

# CONTROLLED COPY CENTRAL FILE

THREE MILE ISLAND NUCLEAR STATION  
UNIT #2 ABNORMAL PROCEDURE 2203-2.3  
STEAM SUPPLY SYSTEM RUPTURE

6/11/78 1-0  
2203-2.3  
Revision 5  
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Unit 1 Staff Recommends Approval

Approval NA Date       
Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval NA Date       
Cognizant Dept. Head

Unit 1 PORC Recommends Approval

NA Date       
Chairman of PORC

Unit 2 PORC Recommends Approval

R.P. Warren Date 10/12/78  
V-Chairman of PORC

Unit 1 Superintendent Approval

NA Date     

Unit 2 Superintendent Approval

A. J. DeLeonis Date 10/6/78

Manager Generation Quality Assurance Approval

NA Date

THREE MILE ISLAND NUCLEAR STATION  
UNIT #2 ABNORMAL PROCEDURE 2203-2.3

Steam Supply System Rupture

1.0 SYMPTOMS

- 1.1 Rapid decrease of secondary steam pressure. (Both OTSG's start to blow down).
- 1.2 Electrical load reducing rapidly.
- 1.3 Decrease in pressurizer level, R.C. Pressure, and cold leg temperature.
- 1.4 For a rupture inside the Reactor Building; Indication of increasing building pressure and temperature. (Possible high Radioactivity Levels on HP-R-227 if a tube leak exists).
- 1.5 For a rupture outside the Reactor Building; Noise may be heard in Control Room or a report made from personnel outside the Control Room.
- 1.6 Decrease in main condenser hotwell level or condensate storage tank level.

2.0 IMMEDIATE ACTION

2.1 Automatic Action

- 2.1.1 Reactor trips.
- 2.1.2 Turbine trips
  1. Main Throttle valves close.
  2. Generator breakers (82-02 and 82-2602) open.
  3. Generator Field breaker opens.
- 2.1.3 Low steam header pressure (<585 PSIG) on affected OTSG results in Feedwater Latching System closing feedwater valves and main steam isolation valves as follows:

<u>Valves Closed</u>	<u>Affected</u>	<u>OTSG</u>
	<u>A</u>	<u>B</u>
Main Feedwater Control Valve	FW-V30A	FW-V30B
Startup Feedwater Control Valve	FW-V25A	FW-V25B
Main F.W. Block Valves	FW-V17A	FW-V17B
Startup F.W. Block Valves	FW-V19A	FW-V19B
Main Steam Isolation Valves	MS-V4A	MS-V4B
	MS-V7A	MS-V7B

NOTE: Once the feedwater has been stopped to the affected OTSG, the affected OTSG will blow dry.

- 2.1.4 Pressurizer Heaters on.
- 2.1.5 Possible High Pressure Injection due to low R.C. Pressure of 1600 psig or 4 psig Reactor Building Pressure.
- 2.1.6 If rupture was inside Reactor Building, containment isolation will occur if building pressure exceeds 4 psi.
- 2.2 Manual Action
  - 2.2.1 Manually trip the reactor if not already tripped automatically.
  - 2.2.2 Verify the Turbine has tripped (Main throttle valves closed).
  - 2.2.3 Manually terminate letdown flow by closing MU-V376.
  - 2.2.4 Verify that the Feedwater Latching System has actuated (steam header pressure < 585 psig) and closed the appropriate feedwater and main steam isolation valves for the affected OTSG as listed in step 2.1.3 above.
  - 2.2.5 Determine which OTSG has suffered the rupture. If the leak is upstream of the MS Isolation Valves (MS-V4A & B and MS-V7A & B), the ruptured one will have low pressure (less than 885 psig) and low water level (less than 30"). If the leak is downstream of MS-V4A,B,7A, B, the pressure in both OTSG's



will return to normal as soon as the MS Isolation valves close.

- 2.2.6
  - 1. Open Block valves (FW-V17A(B) & 19A(B) on unaffected OTSG to re-establish FW flow.
  - 2. (Go to HAND on the Turbine Bypass Valves for the unaffected OTSG and maintain Turbine Header Pressure @ 1010 psig.)
  - 3. Go to manual on FW-V30 & 25's and runback demand to zero on affected OTSG.
- 2.2.7 If any of the following ICS stations are in Hand (Steam Generator/ Reactor Demand, either Feedwater Demand, Main or Startup Feedwater Valve Demand, Feedpump Speed, Reactor Master, and/or Diamond) runback the appropriate ICS stations.

### 3.0 FOLLOW-UP ACTIONS

- 3.1 Select header pressure for the unaffected OTSG to use for indication and control by depressing the TURBINE THROTTLE PRESSURE selector switch for the OTSG (SP-10-MS) on Panel 4.

CAUTION: Auxiliary operators should be warned that high pressure steam leaks can be extremely dangerous and that care should be taken when searching the various compartments for the steam leak.

- 3.2 If reactor building pressure is not increasing, the control room operator announces that a steam line break has occurred outside the reactor building and then dispatches auxiliary operators to the following locations with instructions to report break locations:

- 3.2.1 Control Building Area.

### 3.2.2 Turbine Building.

- 3.3 Depending on the break location, close the appropriate valves as indicated below to isolate the break.

<u>Break Location</u>	<u>Valves to Close</u>	
	<u>A OTSG</u>	<u>B OTSG</u>
Between turbine stop valves and steam isolation valves	MS-V4A and MS-V7A	MS-V4B and MSV7B
Atmospheric dump valve failure	MS-V1A <sup>(1)</sup>	MS-V1B <sup>(1)</sup>
Steam line to emergency feedwater pump	MS-V11A and MS-V11B	
Steam line to turbine bypass valves or to main feedwater pumps or turbine bypass valve failure	MS-V15A	MS-V15B
<sup>(1)</sup> Manually operated valve.		

- 3.4 If pressurizer level has fallen below 20 inches, reactor coolant system pressure continues to decrease below 1600 psig or flux is rising and the high pressure injection system has not automatically initiated, then "INITIATE" high pressure injection flow from the Borated Water Storage Tank by depressing the Emerg. Core Cooling Manual Actuation Pushbutton (PB1/RCA or PB1/RC3) for actuation A or B on Panel 3.
- 3.5 If Reactor Building pressure has increased to >4 psig as indicated on the control room Panel 3, verify that all E.S.F. equipment is in its E.S.F. position by observing that all equipment status lights indicate as shown in Table I.

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, and the component has a local control switch, attempt to actuate the component from its Local Control Station.

- 3.6 Initiate cooldown per 2102-3.2, "Unit Cooldown", using the unaffected OTSG with the following exception to 2102-3.2.
- 3.6.1 If affected OTSG is dry, the cooldown rate should be limited so that the maximum temperature difference between the shell temperature of the dry OTSG and the RC temperature in the loop with the dry OTSG is  $\leq 100^{\circ}\text{F}$  in order to avoid excessive tube and shell temperature differential.
- 3.6.2 FW valves closed per step 2.1.3 and/or 2.2.5 of this procedure remain closed.
- 3.6.3 Steam valves closed to isolate steam break per step 3.3 of this procedure remain closed.
- 3.7 Secure High Pressure Injection when pressurizer level is greater than 100" by defeating the SFAS signals and placing the make-up pump control switches to trip.
- NOTE: If pressurizer level drops below 20", manually initiate HP Injection.
- 3.8 Secure Building Spray Pumps if actuated provided there is no high radioactivity indicated on the reactor building radiation monitoring system HP-R-227 on Panel 12 in the Control Room.
- 3.9 When pressurizer level has been restored to  $>100"$ , run reactivity balance to determine shutdown margin by using 2103-1.9 Reactivity Balance Calculation.



TABLE 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

<u>SAFETY INJECTION GP. 1</u>	
<u>Equipment</u>	<u>ESF Position</u>
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
T1E-21E2	OPEN
DC-V96A	CLOSED

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

ACTUATION B

<u>SAFETY INJECTION GP. 1</u>	
<u>Equipment</u>	<u>ESF Position</u>
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

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

TABLE 1

<u>ACTUATION A</u>		<u>ACTUATION B</u>	
<u>SAFETY INJECTION GP. 3</u>		<u>SAFETY INJECTION GP. 3</u>	
<u>Equipment</u>	<u>ESF Position</u>	<u>Equipment</u>	<u>ESF Position</u>
MU-V36	CLOSED	MU-V37	CLOSED
MU-V16A	OPEN	NS-V32	CLOSED
MU-V16B	OPEN	NS-V67	CLOSED
OH-P-1A	ON	OH-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 8

<u>Equipment</u>	<u>ESF Position</u>	<u>Status Light Indicator</u>
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 (Green).

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.



TABLE 1

NOTE 3: The NR pump in each header 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 3 (depending upon which pump it is selected to backup) fails to start or is inoperable.

TABLE 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

<u>SAFETY INJECTION GP. 1</u>	
<u>Equipment</u>	<u>ESF Position</u>
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
OC-V96A	CLOSED

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

ACTUATION B

<u>SAFETY INJECTION GP. 1</u>	
<u>Equipment</u>	<u>ESF Position</u>
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
OC-V96B	CLOSED

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

TABLE 1

<u>ACTUATION A</u>		<u>ACTUATION B</u>	
<u>SAFETY INJECTION GP. 3</u>		<u>SAFETY INJECTION GP. 3</u>	
<u>Equipment</u>	<u>ESF Position</u>	<u>Equipment</u>	<u>ESF Position</u>
MU-V36	CLOSED	MU-V37	CLOSED
MU-V16A	OPEN	NS-V32	CLOSED
MU-V16B	OPEN	NS-V67	CLOSED
OH-P-1A	ON	OH-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
<u>R.B. ISOLATION AND COOLING GP. 1</u>		<u>R.B. ISOLATION AND COOLING GP. 1</u>	
<u>Equipment</u>	<u>Position</u>	<u>Equipment</u>	<u>Position</u>
AH-V81	CLOSED	AH-E-110	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
OH-V3	CLOSED	CF-V115	CLOSED
NM-V52	CLOSED	OH-V2	CLOSED
NR-V51A	CLOSED	NM-V104	CLOSED
RR-V2A	OPEN	NR-V51B	CLOSED
RR-V5A	OPEN	RR-V2C	OPEN
RR-V5B	OPEN	RR-V2D	OPEN



TABLE 1

<u>ACTUATION A</u>	
<u>R.B. ISOLATION &amp; COOLING GP. 1</u>	
<u>Equipment</u>	<u>Position</u>
RR-V5C	OPEN
SV-V55	CLOSED
WOL-V1095	CLOSED
OC-V114	CLOSED

<u>ACTUATION B</u>	
<u>R.B. ISOLATION &amp; COOLING GP. 1</u>	
<u>Equipment</u>	<u>Position</u>
RR-V6C	OPEN
RR-V6D	OPEN
RR-V6E	OPEN
SV-V54	CLOSED
WOL-V1092	CLOSED
OC-V103	CLOSED
OC-V115	CLOSED

<u>R.B. ISOLATION &amp; COOLING GP. 2</u>	
<u>Equipment</u>	<u>Position</u>
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-18	ON
WDG-V199	CLOSED
WOL-V22	CLOSED
WOL-V1125	CLOSED
AH-04092A & B	
AH-04092D & E	
ED-4098	

<u>R.B. ISOLATION &amp; COOLING GP. 2</u>	
<u>Equipment</u>	<u>Position</u>
AH-E-48	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-10	ON
WDG-V2	CLOSED
WOL-V1125	CLOSED
WOL-V271	CLOSED
AH-04092A & B	
AH-04092D & E	
ED-4098	

TABLE 1

2203-2.3  
Revision 3  
09/29/77

## ACTUATION A

## R.B. ISOLATION &amp; COOLING GP. 3

Equipment	Position
AH-C-8A	ON
AH-E-11B	ON
AH-P-1A	ON
AH-V1B	CLOSED
AH-V1A	CLOSED
AH-V4A	CLOSED
AH-V5	CLOSED
AH-V60	CLOSED
AH-V62	CLOSED
AH-V72	CLOSED
IC-V2	CLOSED
IC-V5	CLOSED
MU-V2A	CLOSED
MU-V2B	CLOSED
MU-V377	CLOSED
NS-V72	CLOSED
NS-V81	CLOSED
NR-P-2A	ON
NR-V144A	CLOSED
RR-P-1A	ON
RR-V25A	CLOSED
RR-V25B	CLOSED
IC-P-1A	OFF
AH-V48	CLOSED

\* 3S-P-1A ON

\* If RB Pressure &gt;30 psig.

## ACTUATION B

## R.B. ISOLATION &amp; COOLING GP. 3

Equipment	Position
AH-C-8B	ON
AH-V171	CLOSED
IC-P-1B	OFF
RR-V25D	CLOSED
RR-V25E	CLOSED
IC-V3	CLOSED
AH-E-11E	ON
IC-V4	CLOSED
AH-P-1B	ON
AH-V2A	CLOSED
MU-V376	CLOSED
AH-V2B	CLOSED
MU-V18	CLOSED
AH-V3A	CLOSED
MU-V25	CLOSED
AH-V3B	CLOSED
NS-V100	CLOSED
AH-V6	CLOSED
NR-P-2B	ON
AH-V61	CLOSED
NR-V144B	CLOSED
AH-V63	CLOSED
RR-P-1C	ON

\* 3S-P-1B ON

- NOTE 1:** Diesel Generator Breaker will only be closed if Normal Power is lost; otherwise status indication will be Open (Green).
- 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 header 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 8

<u>Equipment</u>	<u>ES Position</u>	<u>Indication</u>
OH-V7A (1)	Close	G
OH-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.



PANEL 15

<u>Equipment</u>	<u>ES Position</u>	<u>Indication</u>
OH-V6A <sup>(1)</sup>	Close	G
OH-V6B <sup>(1)</sup>	Close	G
MU-V37B <sup>(2)</sup>	Open	R
MS-V4A <sup>(3)</sup>	Open	R
MS-V4B <sup>(3)</sup>	Open	R
MS-7A <sup>(3)</sup>	Open	R
MS-V7B <sup>(3)</sup>	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

<u>Equipment</u>	<u>ES Position</u>	<u>Indication</u>
AH-E12A	Off	G
AH-E12B	Off	G
AH-E19A	Off	G
AH-E19B	Off	G