may decrease depending upon rupture size and R.C.S. pressure. ($\leq$ 600 psig).

2.1.5 Reactor Building Isolation & Cooling initiated. (R.B. Press. $\geq$ 4 psig).

2.1.6 Reactor Building Spray if the Reactor Building pressure is greater than 30 psig.

2.2 Manual Action.

2.2.1 "CLOSE" MU-V12 and MU-V18.

2.2.2 Small Break LOCA Response

2.2.2.1 Within 2 minutes of the LOCA the CRO dedicated to recognition of a small break LOCA must complete the following:

a. Verify that small break LOCA with single failure symptoms exist.

Symptoms: 1. SFAS initiation and only one MUP started, or

2. SFAS initiation and loss of 2-1E or 2-2E

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b. DISPATCH designated LOCA Response Primary A.O. to OPEN MUP Discharge Cross-connect.

c. PROCEED to MU-V16A & B or MU-V16C & D.

d. Within 5 minutes of the LOCA the MUP discharge cross connect valve must be opened off its closed seat and one of the MU-V16 valves on the side of the single failure must be opened 2 turns.

2.2.2.2 CRO at MU-V16A & B or MU-V16C & D must ESTABLISH communications with the Control Room.

2.2.2.3 Once in communication with the control room the CRO at MU-V16A & B or C & D continue to open the valves to establish 125 gpm per leg; while the control room CRO THROTTLES MU-V16C & D or A & B to prevent pump runout.

NOTE: If the LOCA was E.S. with loss of MUP all MU-V16 valves would initially be open. The operator at the controls must in this case throttle all 4 MU-V16 valves to 125 gpm/leg. Also in this case the CRO dedicated to Small Break LOCA would not need to go to the MU-V16 valves. He should go to the MUP discharge cross connect valves and assist the A.O. to speed up the opening of the MUP discharge cross connect.

SMALL BREAK LOCA ACTION TIMES

EVENT	TIME From Occurance
Recognition	$\leq$ 2 minutes
CRO to MU-16's	$\leq$ 4.5 minutes

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SMALL BREAK LOCA ACTION TIMES (Cont'd)

EVENT	TIME From Occurance
AO to MUP Discharge X-Connects	≤ 3.5 minutes
Communications Established With CRO at MU-V16's	≤ 5.0 minutes
One of the Single Failure Side MU-V16's Open 2 turns	≤ 5.0 minutes
Discharge X-Connect OFF Closed Seat	≤ 5.0 minutes
Discharge X-Connect Open	≤ 10.0 minutes
MU-V16's Throttled to 125 gpm/leg	≤ 10.0 minutes

2.2.3 Verify Hi pressure injection is operating properly as evidenced by injection flow in all four legs. (MU-V16A/B/C/D). Flow indicated on MU23 FE1,2,3,4.

2.2.4 "TRIP" reactor coolant pumps before reaching 1200 psig.

2.2.5 Verify Reactor Building Cooling and Isolation is operating properly.

3.0 FOLLOW UP ACTION

3.1 Verify that all E.S.F. equipment is in its ESF position, by observing that all equipment status lights indicate as shown in Table B-1.

3.1.1 Check locked valve status book and verify closed or close the following manual containment isolation valves MU-V330, MU-V364, CF-V114A, CFV114B, CF-V145, CF-V146, DH-V187, and DW-V28.

NOTE: Should any component not operate properly, attempt to actuate it at its remote switch in the Control Room. If it still does not operate, & the component has a local control station attempt to operate the component locally.

3.2 Notify Shift Foreman, who notifies all Station personnel over the cross-tied PA system that a site emergency has occured.

3.3 0 to 20 or 30 minutes past LOCA until sump recircualtion is initiated: Control Room operator continuously monitors the following:

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3.3.1 Liquid levels in the:

1. Borated Water Storage Tank, DH-T1, (DH-3-LI 1/2).
2. Sodium Hydroxide Tank, DH-T2, (DH-7-LI).

3.3.2 Safety Features flow rate in each of the following:

1. Two Low Pressure (Decay Heat) Injection lines, DH-1-FI 1 and 2.
2. Four High Pressure (Makeup) Injection lines, MU-23-FI 1, 2, 3, and 4.
3. Two Reactor Building Spray injection lines, BS-1-FI and 2.
4. Four of five reactor building emergency cooling river water lines AH-FI-5620, 5621, 5522, 5623, or 5624 respectively.

3.3.3 Reactor Building environmental indications:

1. Temperature, recorder on Panel 25.
2. Pressure, recorder on Panel 3.

3.4 "DEFEAT" any <u>two</u> channels of Reactor Building Isolation and Cooling, then bypass all three Safety Injection Channels.

<u>CAUTION</u>: If normal power is lost while operating in the injection Mode from the BWST, RB Isolation and Cooling must be manually initiated, when either the BUS 2-1E or 2-2E Undervoltage alarm is received to ensure proper diesel generator load sequencing.

3.5 "THROTTLE" as required to prevent pump runout:

1. Hi press. inj. flow (MU-16A/B/C/D) 0-250 GPM/LEG.

<u>CAUTION</u>: If MU pump flow drops below 95 GPM trip the excess MU pumps.

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2. Lo Press. Inj. Flow (DH-V128A/B) 3000-3300 GPM/PMP.

3. Building spray flow (BS-V1A/B) 1400-1700 GPM/PMP.

NOTE: Hi flow alarms should actuate as a warning to throttle flows.

CAUTION: The actions to be taken for switching suction from the BWST to the R.B. sump depend upon the number of operating ECCS injection strings and the delivered flowrates in these injection strings. Based upon the existing situation, in the ECCS, proceed as outlined below to perform switch over of suction to the RB sump:

	Situation	Go to Step
1.	Both LPI strings are operating and indicated flow in each is above 750 gpm.	3.6
2.	Both LPI strings are operating but indicated flow in each is below 750 gpm.	3.7
3.	One LPI string is inoperative.	3.8

NOTE: The main objective when switching suction from the BWST to the RB sump is to maintain ECCS flow through two flow paths.

3.6 Both LPI Strings are Operating and Indicated Flow in Each is Above 750 GPM.

3.6.1 When the BWST level reaches approximately 12', initiate the following steps:

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3.6.2 If not already done "THROTTLE" LPI strings flow rates back to 3000 GPM each using control valves DH-V128 A &B (flow rate indication and valve control in control room).

3.6.2.1 If not already done, THROTTLE BS pump's flows back to 1600 gpm per pump. This must be done prior to taking suction from the RB sump.

3.6.3 "SHUT OFF" HPI pumps (pump control in control room).

3.6.4 Verify the ECCS suction valves DH-V6A & B from RB sump automatically open at BWST level of 7'.

3.6.5 When suction valves from RB sump are full open, "CLOSE the ECCS suction valves (DH-V5A & B) from the BWST.

3.6.6 "REPOSITION" LPI flow control valves (DH-V128 A&B) to obtain 3000 GPM each string if necessary. (Flow rate could change due to change in suction sources).

3.6.7 Proceed to step 3.9.

3.7 Both LPI Strings Are Operating But Indicated Flow In Each Is Below 750 GPM.

3.7.1 When the BWST level reaches approximately 12', initiate the following steps.

3.7.2 If not already done, "THROTTLE" HPI strings' flow rates back to 500 GPM per pump each using control valves MU-V16A, B, C, and D (flow rate indication and valve control in control room).

3.7.2.1 If not already done, THROTTLE BS pump's flows back to 1600 GPM per pump. This must be done prior to taking suction from the RB sump.

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3.7.3 "OPEN" valves DH-V7A and B in crossover line from LPI line to suction of HPI pumps (valve control and position indication in control room). "Reposition" HPI flow control valves (MU-V16A,B,C, & D) to obtain 500 GPM each string. (HPI flow would increase because of increased HPI pump suction pressure).

3.7.4 VERIFY the ECCS suction valves (DH-V6A & B) from RB sump automatically open at BWST level of 7'.

3.7.5 When suction valves from RB sump are fully open, "Close" the ECCS suction valves (DH-V5A & B) from the BWST. The ECCS is now in "piggy-back" operation.

3.7.6 Proceed to step 3.9.

NOTE: Once the flow in each LPI string exceeds 750 gpm, the HPI pumps can be "SHUT OFF" and valves DH-V7A & B can be "CLOSED".

3.8 One LPI String is Inoperative

3.8.1 The BWST 7' automatic transfer to the RB sump is reached in approximately 55-80 minutes from initiation of ECCS injection, depending upon reason for string failure (i.e. - local LPI failure or diesel failure). Prior to actuation of the lo-lo level alarm, initiate the following steps.

3.8.2 Using the controls in the control room, attempt to "START UP" the non-operating LPI String. If successful, proceed to step 3.6. If not successful, proceed to step 3.8.3 below.

3.8.3 If step 2 was unsuccessful, initiate opening the DH cross-connect isolation valves (DH-V193 A & B) as follows:

3.8.3.1 ENSURE SN-V188 is closed then OPEN DH-V112 A & B to fill the inoperable string.

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NOTE: If offsite power is lost DHV193 A & B must be manually opened.

3.8.3.2 Obtain the keys for the DH cross-connect isolation valves' (DH-V193A and DH-V193B) breakers from the shift supervisor.

3.8.3.3 Proceed to 480V MCC 2-32B and MCC 2-42B.

3.8.3.4 Remove the locks from the isolation valve breakers for the DH cross-connect line.

NOTE: Local control stations for DH-V193A and are located in the Aux Bldg at Elev. 280'6" near the DH vaults.

3.8.3.5 "OPEN" the DH cross-connect isolation valve (e.g. DH-V-193A(B)] next to the operating LPI String.

3.8.3.6 "OPEN" the second isolation valve (DH-V193A(B)).

3.8.3.7 While opening the second decay heat cross-connect isolation valve, "THROTTLE" either DH-V128A or DH-V128B in the control room as required to achieve essentially equal flow rates in both D.H. injection lines. (Approximately 1500 gpm per LPI string).

3.8.3.8 If flow is established at greater than 750 gpm through each LPI string, then proceed to step 3.8.5.

3.8.3.9 If flow cannot be established through each LPI string in excess of 750 gpm using the cross-connect line before ECCS suction must be switched to the RB sump, then proceed to step 3.9.4.

3.8.4 If opening the DH cross-connect line fails to provide flow in each LPI string in excess of 750 gpm, then place one HPI string in a modified "Piggy-Back" mode with the operating LPI string as follows (assume LPI string "A"(B) is the operating string):

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3.8.4.1 If not already done, "THROTTLE" HPI string "A"(B) flow rate back to 500 GPM using control valve MU-V16A and V16B.

3.8.4.2 "THROTTLE" LPI string "A"(B) flow rate to 3000 GPM using control valve DH-V128A(B).

3.8.4.3 "OPEN" valve DH-V7A(B) in crossover line from LPI line to suction of the operating HPI pump.

3.8.4.4 "REPOSITION" HPI flow control valves MU-V16A&B to otbain 250 GPM per leg HPI flow and reposition LPI flow control valve DH-V128A to obtain 2500 GPM LPI flow. The LPI pump is pumping design flow of 3000 GPM (2500 GPM LPI plus 500 GPM HPI).

3.8.4.5 "SHUT OFF" HPI pump in HPI string "B"(A).

3.8.4.6 Proceed to step 3.8.6.

3.8.5 "SHUT OFF" HPI pumps (pump control in control room).

3.8.6 If not already done, THROTTLE BS pump's flows back to 1600 GPM per pump. This must be done prior to taking suction from the RB sump.

3.8.6.1 When the BWST level decreases to 7' VERIFY the ECCS suc[illegible] valves (DH-V6A & B) from RB sump automatically open.

3.8.7 When suction valves from RB sump are full open (position indication in control room), "CLOSE" the ECCS suction valves (DH-V5A & B) from the BWST.

3.8.8 "REPOSITION" LPI flow control valve(s) (DH-V128A and/or B) as required to obtain proper string flowrates. (Flow rates could change due to change in suction sources).

3.9 When the Sodium Hydroxide Tank level reaches approximately 3 ft. "CLOSE" DH-V8A & B.

3.10 Actuate Environmental Barrier System by opening EB-V11.

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3.11 Within 24 hours of ECCS initiation, establish one of the long-term cooling circulation modes described in 2104-1.3 - Decay Heat Removal System, and listed below:

Mode 1 Forced circulation using decay heat drop line.

Mode 2 Gravity draining reactor coolant hot leg to the Reactor Building sump via the D.H. drop line.

Mode 3 Hot leg injection using pressurizer auxiliary spray line.

Mode 4 Reverse flow through the decay heat drop line into "B" Reactor Coolant Loop Hot leg.

4.0 LONG TERM ACTION

4.1 Verify all previous actions and carry out additional actions as outlined below.

4.2 Evaluate symptoms and determine if possible the cause of the loss of coolant.

4.3 Secure turbine, feed water, and steam systems when time permits.

4.4 Monitor for H_2 buildup and assure actuation of H_2 recombiner per 2104-6.4, Hydrogen Recombiner Operations.

4.5 Monitor R.B. Sump for pH and add Sodium Hydroxide as required thru the decay heat removal system.

4.6 As conditions permit, evaluate unit conditions, and return all non-essential equipment to its normal line up.

NOTE: Refer to the following instructions and procedures for additional information as required.

1. Radiation emergency plan site emergency in the emergency plan.
2. 2104-5.4 - Control Building HVAC.

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TABLE A-1

ESF EQUIPMENT - ESF POSITION IN THE CONTROL ROOM PANEL 13

The White light for each component should be lit to indicate that the component is in its ESF position, unless otherwise noted.

ACTUATION A

SAFETY INJECTION GP. 1 Equipment	ESF Position
DC-P-1A	ON
G2-12 (Note 1)	CLOSED
MU-P-1A (Note 2)	ON
NR-P-1A (Note 3)	ON
NS-P-1A (Note 4)	ON
T1E-2E2	OPEN
T3E-4E2	OPEN
T11E-21E2	OPEN
DC-V96A	CLOSED

SAFETY INJECTION GP. 2 Equipment	ESF Position
NR-V9A	CLOSED
DH-V4A	OPEN
DH-V5A	OPEN
DH-V8A	OPEN
DH-V100A	CLOSED
DH-V102A	OPEN
MU-P-1B (Note 2)	ON
NR-V40A	OPEN
NS-P-1C	ON
T12-22E-2	OPEN
MU-V2B	CLOSED

ACTUATION B

SAFETY INJECTION GP. 1 Equipment	ESF Position
DC-P-1B	ON
G22-12 (Note 1)	CLOSED
MU-P-1B (Note 2)	ON
NR-P-1C (Note 3)	ON
NS-P-1B (Note 4)	ON
T2E-1E2	OPEN
T4E-3E2	OPEN
T21E-11E2	OPEN
DC-V96B	CLOSED

SAFETY INJECTION GP. 2 Equipment	ESF Position
NR-V9B	CLOSED
DH-V4B	OPEN
DH-V5B	OPEN
DH-V8B	OPEN
DH-V100B	CLOSED
DH-V102B	OPEN
MU-P-1C	ON
NR-V40B	OPEN
NS-P-1C (Note 4)	ON
T22E-12E-2	OPEN
HY-V55	CLOSED

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TABLE A-1

ACTUATION A		ACTUATION B	
SAFETY INJECTION GP. 3		SAFETY INJECTION GP. 3	
Equipment	ESF Position	Equipment	ESF Position
MU-V36	CLOSED	MU-V37	CLOSED
MU-V16A	OPEN	NS-V32	CLOSED
MU-V16B	OPEN	NS-V67	CLOSED
DH-P-1A	ON	DH-P-1B	ON
NR-P-1B (Note 3)	ON	MU-V16C	OPEN
T31E-41E-2	OPEN	MU-V16D	OPEN
NS-V84B	CLOSED	NR-P-1D (Note 3)	ON
NR-V42A	OPEN	T41E-31E-2	OPEN
		NS-V84A	CLOSED
		NR-V42B	OPEN

PANEL 3

Equipment	ESF Position	Status Light Indicator
NS-V83A	OPEN	R
NS-V83B	OPEN	R
NS-V215	CLOSED	G
NS-V216	CLOSED	G

NOTE 1: Diesel Generator Breaker will only be closed if Normal Power is lost; otherwise status indication will be Open (white).

NOTE 2: MU-P-1B will be running if normal power is available for the Actuation, for the pump that it is selected to backup.
If normal power is lost, MU-P-1B will be running, if the pump that it is selected to backup fails to start or is inoperable.

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TABLE A-1

NOTE 3: The NR pump in each neader selected for ES or standby will start if a pump is not operating in that header; otherwise the operating pump will remain in service.

NOTE 4: Normally NS-P-1A and 1B will start; however, NS-P-1C will start if either NS-P-1A or B (depending upon which pump it is selected to backup) fails to start or is inoperable.

TABLE B-1

ESF EQUIPMENT - ESF POSITION IN THE CONTROL ROOM PANEL 13

The White light for each component should be lit to indicate that the component is in its ESF position, unless otherwise noted.

ACTUATION A

SAFETY INJECTION GP. 1	
Equipment	ESF Position
DC-P-1A	ON
G2-12 (Note 1)	CLOSED
MU-P-1A (Note 2)	ON
NR-P-1A (Note 3)	ON
NS-P-1A (Note 4)	ON
T1E-2E2	OPEN
T3E-4E2	OPEN
T11E-21E2	OPEN
DC-V96A	CLOSED

SAFETY INJECTION GP. 2	
Equipment	ESF Position
NR-V9A	CLOSED
DH-V4A	OPEN
DH-V5A	OPEN
DH-V8A	OPEN
DH-V100A	CLOSED
DH-V102A	OPEN
MU-P-1B (Note 2)	ON
NR-V40A	OPEN
NS-P-1C	ON
T12-22E-2	OPEN
MU-V28	CLOSED

ACTUATION B

SAFETY INJECTION GP. 1	
Equipment	ESF Position
DC-P-1B	ON
G22-12 (Note 1)	CLOSED
MU-P-1B (Note 2)	ON
NR-P-1C (Note 3)	ON
NS-P-1B (Note 4)	ON
T2E-1E2	OPEN
T4E-3E2	OPEN
T21E-11E2	OPEN
DC-V96B	CLOSED

SAFETY INJECTION GP. 2	
Equipment	ESF Position
NR-V9B	CLOSED
DH-V4B	OPEN
DH-V5B	OPEN
DH-V8B	OPEN
DH-V100B	CLOSED
DH-V102B	OPEN
MU-P-1C	ON
NR-V40B	OPEN
NS-P-1C (Note 4)	ON
T22E-12E-2	OPEN
HY-V55	CLOSED

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TABLE B-1

ACTUATION A		ACTUATION B	
SAFETY INJECTION GP. 3		SAFETY INJECTION GP. 3	
Equipment	ESF Position	Equipment	ESF Position
MU-V36	CLOSED	MU-V37	CLOSED
MU-V16A	OPEN	NS-V32	CLOSED
MU-V16B	OPEN	NS-V67	CLOSED
DH-P-1A	ON	DH-P-1B	ON
NR-P-1B (Note 3)	ON	MU-V16C	OPEN
T31E-41E-2	OPEN	MU-V16D	OPEN
NS-V84B	CLOSED	NR-P-1C (Note 3)	ON
NR-V42A	OPEN	T41E-31E-2	OPEN
		NS-V84A	CLOSED
		NR-V42B	OPEN
R.B. ISOLATION AND COOLING GP. 1		R.B. ISOLATION AND COOLING GP 1	
Equipment	Position	Equipment	Position
AH-V81	CLOSED	AH-E-11D	ON
AH-V101	CLOSED	AH-V80	CLOSED
AH-V102	CLOSED	AH-V103	CLOSED
AH-V105	CLOSED	AH-V104	CLOSED
AH-V107	CLOSED	AH-V106	CLOSED
CF-V144	CLOSED	AH-V108	CLOSED
DH-V3	CLOSED	CF-V115	CLOSED
NM-V52	CLOSED	DH-V2	CLOSED
NR-V51A	CLOSED	NM-V104	CLOSED
RR-V2A	OPEN	NR-V51B	CLOSED
RR-V2B			
RR-V5A	OPEN	RR-V2C	OPEN
RR-V5B	OPEN	RR-V2D	OPEN

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TABLE B-1

ACTUATION A

R.B. ISOLATION & COOLING GP. 1

Equipment	Position
RR-V5C	OPEN
SV-V55	CLOSED
WDL-V1095	CLOSED
DC-V114	CLOSED

R.B. ISOLATION & COOLING GP. 2

Equipment	Position
AH-E-4A	ON
AH-E-11A	ON
RR-V25C	CLOSED
BS-V1A	OPEN
CA-V10	CLOSED
CA-V4A	CLOSED
CA-V9	CLOSED
RR-P-1B	ON
WDG-V199	CLOSED
WDL-V22	CLOSED
WDL-V1126	CLOSED
AH-D4092A & B	RECIRC
AH-D4092D & E	RECIRC
ED-4098	

ACTUATION B

R.B. ISOLATION & COOLING GP. 1

Equipment	Position
RR-V6C	OPEN
RR-V6D	OPEN
RR-V6E	OPEN
SV-V54	CLOSED
WDL-V1092	CLOSED
DC-V103	CLOSED
DC-V115	CLOSED

R.B. ISOLATION & COOLING GP. 2

Equipment	Position
AH-E-4B	ON
AH-E-11C	ON
RR-V25C	CLOSED
BS-V1B	OPEN
CA-V1	CLOSED
CA-V3	CLOSED
CA-V4B	CLOSED
CA-V8	CLOSED
CA-V6	CLOSED
RR-P-1D	ON
WDG-V2	CLOSED
WDL-V1125	CLOSED
WDL-V271	CLOSED
AH-D4092A & B	RECIRC
AH-D4092D & E	RECIRC
ED-4098	RECIRC

TABLE B-1

ACTUATION A		ACTUATION B	
R.B. ISOLATION & COOLING GP. 3		R.B. ISOLATION & COOLING GP. 3	
Equipment	Position	Equipment	Position
IC-V2	CLOSED	IC-V3	CLOSED
IC-V5	CLOSED	IC-V4	CLOSED
MU-V2A	CLOSED	MU-V376	CLOSED
MU-V2B	CLOSED	MU-V18	CLOSED
MU-V377	CLOSED	MU-V25	CLOSED
NS-V72	CLOSED	NS-V100	CLOSED
NS-V81	CLOSED	NR-P-2B	ON
NR-P-2A	ON	RR-P-1C	ON
NR-V144A	OPEN	RR-V25D	CLOSED
RR-P-1A	ON	RR-V25E	CLOSED
RR-V25A	CLOSED	AH-C-8A	ON
RR-V25B	CLOSED	AH-E-11E	ON
IC-P-1A	OFF	AH-P-1B	ON
AH-C-8A	ON	AH-V2A	CLOSED
AH-E-11B	ON	AH-V2B	CLOSED
AH-E-11C	ON	AH-V3A	CLOSED
AH-P-1A	ON	AH-V3B	CLOSED
AH-V1A	CLOSED	AH-V6	CLOSED
AH-V1B	CLOSED	AH-V61	CLOSED
AH-V4A	CLOSED	AH-V61	CLOSED
AH-V4B	CLOSED	AH-V63	CLOSED
AH-V5	CLOSED	AH-V71	CLOSED
AH-V60	CLOSED	IC-P-1B	OFF
AH-V102	CLOSED		
AH-V72	CLOSED		
* BS-P-1A	ON	* BS-P-1B	ON

* If RB Pressure >30 psig.

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NOTE 1: Diesel Generator Breaker will only be closed if Normal Power is lost; otherwise status indication will be Open (white).

NOTE 2: MU-P-1B will be running if normal power is available for the Actuation, for the pump that it is selected to backup.
If normal power is lost, MU-P-1B will be running, if the pump that it is selected to backup fails to start or is inoperable.

NOTE 3: The NR pump in each neader selected for ES or standby will start if a pump is not operating in that header; otherwise the operating pump will remain in service.

NOTE 4: Normally NS-P-1A and 1B will start; however, NS-P-1C will start if either NS-P-1A or B (depending upon which pump it is selected to backup) fails to start or is inoperable.

PANEL B

Equipment	ES Position	Indication
DH-V7A(1)	Close	G
DH-V7B(1)	Close	G
NS-V83A	Open	R
NS-V83B	Open	R
NS-V215	Close	G
NS-V216	Close	G
CF-V1A	Open	R
CF-V1B	Open	R

(1) This valve may have to be opened for "piggy-back" operation. Once, opened, the Position/Indication becomes Open/R.

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PANEL 15

Equipment	ES Position	Indication
DH-V6A(1)	Close	G
DH-V6B(1)	Close	G
MU-V378(2)	Open	R
MS-V4A(3)	Open	R
MS-V4B(3)	Open	R
MS-7A(3)	Open	R
MS-V7B(3)	Open	R

(1) This valve must be opened for sump-switchover. Once opened, the Position/Indication becomes OPEN/R.

(2) This valve should be closed at the operator's first chance. Once closed, the Position/Indication becomes CLOSE/W.

(3) These valves should be closed when the steam system is secured. Once closed, the Position/Indication becomes CLOSE/G.

PANEL 25

Equipment	ES Position	Indication
AH-E12A	Off	G
AH-E12B	Off	G
AH-E19A	Off	G
AH-E19B	Off	G

TMI DOCUMENTS

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Wilda R. Mullinix, NRC

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