

U.S. DEPARTMENT OF JUSTICE  
FEDERAL BUREAU OF INVESTIGATION  
WASHINGTON, D.C. 20535

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CPU EXHIBIT 500 FOR IDENT.  
4/21/82 H. A. RUDOLPH

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RogersTHREE MILE ISLAND NUCLEAR STATION  
UNIT #1 EMERGENCY PROCEDURE 1202-6  
LOSS OF REACTOR COOLANT/REACTOR COOLANT PRESSURE

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Unit 1 Staff Recommends Approval

Approval [Signature] Date \_\_\_\_\_  
Cognizant Dept. Head

Unit 2 Staff Recommends Approval

Approval [Signature] Date \_\_\_\_\_  
Cognizant Dept. Head

Unit 1 PORC Recommends Approval

[Signature] Date 6-1-75  
Chairman of PORCPORC comments of \_\_\_\_\_ included  
(date)

By \_\_\_\_\_ Date \_\_\_\_\_

Unit 2 PORC Recommends Approval

[Signature] Date \_\_\_\_\_  
Chairman of PORCPORC comments of \_\_\_\_\_ included  
(date)

By \_\_\_\_\_ Date \_\_\_\_\_

Approval [Signature] Date 6-7-75  
Station Superintendent/  
Unit Superintendent

TMI 55-A 11-74

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## THREE MILE ISLAND NUCLEAR STATION UNIT 1

## EMERGENCY PROCEDURE 1202-6

## Loss of Reactor Coolant / R.C.S. Pressure

A. Leak or Rupture Within Capability of System Operation6.1 Symptoms

1. Initial loss of reactor coolant pressure & decrease in pressurizer level becoming stable after short period of time.
2. Possible reactor building high radiation and/or temp. alarm.
3. Possible reactor building sump high level alarm.
4. Make-up tank level 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 - RMA-2 particulate, iodine & Noble gas monitor alarm.
2. OTSG tube rupture - RMA-5 Noble gas monitor alarm.
3. Steam break inside Rx Bldg - low condensate storage tank level alarm - and or low hot well level alarm

6.2 Immediate ActionA. Automatic Action:

1. MU-V17 will open to compensate for reduced pressurized level.
2. Additional pressurizer heaters will come on to compensate for reduced reactor coolant pressure.

B. Manual Action

1. Verify MU-V17 open and pressurizer heaters on.

2. Close MJ-V3, letdown isolation valve, & start additional MJ pump (normally MJ-PIA)
3. Reduce load at 10%/minute & proceed with normal shutdown.
4. Line up a waste transfer pump to the "B" R. C. Bleed Tank & pump to the makeup tank to maintain required level.
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 hi pressure injection manually, & then close MJ-V12.

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### 6.3 Follow Up Action (Leak within system capability)

#### A. Hi Pressure Injection Not Initiated

1. Initiate plant shutdown & cooldown per OP-1102-10.

#### B. Hi Pressure Injection Manually Initiated

1. Verify that the makeup pumps & decay heat removal pumps start satisfactorily.
2. Bypass the E.S. signal, & throttle MJ-V16A/B/C/D as necessary to maintain 220" pressurizer level and not exceed 250 GPM/HPT flow leg.
3. When MJ pump flow drops below 80 GPM, as a result of throttling MJ-V16A/B/C/D open MJ-V36&37 to provide MJ pump recirculation path to MJ tank.

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NOTE: RCS Loop A MJ pump flow is the sum of MJ23 FE1&2. RCS Loop B MJ pump flow is the sum of MJ23 FE3&4.

4. Verify that the following E.S. equipment is in its E.S. position  
(on panel PCR)

Actuation A		Actuation B	
Status Light Description	(Left) Status Light Color	Status Light Description	(Right) Status Light Color
A. E.WST. SUP MU-V-14A	Blue	A. E.WST SUP MU-V14B	Blue
B. R.B. SUMP DE-V5A	Blue	B. R.B. SUMP DE-V6B	Blue
C. DH to MU DE-V7A	Blue	C. DH to MU DE-V7B	Blue
D. Diesel A Running	Blue	D. Diesel B. Running	Blue
E. Aux. Bldg. MCC A Bkr.	Blue	E. Aux. Bldg. MCC B Bkr.	Blue
F. Scrn. House MCC A Bkr.	Blue	F. Scrn. House MCC B Bkr.	Blue
G. LPI Line DE-V4A	Blue	G. LPI Line DE-V4B	Blue
H. E.WST SUP DE-V5A	Blue	H. E.WST SUP DE-V5B	Blue
I. R.B.C. Pump A ER-PIA	Blue	I. R.B.C. Pump B ER-PIB	Blue
J. REC PP REC ER-V10A	Amber	J. REC PP REC ER-V10B	Amber
K. RB Fan A AH-E1A	Blue	K. RB Fan B AH-E1B	Blue
L. RB Fan MTR NS-V52A	Blue	L. RB FN MTR NS-V52B	Blue
M. RB Fan MTR NS-V53A	Blue	M. RB FN MTR NS-V53B	Blue
N. DR Pump A DR-PIA	Blue	N. DR Pump B DR-PIB	Blue
O. DR PMP DIS DR-V1A	Blue	O. DR PMP DIS DR-V1B	Blue
P. NR PMP A/B NR-PIA/B	Blue	P. NR PMP B/C NR-PIB/C	Blue
Q. NR PMP DIS NR-V1A/B	Blue	Q. NR PMP DIS NR-V1B/C	Blue
R. D.C. Pump A DC-PIA	Blue	R. D.C. Pump B DC-PIB	Blue
S. NS PMP A/B NS-PIA/B	Blue	S. NS PMP B/C NS-PIB/C	Blue

T. NS Deicing NR-V4A	Blue	T. NS Deicing NR-V4B	Blue
U. Aux. BL Fan AH-E-15A	Blue	U. Aux. BL Fan AH-E-15B	Blue
V. SCR HS Fan AH-E-27A	Blue	V. SCR HS Fan AH-E-27B	Blue
W. H-P Recirc. MU-V36	Blue	W. H-P Recirc. MU-V37	Blue

Actuation A or B	(Center)
Status Light Description	Status Light Color
A. Non ESS. Dump NS-V32	Blue
B. KB Fan C AH-E1C	Blue
C. RB FN MTR NS-V52C	Blue
D. RB FN MTR NS-V53C	Blue

5. Upon a Borated Water Storage Tank-Lo-Lo alarm of 36", shift suction of Hi pressure injection from the Borated Water Storage Tank to the Reactor Building Sump by opening DH-V7A & 7B, DH-V6A & 6B and closing DH-V5A and 5B. Injection flow path is now as follows: Spilled coolant to R.B. sump, R.B. sump to LPI pumps, LPI pumps to MU pumps, MU pumps to RCS via MU-V 16A,B,C,D.

NOTE: Trip reactor coolant pumps before R.C. press. decreases below pump NPSH. (300 psig)

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6. After R.C.S. pressure decreases to  $\approx$  200 psig, throttle HPI discharge flow by throttling MJ-V16A/B/C/D. Observe that LPI pumps now deliver water to RCS via DH-V4A/B.
  7. When MJ-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.
  8. Throttle DH-V4A & 4B as required to maintain 220" pressurizer level and max. LPI pump flow of  $<$  3500 gpm. & when time permits, throttle manual valves DH-V19A & 19B and reopen DH-V4A & 4B. Within about 24 hours, establish a long-term cooling circulation mode as described in OP #1104-4 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.
  9. Evaluate radiation levels & initiate action for Site Emergency as outlined in the TMI radiation emergency plan.
- C. Reactor Building Isolation Initiated
1. Refer to section 6.2 & complete all steps.

B. Leak or rupture of Significant Size Such That Hi Pressure Injection Is Automatically Initiated

6.1 Symptoms

1. Rapid continuing decrease of reactor coolant pressure.
  - (A) L<sub>1</sub> alarm 2055 psig
  - (B) L<sub>1</sub>-L<sub>2</sub> alarm 1600 psig (computer)
  - (C) E<sub>1</sub> actuation alarm 1500 psig
2. Rapid continuing decrease of pressurizer level.
  - (A) L<sub>1</sub> alarm 200"
  - (B) L<sub>1</sub>-L<sub>2</sub> alarm 80" (Interlock heater shutoff)
3. HI radiation alarm in reactor building.
4. Reactor building Ambient Temp. Recorder indicating above normal.  
(50°F - 150°F Range)
5. HI reactor building sump level.
6. HI reactor building pressure (R.C.S. or main steam line rupture.)
7. Rapidly decreasing make-up tank level.
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. - RMA2 particulate, iodine & Noble gas monitor alarm.
2. OTSG tube rupture - RMA5 Noble gas monitor alarm.
3. Steam break inside Rx Bldg. - low condensate storage tank level alarm - and/or low hot well level alarm.

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6.2 Immediate actionA. Automatic Action

1. Reactor trip 1800 psig
2. Turbine trip
3. H1 pressure & low pressure injection initiated @ 1500 psig, 500 psig R.C.S. pressure or 4 psig reactor building pressure.
4. Both core flood tank levels & pressures may decrease depending upon rupture size and R.C.S. pressure. ( $\leq 600$  psig)
5. Reactor building isolation & emergency cooling initiated. (R.B. press.  $\geq 4$  psig)
6. Reactor building pressure recorder transfer to wide range transmitter.
7. Reactor building spray if  $\leq 30$  psig.

B. Manual Action

1. Close MU-V12 (stop valve on discharge line from makeup tank).
2. Verify H1 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.
3. Trip reactor coolant pumps before reaching 300 psig & verify reactor building cooling and isolation is operating properly.

6.3 Follow Up Action (Large Break - EPI auto initiated)

1. Verify that all E.S. equipment is in its E.S. position, by observing that all equipment status lights indicate blue with the following exceptions:

(On panel PCR top center)

- a. BKR-G1-02
- b. BKR-G11-02
- c. STM GN A MS-V1A
- d. STM GN A MS-V1B
- e. STM GN B MS-V1C
- f. STM GN B MS-V1D
- g. C.F. Tank A CF-V1A
- h. C.F. Tank B CF-V1B
- \*i. RBS Pump A BS-P1A
- \*j. RBS Pump B BS-P1B
- k. MU-V20

\*Pump starts when RB pressure  $\geq$  30 psig. RBS pumps discharge valves BS-V1A/B open at RB pressure of 4 psig.

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 "69" bypass switch, place switch from "normal" to "bypass" & again attempt to start.

- 2. Notify Shift Foreman, who notifies all Station personnel over the cross-tied PA system that an apparent major accident has occurred.
- 3. 0 to 20 or 30 minutes past LOCA: Control Room duty operator continuously monitors the following:
  - a. Liquid levels in the: (1) Borated Water Storage Tank  
(DH-T1) DR-3-LI 1/2

(2) Sodium Thiosulfate Tank  
(BS-T1) BS-3-LI

(3) Sodium Hydroxide Tank  
(BS-T2) BS-5-LI

b. Safeguards injection flow rate in each of the:

(1) Two low pressure (Decay Heat) injection lines.

(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 1 and 2

(4) Three (each) reactor building emergency cooling water inlet and outlet lines NS-20, 21 and 22-FI and NS-23, 24 and 25-FI, respectively.

c. Reactor Building environmental indications:

(1) Sump liquid level

(2) Temperature

(3) Pressure

4. Defeat any two channels of reactor building isolation, then bypass all three Hi pressure and low pressure injection channels.

5. Throttle as required to prevent pump runoff:

a. Hi press. inj. flow (MU-V16A/B/C/D)

0-250 GPM/LEG

CAUTION: When MU pump flow drops below 80GPM as a result of throttle MU-V16A/B/C/D, open MU-V36337 to provide MU pump recirculation path to PU tank.

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NOTE: With MJ-V12 closed & make up pumps recirculating thru MJ-35337, eventually the make up tank relief valve will lift, but the make up system will not be over pressurized.

- b. Lo Press. Inj. Flow (DH-V4A/B) 2800-3500 GPM/DW
- c. Building spray flow (BS-V1A/B). 1500-1800 GPM/DW

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

CAUTION: Should flow in either decay heat line decrease and remain below 1500 GPM, complete step #6 below, if not proceed to step #7.

6. If there is less than 1500 gpm flow in one of the Decay Heat (DR) injection lines, verify DH-V4A/B console position indication lights show valves are open.
7. If DH-VA/B are open and flow is less than 1500 gpm in one of the Decay Heat Injection Lines, proceed as follows:
  - a. Obtain the administrative keys for the DH cross-connect isolation valves (DH-V387 and DH-V388) and the DH injection manual flow control valves (DH-V19A and DH-V19B) from the shift supervisor.
  - b. Proceed from the control room to the north end of the auxiliary building at elevation 281'-0".
  - c. Run a quick radiation survey for any high radiation "beams" in the working area.
  - d. Remove the administrative locks from the isolation valves in the DH cross-connect line and the DH injection manual flow control valves.

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L. F.

- e. Open the DH cross-connection isolation valve (e.g. DH-V-38A) next to the line having the higher flow rate as rapidly as possible and then to crack open the second cross-connect isolation valve (e.g. DH-V-38B).
  - f. Open the second isolation valve which was just cracked in step e above in the DH cross-connect line.
  - g. While opening the second decay heat cross-connect isolation valve, throttle either DH-V19A or DH-V19B as required to achieve essentially equal flow rates in both D.H. injection lines.
8. Upon receiving a B.W.S.T. Lo-Lo level alarm @ 36":
- a. If reactor coolant system is above 200 psig:
    - 1. Open DH-V6A and 6B, 7A and 7B.
    - 2. Close DH-V5A and 5B.
    - 3. When the Sodium Hydroxide Tank reaches low level, close BS-V2A and 2B.
    - 4. When the pressure decreases below 200 psig, trip the make up pumps and close MU-V16A/B/C/D, MU-V-14A/B, and DH-V7A/B.
  - b. If reactor coolant system is below 200 psig:
    - 1. Open DH-V6A and 6B.
    - 2. Close DH-V5A and 5B and BS-V2A and 2B.
    - 3. Trip make up pumps and close : V-14A and 14B, and MU-V 16A/B/C/ & D.
9. If building spray pumps operate, when the Sodium Thiosulfate Tank reaches low level, close ES-V4A & 4B. If building spray pumps did not operate, (less than 30 psig R.B. pressure) when R.B. pressure decreases to below 4 psig, close ES-V4A & 4B.

10. When time permits, throttle manual valves DM-V19A and 19B and reopen DM-V14A and 4B. Within 24 hours, establish one of the long-term cooling circulation modes described in OP #1104-4 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.

#### 6.4 Long Term Action

1. Verify all previous actions and carry out additional actions as outlined below.
2. Evaluate symptoms and determine if possible the cause of the loss of coolant.
3. Secure turbine, feed water, and steam systems when time permits.
4. When the reactor building pressure is reduced to = atmospheric, monitor for H<sub>2</sub> buildup and purge per EP-1202-28.
5. Monitor R.B. Sump for Ph and add Sodium Hydroxide as required thru the decay heat removal system.
6. As conditions permit, evaluate plant 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:

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- a. Radiation emergency plan site emergency in the emergency plan.
- b. OP-1104-21 - Penetration Pressurization
- c. OP-1104-20 - Fluid Block
- d. OP-1104-19 - Control Room Tower Ventilation.



CCO Comment Resolution

Procedure Number 1202-6  
Procedure Title Loss R.C. / R.C.B. Procedure  
Reviewing Organization SW  
Comment Letter Date 2-25-76  
Comments Resolved (Date) 7-13-76

OP Para	Comment Summary	Comment Incorporated Yes/No	Remarks
A.6.2.B.2	Include notify shift foreman	Yes	Deleted from immediate action.
A.6.2.B.3	Close MJ-V-25 - Start Ind MJ Pump.	Yes	
A.6.3.B.2	1. ES Should not be by-passed when high pressure injection begins.	No	By-passing HPI gives operator means of controlling R water inventory and throttling HF/LP pump to maintain flow rates.
A.6.3.B.2	2. HPI run at full capacity when initiated.	Yes	Open recirculation on HPI pumps when approach min flow.
A.6.3.B.2	3. Shutdown HPI pump vice, open recirculating line.	No	From safety stand point, maintain small injection thru 2 lines vice high injection thru 2 lines.
A.6.3.B.5	1. Don't operate decay heat system when RCS pressure is greater than 2000.	No	Steps 33.4.5 and 6 clarify to indicate use of LPI pump in booster pump mode when RCS pressure is greater than 2000.
A.6.3.B.5	2. Decay Heat Pump not to exceed 3500 G.P.M.	Yes	Added precaution to A.6.3.7.

cc: Messrs. J. J. Colitz  
K. A. Greene  
Reviewing Organization ✓

GOE Comment Resolution

Procedure Number 1202-6  
 Procedure Title Loss R.C./R.P.S. Pressure  
 Reviewing Organization ESW  
 Comment Letter Date 2-26-74  
 Comments Resolved (Date) 3-13-74

OP Para	Comment Summary	Comment Incorporated Yes/No	Remarks
A.6.2.B.1	Note that BS-V-1A/B spray pump discharge valves open at 4#.	Yes	Added precaution to A.6.3.7.
B.6.2.B.2	Shift foreman notification & announcement of emergency to be accomplished after HPI flow verification.	Yes	Included in step 2 follow up action.
B.6.3.2.	Don't defeat ES (4# reactor building signal)	No	By-passing reactor building signal is necessary to throttle HP/LP discharge valves. To maintain HP-LP pump allowable flow rates.
B.6.3.3.A	Don't open HPI recirculation valves. Stop 2nd make-up pump in event HPI flow is low due to throttling HPI discharge valves.	No	From safety stand point, maintain small injection thru 4 lines with recirc. flow vice HPI flow thru only 2 lines. NOTE: However that procedure has been changed to specify recirc. valves are only opened when minimum flow is 30 GPM per HPI pump is being approached.

cc: Messrs. J. J. Colitz  
 E. A. Greene  
 Reviewing Organization ✓

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GCRB Comment Resolution

Procedure Number 1202-6  
 Procedure Title Loss R.C./R.C.S. Pressure  
 Reviewing Organization BAW  
 Comment Letter Date 2-26-74  
 Comments Resolved (Date) 3-13-74

OP Para	Comment Summary	Comment Incorporated Yes/No	Remarks
B.6.3.3.C	Failure of LPI pump will cause zero LPI flow indication. Not 1500 GPM.	Yes	Deleted reference to diesel & decay heat pump failure & added step to op decay heat cross connect & LPI flow drops to less than 1500 GPM.

cc: Messrs. J. J. Colitz  
 K. A. Greene  
 Reviewing Organization ✓

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THE BASCOCK & WILCOX COMPANY  
POWER GENERATION GROUP

ENCLOSURE

FEB 26 1974

RECEIVED

To

✓ J. D. PHINNEY - SITE OPERATIONS MANAGER - TMI

From

G. C. SCHIECK - TEST PROGRAM SUPERVISOR (2456)

BOS 663.5

Cust.

NET ED

File No. MSS-5  
or Ref. 12K

Subj.

REVIEW OF TMI-1 PROCEDURES

Date

FEBRUARY 20, 1974

This letter is for the customer and should not be returned.

Enclosed are the following TMI-1 procedures which have been reviewed by Nuclear Service.

- EP 1202 06 Loss of RC/RCS Pressure
- OP 1102 01 Plant Heatup to 525°F
- EP 1202 02 Station Blackout & Blackout With Loss of Both Diesel Generators
- OP 1103 02 Fill and Vent of RC System
- OP 1105 11 Secondary Plant and Auxiliary Systems - TMI
- OP 1104 30 Nuclear Service River Water System
- OP 1105 02 Reactor Protection System
- OP 1106 14 Main Steam System
- EP 1202 29 Pressurizer System Failure
- OP 1105 09 Control Rod Drive System
- OP 1103 11 Draining and N<sub>2</sub> Blanketing of RC System
- OP 1102 02 Plant Startup

These have been reviewed for interaction with B&W supplied equipment and systems. Comments relative to system protection or preferred method of operation have been included. No comments concerning format, grammar, superfluous information or convenience have been made. These reviews reflect current operating philosophy and requirements, but of course, not any conversations or information passed informally between B&W site personnel and the customer. Where applicable, compliance with B&W draft procedures has been verified.

*Chris Schick*

GCS/hh

Enclosures

cc: R. R. Beach  
K. E. Suhrke  
W. S. Delicate

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Comments on Emergency Procedure 1202-6, Loss of RC/PC Pressure

Three Mile Island - Unit 1

A.6.2.B.2 - Immediate action should probably not include notification of the shift foreman. This should be done as one of the first followup action items.

A.6.2.B.3 - Also close seal return isolation valve, MU-V25. MU-PIA is not necessarily the pump which will be started at this time, this depends on pump configuration prior to loss of RC coolant.

A.6.2.B.2 - ES should not be bypassed when HPI is begun. HPI should be run at full capacity when initiated. If leak is within capacity of HPI, the valves MU-V16A/B/C/D may then be throttled to maintain pressurizer level. If the HPI required is low enough, a pump may be shut down rather than opening recirculation lines.

A.6.3.B.5 - With the exception of using the decay heat system to supply the makeup system, the decay heat system should not be placed in operation above 200 psig. This protection of the system is further insured by DH letdown line (DH-V1,V2) interlock which will prevent opening of these valves above LH system design pressure limits. An additional precaution that individual DH pumps shall not exceed 3500 gpm, this is the high flow alarm setpoint.

B.6.2.B.1 - It should be noted here that in addition to starting RB spray pumps on 230 psig RB press., A separate ES command opens valves BS-V1A/B to initiate spray. This is an important consideration if RB spray must be manually actuated.

B.6.2.B.2 - Notification of the shift foreman should be deferred until more important immediate items (like verification of RP injection operation) have been completed.

B.6.3.2 - ES should not be defeated while an emergency condition exists, this should be made clearer as to conditions existing when this step is performed.

B.6.3.3A - By opening MU-V36, MU-V37 95 gpm per pump is recirculated. By checking that required minimum flow for pumps is maintained, this recirculation is not needed unless flow is too low. However, a pump will be shut down prior to this so there should be no need to recirculate.

B.6.3.3C - Since decay heat crossover is located downstream from flow indication, the flow will not decrease to 1500 gpm with the loss of one diesel and the associated decay heat pump. The flow indication associated with this pump will go to zero flow. Section B6.3.4 will need to be changed to reflect this fact.

Comments by

Jim R. Albert  
of Babcock & Wilcox Nuclear Service

Date: February 20, 1974

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