(39)

EP 1202.01

Davis-Besse Nuclear Power Station

Unit No. 1

Emergency Procedure EP 1202.01

RPS, SFAS, SFRCS TRIP or SG TUBE RUPTURE

NUCLEAR SAFETY RELATED

INFORMATION COPY

Record of Approval and Changes

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Revision No.	SRB Recommendation	Date	QA Approved	Date	Plant Manager Approval	Date
1	[signature]	DEC 12 1984	NA		[signature]	12/21/84
2	[signature]	MAY 1 1985	NA		[signature]	5/21/85

1. SYMPTOMS

This procedure will be implemented anytime one of the six below listed conditions exist alone or in combination with the others and recognizes the fact the Safety Features Actuation System (SFAS) or Steam and Feedwater Rupture Control System (SFRCS) may trip with the plant initially in Mode 3 or less. In case of annunciator alarm failure, the procedure may have to be implemented solely on the plant response.

1.1 Reactor trip (also denotes a trip condition exists whether or not an automatic trip has occurred)

1. Alarm: The following annunciator

   CRD TRIP CONFIRM (8-1-1)

   AND

2. Plant Response: NI's indicate a rapid decrease in neutron flux level

OR

1.2 SFAS trip (except Incident Level 1 on CTMT RAD TRIP (5-6-1)

1. Alarms: Any one or more of the following annunciators

   SFAS CTMT PRESS > 18.4 PSIA TRIP (5-6-2)

   OR

   SFAS RC PRESS < 1650 PSIG TRIP (5-6-3)

   OR

   SFAS RC PRESS < 450 PSIG TRIP (5-6-4)

   OR

   SFAS CTMT PRESS > 38.4 PSIA TRIP (5-6-5)

   AND

2. Plant Response: Plant response indicates a full trip of SFAS actuation Channel 1 AND/OR 2, on any Incident Level(s) except for CTMT RAD TRIP of Incident Level 1.

<u>OR</u>

1.3 SFRCS trip

1. Alarm: The following annunciator

   SFRCS FULL TRIP (8-6-1)

   <u>AND</u>

2. Plant Response: Plant response indicates a full trip of SFRCS actuation Channel 1 <u>AND/OR</u> 2.

<u>OR</u>

1.4 SG tube rupture larger than the MU capacity exists.

1. Alarm: One or more of the following annunciators:

   <u>NOTE:</u> Main Steam Line RAD monitors will <u>NOT</u> respond in analyze mode with reactor shutdown.

   VACM SYS DISCH RAD HI (9-5-1)
   MN STM LINE 1 RAD HI (12-6-3)
   MN STM LINE 2 RAD HI (12-6-4)

   <u>AND</u>

2. Plant Response: Pressurizer level still decreasing with maximum makeup flow and letdown isolated.

<u>OR</u>

1.5 In the judgment of the operator(s), plant conditions indicate this procedure should be implemented, for example:

1. Manual reactor trip is required

2. During plant heatup or cooldown with SFAS low reactor coolant pressure trips bypassed, SFAS actuation is required.

<u>OR</u>

..6 Another procedure directs implementation of this procedure.

2. AUTOMATIC ACTIONS

2.1 Reactor trip

1. All control rods (except Group 8) drop to the bottom, individual and group in-limit lights come on.

2. Main turbine trips and all turbine MSVs, CVs, IVs, and ISVs close.

3. Turbine bypass valve setpoint transfers from 870 psig at selected header pressure to 1015 psig at individual steam generator (SG) pressure.

4. Rapid Feedwater Reduction (RFR) Control actuates to increase main feed pumps (MFPs) to target speed and target positions the main feedwater control valves and startup feedwater control valves. After 2½ minutes or when SG level decreases to low level limits, the Integrated Control System (ICS) will control MFP speed and startup feedwater control valve to maintain SGs on low level limits.

5. If the main generator was initially synchronized to the switchyard and supplying housepower via station auxiliary transformer HX11, one of the following two sequences will occur:

   1) For a generator trip the generator breakers ACB34560 and ACB34561 and the generator field circuit breaker will immediately trip. 13.8 KV buses A and B will fast dead transfer to the startup transformers HX01 or HX02 per the reserve source selector switch settings.

   OR

   2) For a turbine trip the generator breakers ACB34560 and ACB34561 and the generator field circuit breaker will trip when the generator anti-motoring timer times out (30 seconds) after the turbine trip. 13.8 KV buses A and B will fast dead transfer to the startup transformers HX01 and HX02 per the reserve source selector switch settings.

2.2 SFAS trip

1. Equipment is actuated by Incident Level, dependent on the trip parameter (detailed list on Table 2, Tables Tab).

2.3 SFRCS trip

1. Equipment is actuated dependent on the trip parameter (detailed list on Table 1, Tables Tab).

3. <u>IMMEDIATE OPERATOR ACTION</u>

ACTIONS

3.1 <u>If</u> a SG tube rupture has occurred <u>AND</u> the reactor has <u>NOT</u> tripped, go to SGTR Section 8.

<u>IF THE RX HAS TRIPPED</u>

Continue with Step 3.2.

3.2 Manually trip the reactor

<u>AND</u>

Verify rods respond to the trip

<u>IF NOT</u>

Shutdown the reactor by any available means. Do <u>NOT</u> proceed in this procedure until the reactor is shutdown.

3.3 Manually trip the turbine.

3.4 Isolate letdown.

3. IMMEDIATE OPERATOR ACTION

DETAILS

3.2 Use either manual reactor trip pushbutton. If the control rods fail to de-energize in response to the RPS trip and the manual trip, perform the steps below in parallel.

3.2.1 Attempt to maintain primary to secondary heat transfer balanced.

1. If MFW has run back below reactor power, manually control MFW to match reactor power.

2. If MFW is lost, initiate AFW by tripping SFRCS on low SG level.

3.2.2 Attempt to manually de-energize the CRDs in the order listed below:

1. Momentarily de-energize 480 volt unit subs E2 and F2 simultaneously.

2. Manually trip the three reactor trip breakers in the low voltage switchgear rooms.

3. Manually de-energize the CRD System by tripping BE211 on E2 AND BF211 on F2.

3.2.3 Attempt to manually shutdown the reactor

1. Manually drive control rods in

2. Begin emergency boration by shifting MU pump suction to the BWST, initiate maximum MU and letdown, shift the letdown 3-way valve to the CWRT.

3.3 Use the EHC EMERGENCY TRIP SYSTEM trip pushbutton.

3.4 If power is available to E11B, isolate letdown with MU2B, letdown isolation valve

OR

If power is NOT available to E11B, isolate letdown with MU3, letdown line stop valve.

4. SUPPLEMENTARY ACTIONS

ACTIONS

4.1 ELECTRICAL POWER

4.1.1 Verify A AND B buses shift to startup transformers AND voltage is indicated on AC distribution buses and go to 4.2.

IF NOT

CAUTION 4.1.2: If a Diesel Generator (DG) fails to auto start, do NOT re-energize a 4160 volt bus with a makeup pump breaker closed and MU-19, Seal Injection Controller, in AUTO as damage to the Reactor Coolant Pump (RCP) seals could occur.

4.1.2 Start OR verify auto start AND load(ing) of DG(s) to unpowered essential bus(es) and go to 4.2.

OR

4. SUPPLEMENTARY ACTIONS

DETAILS

4.1 ELECTRICAL POWER

4.1.1 On generator faults the transfer will be immediate.

On turbine trips the transfer will occur on generator anti-motoring timer action, 30 seconds after the turbine trip.

Normally, A bus will transfer to 01 transformer by the closing of HX01A AND opening of HX11A. B bus will transfer to 02 transformer by the closing of HX02B AND opening of HX11B. The actual final lineup is dependent on startup transformer availability and reserve source selector switch lineup. The generator field circuit breaker will also trip open. Verification of bus voltage and continuation in the procedure prior to the 30 second transfer is allowed, however, reverifications after the transfer will be required.

4.1.2

Auto started, non SA

1. DG starts, output breaker closes to bus.
   1) DG 1, AC101 closes to C1
   2) DG 2, AD101 closed to D1
2. Bus Loading
   1) E1 and F1 re-energize
   2) Previously running component cooling water (CCW) pump restarts
   3) Previously running makeup (MU) pump restarts
   4) Previously non-running CCW pump starts about 40 seconds after DG output breaker closes
   5) Service Water (SW) Pump(s) start about 40 seconds after DG output breaker(s) closes
   6) Instrument Air Compressor starts when instrument air header pressure decreases to 95 psig. If the Instrument Air Compressor will not start or has no power, dispatch an operator to start the diesel air compressor.

ACTIONS

4.1.3 If NEITHER DG can be started AND BOTH C1 and D1 are de-energized,

THEN

Go to AB 1203.28, Loss of AC Bus Power Sources, until an AC power source is regained to C1 OR D1

DETAILS

Failed to auto start, non-SA

Start the DG and re-energize the 4160 volt bus with the following sequence for each bus that didn't auto start.

1. If closed, TRIP the MU pump breaker OR close MU19.

2. Press DG start button.

3. Adjust/verify DG frequency is 60 Hz and output voltage 4100 to 4300 volts.

NOTE Substep 3: If DG fails to reach rated speed and voltage at this point, dispatch an operator to attempt to start and load the DG locally per SP 1107.11.

4. Place DG 1 (2) SYNC switch in the DG BKR to C1 (D1) position.

5. Close AC101 (AD101) and verify C1 (D1) bus voltage matches DG voltage.

CAUTION Substep 5: If DG output breaker will NOT close due to a C1 (D1) bus lockout, overheating damage may occur to the engine if left running without cooling water.

6. Turn DG 1 (2) SYNC switch OFF.

Load or verify auto loading of C1 (D1) as follows:

1. E1 (F1) re-energized

2. Start one CCW pump per loop

3. Start one SW pump per loop

4. Verify Instrument Air Compressor starts when instrument air header pressure decreases to 95 psig. If the Instrument Air Compressor will not start, dispatch an operator to start the diesel air compressor.

4.1.3

AB 1203.28 will direct actions for plant stabilization. When an AC power source is regained to C1 or D1, return to this procedure at Step 4.1.2.

ACTIONS

4.2 INSTRUMENT AIR

4.2.1 Verify an air compressor is running to supply the instrument air header AND instrument air header pressure > 75 PSIG and go to 4.3.

IF NOT

4.2.2 IF instrument air header pressure < 75 PSIG OR pressure loss is imminent because no compressor is immediately available,

THEN

Manually actuate SFRCS on low SG level

AND

Have an operator hand jack open CC1460, MU pump header isolation and go to 4.3.

4.3 NNI POWER

4.3.1 Verify all four NNI power sources are energized and go to 4.4.

IF NOT

4.3.2 For loss of X AC OR DC, perform 4.3.3.

For loss of Y AC OR DC, perform 4.3.4.

DETAILS

4.2 INSTRUMENT AIR

4.2.1

Instrument air header pressure is indicated in the Control Room on PI810. Air compressor status will be known from pretrip plant status and previous actions.

4.2.2

This step assumes if the cause of the reactor trip was the loss of instrument air, the steps to regain a compressor were already underway prior to the trip. If the loss of compressors is a result of loss of offsite power and a failure of a D-G to start, step 4.1 directed start of the diesel air compressor. At this point, if the instrument air header pressure is still > 75 psig, the operator will know if a compressor is immediately available or if the SFRCS must be manually actuated.

CC1460, MU pump header isolation, is in CCW Pump Room, on a 1½" line directly above door 332.

4.3 NNI POWER

NNI power source indicating lights are "ON" for all four power sources

Y side	X side
AC <u>AND</u> DC	AC <u>AND</u> DC

ACTIONS

4.3.3 For loss of X AC OR DC

1. Manually actuate SFRCS on low SG level

2. Use essential powered indicators

3. IF loss of NNI X AC only, transfer pressurizer level AND temperature to Y

   AND

   Transfer MU tank level to Y and go to 4.4.

4. ADDITIONALLY IF loss of NNI X DC

   1) Manually control pressurizer heaters to maintain RCS pressure consistent for plant conditions.

   2) Turn off all pressurizer heaters if uncompensated level is below 50".

   3) Monitor MU tank level on Y powered indicator AND transfer MU pump suction to the BWST if MU tank level decreases to 10".

4.3.4 For loss of Y AC OR DC

1. Use essential AND X powered indicators

2. Transfer BOTH SG pressure selectors to X power

3. Transfer loop 2 FW valve ΔP to X power

4. Continue with 4.4.

DETAILS

4.3.3

1. Manually trip SFRCS on low SG level using BOTH SG LVL TRIP buttons.

2. Panel indicators marked with black dots and the T-SAT indicators are essential powered.

3. With initial switch lineup on X indicators, loss of X AC OR DC will cause loss of the pressurizer low level heater interlock and the MU tank low level transfer interlock. If the power loss is to X AC only, the interlocks can be regained by transferring pressurizer level AND temperature selector switches to Y and transferring MU tank level to Y. Pressurizer level and MU tank level recorders will not have power but the interlocks will work.

4. On a power loss to X DC manual control of pressurizer heaters will be required. The SCR heaters will not function at all. Operation of heaters below an uncompensated level of 50 inches may result in operation with the heaters uncovered. The MU pump suction valve, MU3971, must be manually transferred to the BWST at 10" on the Y powered MU tank level indicator since the low level interlock will be lost.

4.3.4

1. Panel indicators marked with black dots and the T-SAT indicators are essential powered.

2. This will transfer X powered signals into the ICS for TBV/AVV pressure control.

3. Transfers X powered signal into ICS for MFP speed control from loop 2.

ACTIONS

4.4 ICS POWER

4.4.1 Verify ICS AC AND DC power sources are energized and go to 4.5.

IF NOT

4.4.2 Manually actuate SFRCS on low SG level

4.5 MAKEUP

4.5.1 If one MU pump is running, go to 4.5.3.

OR

4.5.2 If neither MU pump is running, go to 4.5.4.

4.5.3

1. Start the second MU pump.

2. Verify MU flow is increasing and go to 4.6.

   IF NOT INCREASING

   Continue with Step 3.

DETAILS

4.4 ICS POWER

4.4.1

1. Loss of ICS DC indicated by annunciator alarm ICS 24 VDC BUS TRIP (14-1-2.)

2. Loss of ICS AC indicated by annunciator alarm ICS/NNI 118 VAC PWR SUPPLY TRBL (14-2-3.)

WITHOUT

Loss of NNI AC power from NNI power indicating lights.

4.4.2 Manually trip SFRCS on low SG level using BOTH SG LVL TRIP buttons.

4.5 MAKEUP

4.5.3

1. Start MU pump with the following sequence:

   1) Start the AC oil pump (DC oil pump will auto start, run momentarily and stop).

   2) Verify auxiliary gear oil pump auto starts.

   3) Start the MU pump.

2. Increased MU flow is indicated by an increasing demand on MU32, MU control valve, and increased MU flow indication. If necessary, MU32 H/A station can be placed in HAND and flow increased manually.

ACTIONS

3. If NNI X AC OR DC is lost

   AND

   Instrument air pressure is > 65 PSIG

   THEN

   Have an operator locally increase MU flow as necessary using MU211, the MU32 bypass valve and go to 4.6.

4.5.4 IF NNI X AC OR DC is lost

AND

Instrument air pressure is < 20 PSIG

THEN

Go to Step 5, otherwise continue.

1. Close MU19, seal injection controller.

2. Start BOTH MU pumps if possible.

3. Slowly re-establish seal injection and return MU19, seal injection controller, to AUTO while continuing.

4. Verify MU flow is increasing and go to 4.6.

5. Start BOTH MU pumps if possible.

DETAILS

3. MU32 will fail as is on loss of NNI X AC and will fail half open on loss of NNI X DC. If instrument air header pressure is < 65 PSIG, the Auxiliary Building header will be isolated and MU32 will fail open even if NNI X AC or DC has been lost. However, since it only takes 21 PSIG air pressure to hold MU32 closed, if increased MU flow cannot be verified, it may be necessary to open MU211, the MU32 bypass valve to increase MU flow to help recover pressurizer level.

4.5.4

1. Place MU19 H/A station in HAND and run the demand to zero.

2. Perform 4.5.3.1 MU pump start sequence.

3. Increase total seal injection flow with MU19, seal injection controller, in 5 gpm increments back to the normal setpoint over a 2 minute period.

4. Increased MU flow is indicated by an increasing demand on MU32, MU control valve, and increased MU flow indication. If necessary, MU32 H/A station can be placed in HAND and flow increased manually.

5. Perform 4.5.3.1 MU pump start sequence. MU19 will be inoperable on loss of NNI X AC or DC or when instrument air header pressure is < 20 PSIG. The MU pumps will have to be started with MU19 as is. MU19 air supply is from the penetration room air header, which does not have a low pressure cut-off valve.

ACTIONS

6. Verify MU flow is increasing

IF NOT

Have an operator locally increase MU flow as necessary using MU211, the MU32 bypass valve and go to 4.6.

4.6 REACTOR SHUTDOWN

4.6.1 Verify all (except APSRs) rods on bottom

AND

Reactor power decreasing on intermediate range and go to 4.7.

IF NOT

4.6.2 Begin RCS boration to a boron value:

1. To assure 1% ΔK/K shutdown margin per SP 1103.15, if one rod failed to insert.

OR

2. ≥1800 ppmB if more than one rod failed to insert.

4.7 TURBINE TRIP

4.7.1 Verify all main turbine stop valves OR control valves are closed and go to 4.8.

IF NOT

4.7.2 Manually trip SFRCS on low SG level and go to 4.9.

DETAILS

6. If instrument air pressure < 65 PSIG, MU32 will fail open allowing increased MU flow even if NNI X AC or DC is also lost. If instrument air pressure > 65 PSIG, MU32 will fail as is on loss of NNI X AC and will fail half open on loss of NNI X DC. MU211, MU32 bypass valve, can be locally throttled to increase MU flow to help recover pressurizer level.

4.6 REACTOR SHUTDOWN

4.6.1 Individual rod zero percent lites "ON" on CRD PI panel.

4.6.2 RCS can be borated by:

1. Shift MU pump suction to the BWST by closing MU3971, MU pump suction 3-way valve

<u>OR</u>

2. Boric acid additions to the MU tank per SP 1103.04.

4.7 TURBINE TRIP

4.7.1 Zero percent valve position indicated on EHC Panel 1 for the following valves:

MSV-1	CV-1
MSV-2	CV-2
MSV-3	CV-3
MSV-4	CV-4

4.7.2 Manually trip SFRCS on low SG level using <u>BOTH</u> SG LVL TRIP buttons.

ACTIONS

4.8 CONDENSATE AND FEEDWATER RESPONSE

2 4.8.1 Stop all but one of the running Condensate Pumps as Condensate System flow allows.

4.8.2 IF SFRCS isolation has occurred, go to 4.9, otherwise continue

4.8.3 Verify proper OR manually control MFW system response for RFR OR low level limit control on BOTH SGs and go to 4.9.

IF AUTO OR MANUAL CONTROL IS NOT PROPER

DETAILS

4.8 CONDENSATE AND FEEDWATER RESPONSE

2

4.8.1 Condensate System flow is reduced to prevent a deaerator high level trip. Maximum flow for one Condensate Pump is approximately 3.5 MPPH.

4.8.2 SFRCS isolation is caused by any SFRCS actuation except loss of all RCPs trip. MFW response to SFRCS isolation is covered later in Step 4.10.

4.8.3 Main Feedwater (MFW) system response is dependent on initial SG level and feedwater H/A control station mode (AUTO or HAND).

1. SG level > low limit AND all feedwater control valves in AUTO

   1) RFR increases MFPs to target speed

      AND

      Closes MFW control valves AND Startup feedwater control valves.

   2) FW flow AND SG level decrease

   3) RFR transfers all valves to level/flow error correction after 2.5 minutes OR individual loop valves to level/flow error correction when respective SG goes on low level limit.

   4) MFP target speed is modified by the larger SG level error signal if one SG is on low level limit.

   5) MFP target speed is NOT modified if NEITHER SG on low level limit.

   6) If running, the operator shuts down second MFP. (If applicable, shutdown MFP on the side with SGTR.)

2. SG level > low level limit AND at least one of the FW control valves in HAND

   1) Place MFP H/A station in HAND and increases MFP speed to maintain MFP discharge pressure > SG pressure.

   2) The controls in AUTO will respond to ICS flow and level errors.

ACTIONS

4.8.4 If FW flow will NOT decrease to a SG

AND

Same SG level is increasing

THEN

Trip BOTH MFPTs and go to 4.9

DETAILS

3) The operator controls the FW control stations that are in HAND.

4) FW flow AND SG level decrease.

5) If running, the operator shuts down second MFP. (If applicable, shutdown MFP on the side with SGTR.)

3. SG level on low level limit AND all FW control valves in AUTO

1) RFR increases MFP to target speed.

2) MFW valves respond to SG level error.

3) FW flow decreases AND SG level remains at low level limit.

4. SG level on low level limit AND any FW control valve in HAND

1) Place MFP H/A station in HAND and increases MFP speed to maintain MFP discharge pressure > SG pressure.

2) The controls in AUTO will respond to ICS flow and level errors.

3) The operator controls the FW control stations that are in HAND.

4) FW flow decreases AND SG level remains at low level limit.

4.8.4 In any initial configuration or SG level, after a reactor trip, proper AUTO OR MANUAL FW control should never show FW flow NOT decreasing AND SG level increasing at the same time. MFPT trip is required to prevent SG overfill.

ACTIONS

4.9 SFAS

4.9.1 Verify there has NOT been an SFAS actuation on Actuation Channel 1 AND/OR Actuation Channel 2 and go to 4.10.

IF SFAS HAS ACTUATED

4.9.2 Take the actions below for all trips present as directed.

4.9.3 RCS 1650 PSIG TRIP

1. Verify proper SFAS Incident Level 1 and 2 actuation.

2. Close RC11, PORV block valve.

3. Close RC10, pressurizer spray block valve.

4. IF subcooled margin is NOT adequate.

   THEN

   Trip all RCPs.

DETAILS

4.9 SFAS

4.9.1 SFAS actuation is verified by at least one of the following annunciator alarms indicating at least one SFAS channel tripped.

SFAS CTMT PRESS > 18.4 PSIA TRIP (5-6-2)

OR

SFAS RC PRESS < 1650 PSIG TRIP (5-6-3)

OR

SFAS RC PRESS < 450 PSIG TRIP (5-6-4)

OR

SFAS CTMT PRESS > 38.4 PSIA TRIP (5-6-5)

AND

Plant response indications on the SFAS panels confirm an SFAS actuation.

NOTE: CTMT RAD TRIP (5-6-1) of Incident Level 1, when it is the only trip present, is not within the scope of this procedure.

4.9.3 RCS 1650 PSIG TRIP

1. SFAS incident level response should be verified in accordance with Table 2, Tables Tab.
2. RC11 powered from E16B.
3. RC10 powered from E11A.
4. Adequate subcooling margin exists when the TSAT meters indicate ≧ 20°F. If NEITHER TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

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ACTIONS

5. Insure MU3971, MU pump suction valve shifts to the BWST if MU Tank level decreases to 10 inches.

6. Verify the HPI system is operating properly per specific rules 1 AND 2.

   IF NOT

   Refer to the SAD to assist in getting the HPI system operating.

4.9.4 RCS 450 PSIG TRIP

1. Verify proper SFAS Incident Level 3 actuation.

2. IF DG IS NOT carrying its bus, stop both MU pumps.

   OR

   If DG is carrying its bus, verify the MU pump trips when the respective LPI pump starts.

3. IF the LPI system is not operating properly,

   THEN

   Refer to the SAD to assist in getting the LPI system operating.

4. IF RCS pressure decreases to the point where LPI flow is observed,

   THEN

   Go to Section 10, Large LOCA.

DETAILS

5. MU3971, MU pump suction valve will auto shift (CLOSE) to the BWST at a MU tank level of 10 inches. If the valve doesn't auto shift within 45 seconds of reaching 10 inches, the MU pumps will trip. Suction can be manually shifted by closing MU3971. MU3971 powered from E11D.

6. Specific rules 1 and 2, in Specific Rules Tab, requires both HPI pumps running with balanced flow and injection on all four lines. HPI SAD may help locate the cause of the HPI system failure if the cause is not known.

4.9.4 RCS 450 PSIG TRIP

1. SFAS incident level response should be verified in accordance with Table 2, Tables Tab.

2. This is a large LOCA. MU, seal injection, and seal return are isolated by SFAS. MU pumps are not needed and should be stopped. If this is concurrent with a loss of electrical power to essential buses such that the DG are carrying the loads, the MU pumps must trip when the LPI pumps start to prevent DG overload.

3. LPI SAD may help locate the cause of the LPI system failure if the cause is not known.

4. LPI flow is an indication of a major LOCA. Section 10 provides instructions for long term core cooling following a major LOCA.

ACTIONS

4.9.5 CTMT 18.4 PSIA TRIP

1. Verify proper SFAS Incident Level 1, 2, and 3 actuation.

CAUTION: If an SFAS signal to some ESF equipment is BLOCKED (i.e., overridden) that equipment is incapable of responding to either subsequent automatic actuation signal or the system-level manual actuate (TRIP) pushbuttons. Before an operator BLOCKS any SFAS signal, he must assure that the safety function of that equipment is no longer needed. Afterward, the operator is totally responsible for the proper operation of that equipment, including reactuation, if required, until the BLOCK is removed.

2. IF RCS pressure remains above the SFAS 450 PSIG TRIP

AND

No seismic event has occurred,

THEN

BLOCK and reopen the following valves:

1) CC1460, CCW to MU pump header

AND

Additionally if instrument air has NOT been lost

2) MU2A, RCS letdown CTMT isolation AND MU3, letdown line stop valve

DETAILS

4.9.5 CTMT 18.4 PSIA TRIP

1. SFAS incident level response should be verified in accordance with Table 2, Tables Tab.

NOTE: Reactuation, subsequent to a BLOCK, can be accomplished two ways. First, at the equipment level, BLOCKED equipment will respond to the individual control switches for that piece of equipment. Second, at the system level, operation of the system-level RESET pushbutton will clear any output logic BLOCKS in the system (output logic BLOCKS are the BLOCK switches next to the SAM lights and on the output modules). The equipment will then respond to the system-level manual actuate (TRIP) pushbutton and to automatic actuation signals.

2. CCW to the MU pump header should be returned to service to support MU pump operation. MU2A and MU3 are reopened to restore the letdown lineup. Letdown is still isolated with MU2B. If a loss of instrument air has occurred, CTMT isolation valves should NOT be overridden to the non-SA position since there is no assurance they could be later placed in the SA position if needed.

ACTIONS

3. IF CCW has been restored to the MU pump header

AND

RCS pressure remains above the SFAS 450 PSIG TRIP

AND

Instrument air has NOT been lost

THEN

BLOCK and reopen the following valves.

1) MU33, RCS MU isolation

2) MU66A thru MU66D, RCP seal injection isolations

3) MU38, RCP seal return isolation

4) MU59A thru MU59D, RCP seal return isolations

4.9.6 CTMT 38.4 PSIA TRIP

1. Verify proper SFAS Incident Level 4 actuation

4.10 SFRCS

4.10.1 Verify there has NOT been an SFRCS actuation on Actuation Channel 1 AND/OR Actuation Channel 2 and go to to 4.11.

IF SFRCS HAS ACTUATED

4.10.2

1. Verify proper SFRCS actuation for the trip parameters present.

DETAILS

3. RCS MU should be returned to service and with RCS pressure greater than 1650 psig operated per specific rule 1, Specific Rules Tab.

   Seal injection controller, MU19 should be closed and then RCP seal injection and seal return should be returned to service to assure long term seal integrity even if RCPs are off.

   If a loss of instrument air has occurred, CTMT isolation valves should NOT be overridden to the non-SA position since there is no assurance they could be later placed in the SA position if needed.

4.9.6 CTMT 38.4 PSIA TRIP

1. SFAS incident level response should be verified in accordance with Table 2, Tables Tab.

4.10 SFRCS

4.10.1 SFRCS actuation is confirmed by annunciator alarm SFRCS FULL TRIP (8-6-1)

AND

Plant response indications confirm an SFRCS actuation.

4.10.2

1. SFRCS response should be verified in accordance with Table 1, Tables Tab. Trip parameters are indicated by the following annunciator alarms:

   SFRCS CH 1 (2) DP HALF/FULL TRIP (12-1-3(4))
   SFRCS CH 1 (2) SG LVL HALF/FULL TRIP (12-2-3(4))
   SFRCS CH 1 (2) MN STM LO PRESS TRIP (12-5-3(4))
   RCP MNTR ALL OFF HALF/FULL TRIP (5-2-9)

ACTIONS

2. Verify proper SG level control by AFW per Specific Rule 3.

3. IF the AFW system is not operating properly,

THEN

Refer to the SAD to assist in getting the AFW system operating.

4.11 SUBCOOLING

4.11.1 Verify adequate subcooling margin exists and go to 4.12.

IF NOT

4.11.2 Go to lack of adequate subcooling margin section 5.

4.12 OVERHEATING

4.12.1 Verify adequate primary to secondary heat transfer exists and go to 4.13.

IF NOT

4.12.2 Go to lack of heat transfer section 6.

DETAILS

2. See specific rule 3, Specific Rules Tab.

3. AFW SAD may help locate the cause of the AFW system failure if the cause is not known.

4.11 SUBCOOLING

Adequate subcooling margin exists when the TSAT meters indicate ≥
1 20°F. If <u>NEITHER</u> TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

4.12 OVERHEATING

Adequate primary to secondary heat transfer exists when the RCS pressure and temperature and SG pressure combinations, on the P/T display or manual plot show the following trends:

1. Plant is stable in or approaching the post trip target box,

   <u>OR</u>

2. Plant is stable outside the post trip target box,

   <u>AND</u>

   Tc and SG pressure are coupled, indicating heat transfer to SG. Coupled means Tc and TSAT SG are about the same value.

Inadequate primary to secondary heat transfer exists when RCS temperature is increasing <u>AND</u> SG pressure is constant or decreasing.

ACTIONS

4.13 OVERCOOLING

4.13.1 Verify primary to secondary heat transfer is NOT excessive and go to 4.14.

IF EXCESSIVE

4.13.2 Go to excessive heat transfer section 7.

4.14 SG TUBE RUPTURE

4.14.1 Verify MS line AND/OR vacuum system discharge radiation monitors are NOT alarming and go to 4.15.

IF ALARMING

4.14.2 Go to SG tube rupture section 8.7.

DETAILS

4.13 OVERCOOLING

Primary to secondary heat transfer is NOT excessive when the RCS pressure and temperature and SG pressure combinations, on the P/T display or manual plot show the following trends:

1. Plant is stable in or approaching the post trip target box,

   OR

2. Plant is stable outside the post trip target box,

   AND

   SG pressure is above the steam pressure limit of 960 psig.

Primary to secondary heat transfer is excessive when a secondary side malfunction is causing RCS temperature to decrease due to SG pressure falling below the steam pressure limit of 960 psig.

Significant HPI cooling can cause RCS temperature to decrease with SG pressure following the temperature decrease until it is below the steam pressure limit, but this condition is NOT a symptom of excessive primary to secondary heat transfer.

4.14 SG TUBE RUPTURE

SG tube rupture should cause alarm of at least one of the following annunciators:

NOTE: Main steam line RAD monitors will NOT respond in analyze mode with reactor shutdown.

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

ACTIONS

4.15 The plant is stable in a safe, subcooled condition with proper primary to secondary heat transfer and no major primary or secondary boundry failures. Transfer to another procedure at this point will be under the direction of the Shift Supervisor with the following additional guidance:

1. Notify the STA

2. Check Emergency Plan Activation EI 1300.01 to determine if emergency action levels have been exceeded and proceed with Emergency Plan activities in parallel with operational activities.

3. If the reactor tripped with no additional failures, go to PP 1102.03, Trip Recovery.

4. If loss of power to A and/or B bus has occurred, go to AB 1203.28, Loss of AC Bus Power Sources, for restoration of normal bus power

5. If loss of an NNI power source has occurred, go to AB 1203.41, Loss of NNI Power.

6. If loss of an ICS power source has occurred, refer to SP 1105.04, ICS, for additional guidance.

7. If a loss of instrument air has occurred, go to AB 1203.36, Loss of Instrument Air, for additional guidance.

8. If an SFAS actuation has occurred due to a LOCA and the subcooling margin is being maintained with HPI maintaining pressurizer level, go to Section 13, Solid Cooldown or Pressurizer Recovery.

9. If a SG tube leak has occurred, go to AB 1203.40, SG Tube Leak.

10. If an SFRCS actuation has occurred, go to PP 1102.03, Trip Recovery.

11. If additional failures occurred and have been corrected by the above procedures, go to PP 1102.03, Trip Recovery.

DETAILS

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REASON

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5. LACK OF ADEQUATE SUBCOOLING MARGIN

ACTIONS

ACTIONS FOR TREATMENT OF LACK OF SUBCOOLING MARGIN

5.1 Trip all RCPs.

5.2 Actuate AND control MU/HPI per specific rules 1 and 2.

5.3 Verify proper SFRCS actuation for the loss of 4 RCP trip.

AND

Verify proper SG level control by AFW per Specific Rules 1 and 3.

5.4 Check for overcooling

5.4.1 Verify primary to secondary heat transfer is NOT excessive.

IF EXCESSIVE

5.4.2 Go to excessive heat transfer section 7.

5.5 Isolate possible RCS leaks.

5.5.1 Place RC2A, PORV control switch in CLOSE AND check closed RC11, PORV block valve.

5.5.2 Check closed MU2B, letdown isolation valve.

5.5.3 Check closed RC2, pressurizer spray valve AND RC10, pressurizer spray block valve.

5. LACK OF ADEQUATE SUBCOOLING MARGIN

DETAILS

ACTIONS FOR TREATMENT OF LACK OF SUBCOOLING MARGIN

.

5.2 Specific rules 1 and 2 are contained in the Specific Rules Tab.

5.3 SFRCS response should be verified in accordance with Table 1, Tables Tab and annunciator alarms SFRCS FULL TRIP (8-6-1) and RCP MNTR ALL OFF HALF/FULL TRIP (5-2-9.) At this point there may have already been an SFRCS trip on other trip parameters.

SG level should be controlled per specific rules 1 and 3. See Specific Rules Tab.

5.4 Primary to secondary heat transfer is NOT excessive when the RCS pressure and temperature and SG pressure combinations, on the P/T display or manual plot show the following trends:

1. Plant is stable in or approaching the post trip target box,

OR

2. Plant is stable outside the post trip target box,

AND

SG pressure is above the steam pressure limit of 960 psig.

Primary to secondary heat transfer is excessive when a secondary side malfunction is causing RCS temperature to decrease due to SG pressure falling below the steam pressure limit of 960 psig.

Significant HPI cooling can cause RCS temperature to decrease with SG pressure following the temperature decrease until it is below the steam pressure limit, but this condition is NOT a symptom of excessive primary to secondary heat transfer.

ACTIONS

5.5.4 Close RC239A <u>AND</u> RC239B, pressurizer sample isolations.

5.5.5 Check closed RC4608A <u>AND</u> RC4608B, loop 1 high point vents.

5.5.6 Check closed RC4610A <u>AND</u> RC4610B, loop 2 high point vents.

5.6 Check subcooling

5.6.1 <u>IF</u> subcooling margin has been established (see Details)

<u>THEN</u>

5.6.2 Go to step 5.12.

5.7 Check for inadequate core cooling.

5.7.1 <u>IF</u> the incore T/C's indicate superheated conditions exist

<u>THEN</u>

5.7.2 Go to ICC section 9.

5.8 Check heat transfer conditions are available in <u>BOTH</u> SGs.

5.8.1 <u>IF</u> there are conditions for primary to secondary heat transfer available in <u>BOTH</u> SGs,

<u>THEN</u>

5.8.2 Go to Section 11, RCS Saturated SG Removing Heat.

5.6 Adequate subcooling margin exists when the TSAT meters indicate ≥
1 20°F. If NEITHER TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

It may be necessary to wait, while monitoring plant response, to make this determination. As long as ICC, loss of heat transfer conditions in one or both SG's or CF tank emptying do not exist, it is permissable to allow time for recovery of subcooling margin.

5.7 The normal temperature inputs to the TSAT meters are the wide range Th's. On rapid pressure decrease, due to the response time of the temperature detectors, they may indicate superheated conditions on the TSAT meters when the RCS is actually saturated. This will be indicated by a negative value being displayed and the NEG MARGIN light will be on. The existance of superheated conditions should be verified, prior to proceeding to Section 9, by selecting INCORE as the TSAT meter temperature input and rotating the INCORE TEMPERATURE selector switch through all positions while monitoring the TSAT meter. This should be done on BOTH channels if both are available. If BOTH channels are available, inadequate core cooling will exist if five or more properly working incore detectors show superheated conditions (negative value displayed). If only one channel is available, inadequate core cooling will exist if three or more properly working incore detectors show superheated conditions (negative value displayed).

5.8 Check heat transfer conditions are available in BOTH SGs

5.8.1 Primary to secondary heat transfer conditions are indicated by Tc and SG pressure being coupled. Coupled means Tc and TSAT SG are about the same value. Significant HPI cooling may be causing reverse heat transfer but the conditions for heat transfer still exist.

Inadequate primary to secondary heat transfer conditions exist when RCS temperature is increasing AND SG pressure is constant or decreasing. Tc and TSAT SG will be uncoupled.

5.8.2 The RCS is saturated. A small RCS break is indicated. Cooldown with SGs can be performed while HPI maintains RCS inventory.

ACTIONS

5.9 Loss of heat transfer conditions in ONE SG

5.9.1 IF there are primary to secondary heat transfer conditions in ONLY ONE SG,

THEN

5.9.2 Go to lack of heat transfer section 6.

5.10 Check for major LOCA

5.10.1 IF the CF tanks have emptied,

THEN

5.10.2 Go to Section 10, Large LOCA.

5.11 Go to lack of heat transfer section 6.

ADEQUATE SUBCOOLING MARGIN HAS BEEN ESTABLISHED

5.12 If possible, restart RCPs.

5.12.1 IF A OR B bus is energized

AND

NNI X AC AND DC are energized

THEN

If possible restart a minimum of one RC pump in each loop and go to step 5.13.

OR

5.12.2 IF A AND B bus are de-energized

OR

NNI X AC OR DC are de-energized

THEN

Begin steps to regain A OR B bus AND/OR NNI X AC AND DC in parallel with proceeding with steps below.

DETAILS

5.10.2 The CF Tanks emptying is an indication of a major LOCA. Section 10 provides instructions for long term core cooling following a major LOCA. DO NOT go to lack of heat transfer section 6. Primary to secondary heat transfer will be lost and cannot be regained.

ADEQUATE SUBCOOLING MARGIN HAS BEEN ESTABLISHED

5.12 If possible, restart RCPs.

5.12.1 Restart a minimum of one RC pump in each loop. Normal interlocks apply, if necessary refer to SP 1103.06, RC Pump Operating Procedure. RCP 2-2 is preferred but forced flow in any pump combination is desired at this point. Start as many RCPs as plant conditions allow.

5.12.2 Refer to AB 1203.28, Loss of AC Bus Power Sources, for restoration of in-house bus power.

Refer to AB 1203.41, Loss of NNI Power, and SP 1105.06, NNI Operating Procedure, for restoration of NNI power. Unless absolutely necessary RCPs should not be restarted without seal injection and seal instrumentation and alarms.

ACTIONS

5.13 Check for overheating.

5.13.1 Verify adequate primary to secondary heat transfer exists.

IF NOT

5.13.2 Go to lack of heat transfer section 6.

5.14 Check for overcooling.

5.14.1 Verify primary to secondary heat transfer is NOT excessive.

IF EXCESSIVE

5.14.2 Go to excessive heat transfer section 7.

DETAILS

5.13 Adequate primary to secondary heat transfer exists when the RCS pressure and temperature and SG pressure combinations, on the P/T display or manual plot show the following trends:

1. Plant is stable in or approaching the post trip target box,

   OR

2. Plant is stable outside the post trip target box,

   AND

   Tc and SG pressure are coupled, indicating heat transfer to SG. Coupled means Tc and TSAT SG are about the same value.

Inadequate primary to secondary heat transfer exists when RCS temperature is increasing AND SG pressure is constant or decreasing.

5.14 Primary to secondary heat transfer is NOT excessive when the RCS pressure and temperature and SG pressure combinations, on the P/T display or manual plot show the following trends:

1. Plant is stable in or approaching the post trip target box,

   OR

2. Plant is stable outside the post trip target box,

   AND

   SG pressure is above the steam pressure limit of 960 psig.

Primary to secondary heat transfer is excessive when a secondary side malfunction is causing RCS temperature to decrease due to SG pressure falling below the steam pressure limit of 960 psig.

Significant HPI cooling can cause RCS temperature to decrease with SG pressure following the temperature decrease until it is below the steam pressure limit, but this condition is NOT a symptom of excessive primary to secondary heat transfer.

ACTIONS

5.15 Check for SG tube rupture.

5.15.1 Verify MS line AND/OR vacuum system discha.ge radiation monitors are NOT alarming.

IF ALARMING

5.15.2 Go to SG tube rupture section 8.7.

5.16 Go to Section 13, Solid Cooldown or Pressurizer Recovery.

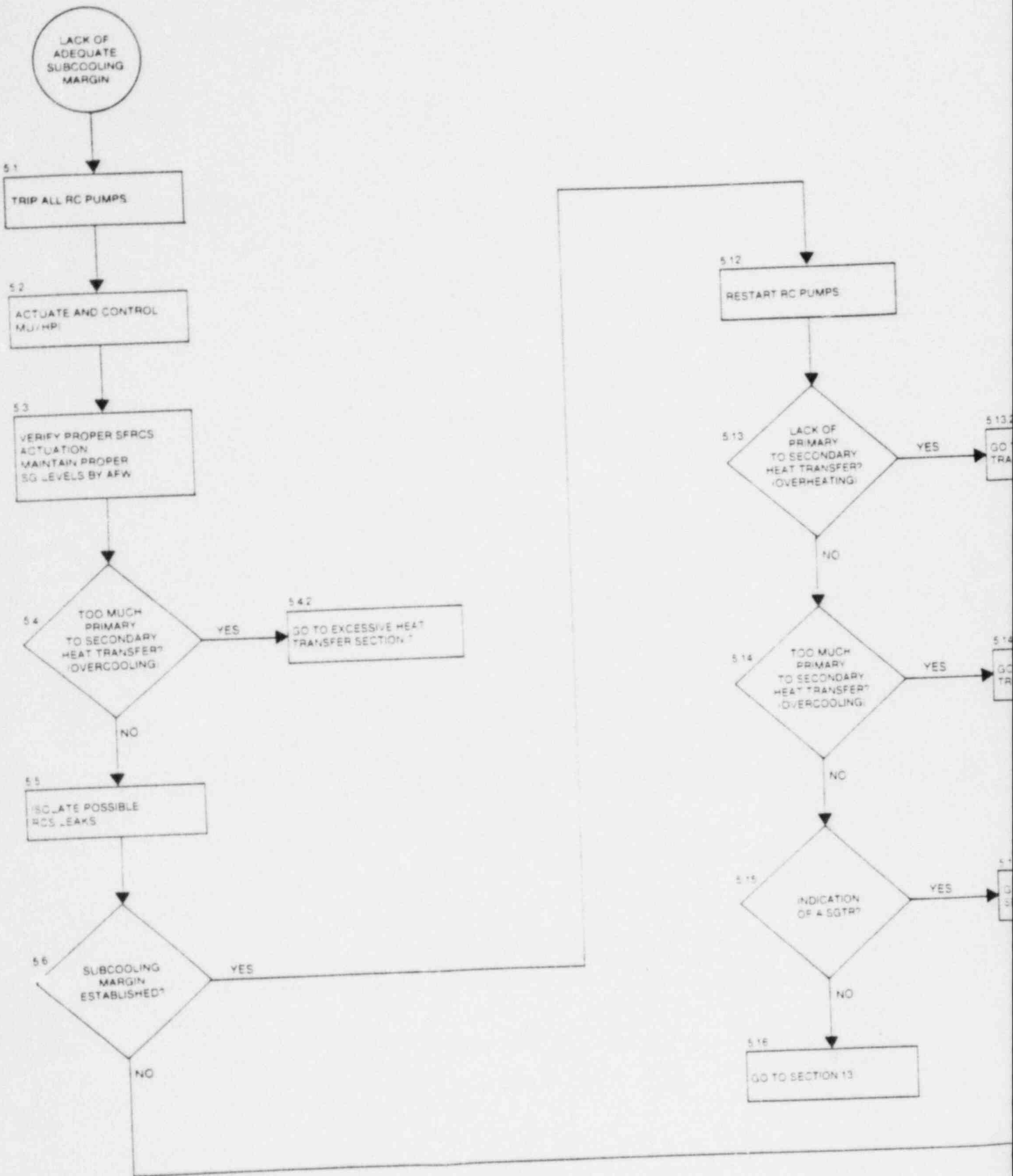
DETAILS

5.15 SG tube rupture should cause alarm of at least one of the following annunciators:

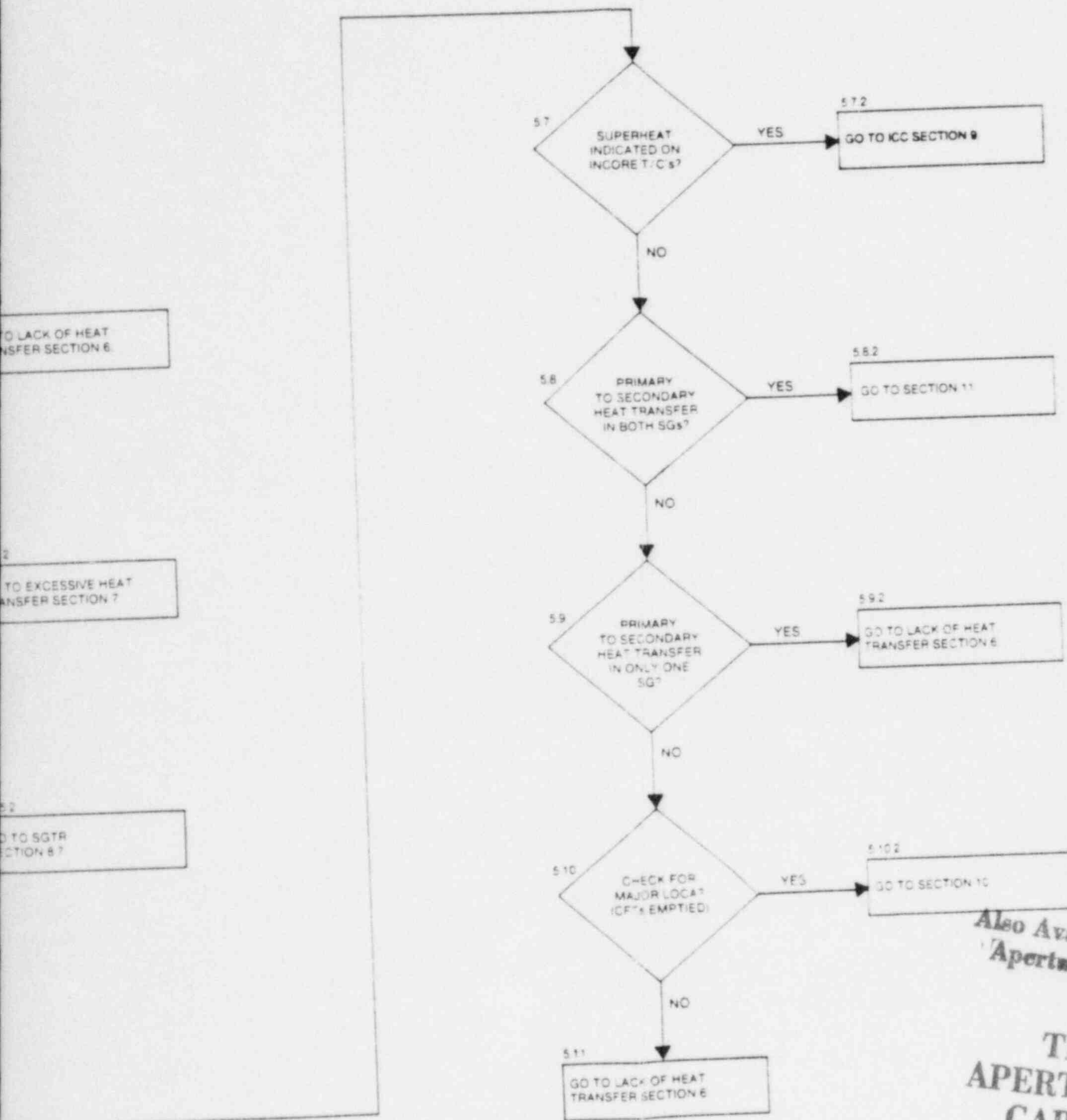
NOTE: Main Steam line RAD monitors will NOT respond in analyze mode with reactor shutdown.

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

5.16 The RCS is subcooled. A small break is indicated. It may or may not be isolated. If MU/HPI are still being used to maintain RCS pressure and pressurizer level, it is NOT isolated. There may or may not be a bubble in the pressurizer. Section 13 provides instructions for these conditions.


LACK OF ADEQUATE SUBCOOLING MARGIN
5.1
TRIP ALL RC PUMPS
5.2
ACTUATE AND CONTROL MU/HPI
5.3
VERIFY PROPER SFRCS ACTUATION
MAINTAIN PROPER SG LEVELS BY AFW
5.4
TOO MUCH PRIMARY TO SECONDARY HEAT TRANSFER? (OVERCOOLING)
YES
5.4.2
GO TO EXCESSIVE HEAT TRANSFER SECTION 7
NO
5.5
ISOLATE POSSIBLE RCS LEAKS
5.6
SUBCOOLING MARGIN ESTABLISHED?
YES
NO
5.12
RESTART RC PUMPS
5.13
LACK OF PRIMARY TO SECONDARY HEAT TRANSFER? (OVERHEATING)
YES
5.13.2
NO
5.14
TOO MUCH PRIMARY TO SECONDARY HEAT TRANSFER? (OVERCOOLING)
YES
NO
5.15
INDICATION OF A SGTR?
YES
NO
5.16
GO TO SECTION 13

SECTION 5: LACK OF ADEQUATE SUBCOOLING MARGIN



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6.0 LACK OF HEAT TRANSFER

ACTIONS

ACTIONS FOR TREATMENT OF LACK OF PRIMARY TO SECONDARY HEAT TRANSFER IN EITHER SG

6.1 Determine main OR aux feedwater availability

6.1.1 IF main OR auxiliary feedwater is available to EITHER SG, go to Step 6.7

IF NOT

6.1.2 Continue with Step 6.2.

LACK OF FEEDWATER EITHER SUBCOOLED OR SATURATED

6.2 Establish MU/HPI cooling

6.2.1 Actuate AND control MU/HPI per specific rules 1 and 2.

6.2.2 De-energize all pressurizer heaters.

6.2.3 Open RC11, PORV block valve.

6.2.4 Open RC2A, PORV.

6.2.5 Open RC4608A AND RC4608B, loop 1 high point vent isolations.

6.2.6 Open RC4610A AND RC4610B, loop 2 high point vent isolations.

6.2.7 Open RC239A AND RC200, pressurizer high point vent line isolations.

6.2.8 While continuing in this section, IF subcooling margin is lost, trip all RCPs AND continue in this section. Do NOT reroute to Section 5, Lack of Adequate Subcooling Margin, at this time.

6.2.9 While continuing in this section, IF SFAS actuation on RCS pressure < 1650 PSIG occurs, verify proper SFAS Incident Level 1 and 2 actuation.

6.0 LACK OF HEAT TRANSFER

DETAILS

ACTIONS FOR TREATMENT OF LACK OF PRIMARY TO SECONDARY HEAT TRANSFER IN EITHER SG

6.1 Attempts to regain main or auxiliary feedwater may continue as long as one SG is NOT dry. With main and aux feedwater NOT available, a SG is considered dry when its startup level is < 8" OR its pressure is < 960 PSIG and decreasing. When BOTH SG's are dry, you must proceed with Step 6.2. Attempts to regain main or auxiliary feedwater may continue in parallel with other actions as time permits.

LACK OF FEEDWATER EITHER SUBCOOLED OR SATURATED

6.2 Establish MU/HPI cooling.

6.2.1 Specific rules 1 and 2 are contained in the Specific Rules Tab.

6.2.4 The PORV can be locked open with its control switch.

6.2.8 Actions of Section 5, Lack of Adequate Subcooling Margin, are not appropriate for this plant condition at this time.

6.2.9 SFAS incident level response should be verified in accordance with Table 2, Tables Tab.

ACTIONS

6.2.9 Continuously monitor for inadequate core cooling.

6.2.9.1. IF the incore T/C's indicate superheated conditions exist

THEN

6.2.9.2. Go to ICC section 9.

6.3 Determine SUFP availability

6.3.1 IF the SUFP is available, line up the SUFP for operation with suction from the CST.

AND

IF D2 bus has to be re-energized to support SUFP operation, refer to Attachment 2 to re-energize D2

AND

Continue with Step 6.4 while performing these lineups.

OR

6.3.2 IF the SUFP is NOT available, go to Section 12, MU/HPI Cooling.

6.4 Pick the best SG to feed.

6.4.1 To feed SG 1 go to Step 6.5.

OR

6.4.2 To feed SG 2 go to Step 6.6.

6.5 To feed SG 1

6.5.1 BLOCK AND open FW612, SG 1 main feedwater stop valve.

DETAILS

6.2.9 The normal temperature inputs to the TSAT meters are the wide range Th's. On rapid pressure decrease, due to the response time of the temperature detectors, they may indicate superheated conditions on the TSAT meters when the RCS is actually saturated. This will be indicated by a negative value being displayed and the NEG MARGIN light will be on. The existance of superheated conditions should be verified, prior to proceeding to Section 9, by selecting INCORE as the TSAT meter temperature input and rotating the INCORE TEMPERATURE selector switch through all positions while monitoring the TSAT meter. This should be done on BOTH channels if both are available. If BOTH channels are available, inadequate core cooling will exist if five or more properly working incore detectors show superheated conditions (negative value displayed). If only one channel is available, inadequate core cooling will exist if three or more properly working incore detectors show superheated conditions (negative value displayed).

6.3 Determine SUFP availability.

6.3.1 SUFP availability includes the availability of TPCW for cooling. The SUFP should be lined up for suction from the CST per SP 1106.27, Startup Feed Pump.

6.3.2 Attachment 2 is in Attachments Tab.

6.4 To determine which SG to feed consider SG tube integrity, secondary side integrity, instrumentation and controls availability, and electrical power availability. If E11C is NOT energized, feed SG 2 since FW612 to SG 1 isn't powered. If F11D is NOT energized, feed SG 1 since FW601 to SG 2 isn't powered.

6.5 To feed SG 1

6.5.1 SFRCS trip is BLOCKED using the SFAS BLOCK button.

ACTIONS

6.5.2 IF ICS AC OR DC is lost

OR

Instrument air pressure is < 65 PSIG

THEN

Go to Step 6.5.5, otherwise continue.

6.5.3 Place loop 1 SU FW valve H/A station in HAND AND run the demand to minimum.

6.5.4 OVERRIDE the SFRCS trip to loop 1 SU FW valve and go to Step 6.5.6

6.5.5 Dispatch an operator to take local manual control of loop 1 SU FW valve AND establish continuous communication with the Control Room.

CAUTION 6.5.6: TPCW must be available to cool the SUFP.

6.5.6 WHEN the SUFP is lined up, start the SUFP.

6.5.7 Feed SG 1 through loop 1 SU FW valve at the maximum rate allowed by the following limits. Keep SUFP discharge pressure > 900 PSIG. Keep SUFP running current < 44 amps.

6.5.8 IF this flowpath is successful, go to Step 6.7.

OR

IF this flowpath is NOT successful, dispatch an operator to verify the SUFP lineup by performing Attachment 1.

DETAILS

6.5.2 Loss of ICS DC indicated by annunciator alarm "ICS 24 VDC BUS TRIP" (14-1-2.)

Loss of ICS AC indicated by annunciator alarm "ICS/NNI 118 AC PWR SUPPLY TRBL" (14-2-3.)

WITHOUT

Loss of NNI AC power from NNI power indicating lights

Loss of instrument air indicated on PI810.

6.5.3 Loop 1 SU FW valve H/A station is ICS-33B.

6.5.4 SFRCS trip is OVERRIDDEN using the pushbuttons on the back wall of the cabinet room.

6.5.5 To take local manual control of the SU FW valve, free-wheel the handwheel until the hole in the shaft sleeve lines up with the hole in the stem, insert the pin, and open the diaphragm equilizing valve. The valve can then be positioned with the handwheel.

6.5.7 Feed is established via manual control from the H/A station or local manual control of the valve. As the SG repressurizes, increased opening of the SU FW valve will be necessary to maintain flow.

6.5.8 Indications of a successful flowpath are the SG repressurizing to the SG safety valve setpoint (1050 PSIG). (This could take about seven minutes starting from zero pressure.) SUFP flow to SG 1 indicated on computer point F866. Tc decreasing. SG level eventually increasing.

ACTIONS

6.5.9 IF the SUFP lineup is correct AND this flowpath remains unsuccessful

THEN

Close FW612 AND go to Step 6.6 to feed SG 2

UNLESS

An attempt to feed SG 2 has already been made

THEN

Go to Section 12, MU/HPI Cooling.

6.6 To feed SG 2

6.6.1 BLOCK AND open FW601, SG 2 main feedwater stop valve.

6.6.2 IF ICS AC OR DC is lost

OR

Instrument air pressure is < 65 PSIG

THEN

Go to Step 6.6.5, otherwise continue.

6.6.3 Place loop 2 SU FW valve H/A station in HAND AND run the demand to minimum.

6.6.4 OVERRIDE the SFRCS trip to loop 2 SU FW valve and go to Step 6.6.6.

6.6.5 Dispatch an operator to take local manual control of loop 2 SU FW valve AND establish continuous communication with the Control Room.

DETAILS

6.5.9 If feedwater is not available to either SG, there is no heat transfer to either SG. Natural circulation does not exist and cannot be induced due to the total loss of feedwater. The SG's are dry and the core must be cooled by MU/HPI cooling.

6.6 To feed SG 2

6.6.1 SFRCS trip is BLOCKED using the SFAS BLOCK button.

6.6.2 Loss of ICS DC indicated by annunciator alarm "ICS 24 VDC BUS TRIP" (14-1-2.)

Loss of ICS AC indicated by annunciator alarm "ICS/NNI 118 VAC PWR SUPPLY TRBL" (14-2-3.)

WITHOUT

Loss of NNI AC power from NNI power indicating lights.

Loss of instrument air indicated on PI810.

6.6.3 Loop 2 SU FW valve H/A station is ICS-33A.

6.6.4 SFRCS trip is OVERRIDDEN using the pushbuttons on the back wall of the cabinet room.

6.6.5 To take local manual control of the SU FW valve, free-wheel the handwheel until the hole in the shaft sleeve lines up with the hole in the stem, insert the pin, and open the diaphragm equalizing valve. The valve can then be positioned with the handwheel.

ACTIONS

CAUTION 6.6.6: TPCW must be available to cool the SUFP.

6.6.6 WHEN the SUFP is lined up, start the SUFP.

6.6.7 Feed SG 2 through loop 2 SU FW valve at the maximum rate allowed by the following limits. Keep SUFP discharge pressure > 900 PSIG. Keep SUFP running current < 44 amps.

6.6.8 IF this flowpath is successful, go to Step 6.7

OR

IF this flowpath is NOT successful, dispatch an operator to verify the SUFP lineup by performing Attachment 1.

6.6.9 IF the SUFP lineup is correct AND this flowpath remains unsuccessful

THEN

Close FW601 AND go to Step 6.5 to feed SG 1

UNLESS

An attempt to feed SG 1 has already been made

THEN

Go to Section 12, MU/HPI Cooling.

FEEDWATER HAS BEEN RE-ESTABLISHED TO AT LEAST ONE SG BUT THERE IS NO SG HEAT TRANSFER

6.7 Maintain appropriate SG level per specific rule 3.

1 | 6.8 IF subcooling margin is being maintained

THEN

Go to AND attempt to maintain a one running RCP combination, preferrably in the loop being fed by the SUFP.

6.9 Check for major LOCA

6.9.1 IF the CF tanks have emptied, go to Section 10, Large LOCA.

IF NOT

6.9.2 Continue with Step 6.10.

DETAILS

6.6.7 Feed is established via manual control from the H/A station or local manual control of the valve. As the SG repressurizes increased opening of the SU FW valve will be necessary to maintain flow.

6.6.8 Indications of a successful flowpath are the SG repressurizing to the SG safety valve setpoint (1050 PSIG). (This could take about seven minutes starting from zero pressure.) SUFP flow to SG 2 indicated on computer point F868. Tc decreasing. SG level eventually increasing.

6.6.9 If feedwater is not available to either SG, there is no heat transfer to either SG. Natural circulation does not exist and cannot be induced due to the total loss of feedwater. The SG's are dry and the core must be cooled by MU/HPI cooling.

FEEDWATER HAS BEEN RE-ESTABLISHED TO AT LEAST ONE SG BUT THERE IS NO SG HEAT TRANSFER

6.7 Specific rule 3 is contained in the Specific Rules Tab.

6.8 Attempt to maintain one RCP running if subcooling margin exists. If pump vibration reaches 30 mils start another pump and trip the running pump. If all RCPs have been run and reached 30 mils vibration, RCPs may be stopped.

6.9 The CF tanks emptying is an indication of a major LOCA. Section 10 gives instructions for long term cooling following a major LOCA. Primary to secondary heat transfer is lost and cannot be regained.

ACTIONS

6.10 If necessary, open the PORV.

6.10.1 IF at any time while attempting to regain heat transfer to the SG, the RC pressure increases to 2400 PSIG

THEN

6.10.2 Open RC2A, PORV AND RC11, PORV block, if closed

AND

Allow the PORV to remain open until RC pressure decreases to ≤ 100 PSI above the SG pressure.

6.10.3 Continue with Step 6.11.

6.11 On each SG with the proper water level, lower SG pressure while maintaining SG level, using the turbine bypass valves (TBV) or atmospheric vent valves (AVV) until secondary TSAT is 40 to 60°F lower than incore T/C temperature AND maintain this SG pressure.

IF an SFRCS trip has closed the MSIVs, AVV will have to be used as follows:

6.11.1 IF ICS AC AND DC are available

AND

Instrument air pressure is ≥ 75 PSIG

THEN

BLOCK the SFRCS signal AND manually control SG pressure from the ICS H/A station in HAND

OR

6.11.2 IF ICS AC OR DC is lost

OR

Instrument air pressure is < 75 PSIG

THEN

Dispatch an operator to establish communications with the Control Room and control SG pressure from local control of the atmospheric vent valve handwheels.

DETAILS

6.10 If necessary, open the PORV.

6.10.2 The PORV can be locked open with its control switch.

RC pressure is kept as low as possible to maximize MU/HPI flow while maintaining the primary to secondary ΔP across the SG tubes in the normal direction.

6.11 This is an attempt to induce heat transfer to the SG by lowering the heat sink temperature (SG) 50°F below the heat source temperature (incore T/C temperature).

6.11.1

1. Place both atmospheric vent valves H/A stations in HAND and run the demand to minimum.
2. Press both atmospheric vent valves block buttons, HIS-ICS-11D and HIS-ICS-11C.
3. Press AUTO on HIS-ICS-11B and HIS-ICS-11C.
4. Control SG pressure as desired from the H/A station.

6.11.2 Atmospheric vent valves will NOT operate from the Control Room H/A station if ICS AC OR DC is lost OR instrument air pressure is < 75 PSIG. Local control will be required per Attachment 3, Attachments Tab.

ACTIONS

6.12 Check for re-established SG heat transfer.

6.12.1 IF SG heat transfer is re-established go to Step 6.19

IF NOT

6.12.2 Continue with Step 6.13.

6.13 Check ability to bump RCPs.

6.13.1 IF RC pumps can be bumped

THEN

Go to Step 6.14

OR

6.13.2 IF RC pumps could be bumped if A AND/OR B bus was re-energized from offsite power

THEN

Re-energize A AND/OR B bus from offsite power and go to Step 6.14

OR

6.13.3 IF RC pumps can NOT be bumped

THEN

Initiate MU/HPI cooling, if not already in progress, by performing Step 6.2

AND THEN

Go to Section 12, MU/HPI Cooling.

6.14 Use RC pump bumps to induce SG heat transfer.

6.14.1 Bump an RC pump, which is capable of being started, in the loop with the highest SG level.

6.14.2 Allow RCS pressure to stabilize (within ±25 PSIG) at new pressure before determining if SG heat transfer is re-established.

DETAILS

6.12 Check for re-established SG heat transfer.

6.12.1 SG heat transfer is re-established if Tc and TSAT SG re-couple.

6.12.2 Do NOT wait longer than 15 minutes before proceeding with step 6.13

6.13 Check ability to bump RCPs.

6.13.1 Normal interlocks apply, if necessary refer to SP 1103.06 RC Pump Operating procedure.

6.13.2 Refer to AB 1203.28, Loss of AC Bus Power Sources, for restoration of in-house power.

6.13.3 There is no heat transfer to either SG. Natural circulation does not exist and cannot be induced by bumping RC pumps. The core must be cooled by MU/HPI cooling. The actuation of SFAS Incident Levels 1 and 2 may NOT occur right away so Step 6.2.8 should be performed whenever it occurs.

6.14 Use RC pump bumps to induce SG heat transfer.

6.14.1 Bump an RC pump means to start the pump, observe the starting current drops off, allow it to run for 10 seconds, and then stop it.

6.14.2 Pump bumps will force steam into the SG's where it will condense, causing RCS pressure to drop. This will allow increased MU/HPI flow into the system causing pressure to increase as the system refills. RCS pressure will have to be somewhat stable then, to determine if the system has completely "felt" the total effect of the bump, and heat transfer has been re-established to the SG.

ACTIONS

6.14.3 IF SG heat transfer is established, go to Step 6.19.

IF NOT

Continue with Step 6.14.4.

6.14.4 Repeat Steps 6.14.1 through 6.14.3 for available RC pumps that have NOT been bumped. Allow 15 minutes between pump bumps. IF all available RC pumps have been bumped AND SG heat transfer has NOT been re-established

THEN

Continue with Step 6.15.

6.15 On each SG with the proper water level, further lower SG pressure while maintaining SG level, using the turbine bypass valves or atmospheric vent valves, until secondary TSAT is 90 to 110°F lower than incore T/C temperature AND maintain this SG pressure.

6.16 Check for re-established SG heat transfer

6.16.1 IF SG heat transfer is re-established, go to Step 6.19

IF NOT

6.16.2 Continue with Step 6.17.

6.17 Start an RCP.

6.17.1 IF at least one hour has passed since the reactor trip

THEN

6.17.2 Start and run one RC pump in the loop with the highest SG level

AND

Attempt to maintain at least one RC pump running.

DETAILS

6.14.3 SG heat transfer is re-established if Tc and TSAT SG re-couple.

6.15 This is a further attempt to induce heat transfer to the SG by lowering the heat sink temperature (SG) 100°F below the heat source temperature (incore T/C temperature).

6.16.1 SG heat transfer is re-established if Tc and TSAT SG re-couple.

6.17 The RC pump may be running with the RCS saturated in this step. If the pump vibration reaches 30 mils on the Bentley-Nevada (X2 switch required to read this expanded range), stop the pump and start a different pump. It is desirable to run one RC pump on the loop with the highest SG level. Since the reactor has been shutdown for a least one hour, a RC pump may be run with the RCS saturated without regard for the requirements of specific rule 1. Normal starting interlocks apply.

ACTIONS

6.18 Check for re-established SG heat transfer.

6.18.1 IF SG heat transfer has been re-established, go to Step 6.19

IF NOT

6.18.2 Go to ICC section 9.

SG HEAT TRANSFER HAS BEEN RE-ESTABLISHED

6.19 Recover from MU/HPI cooling, if initiated.

6.19.1 Close RC2A, PORV

IF PORV will NOT close

THEN

Close RC11, PORV block valve.

6.19.2 Close RC4608A AND RC4608B, loop 1 high point vent valves.

6.19.3 Close RC4610A AND RC4610B, loop 2 high point vent valves.

6.19.4 Close RC239A AND RC200 pressurizer high point vent line isolations.

6.19.5 Control MU/HPI per specific rules 1 AND 2.

6.20 Control turbine bypass valves or atmospheric vent valves to maintain RC temperature approximately constant or slightly decreasing.

6.21 Check subcooling.

6.21.1 IF there is adequate subcooling margin, continue with Step 6.22

IF NOT

6.21.2 Go to Section 11, RCS Saturated SG Removing Heat.

DETAILS

6.18 Check for re-established SG heat transfer

6.18.2 If there still is no heat transfer to either SG, attempts to establish heat transfer by natural circulation and forced flow have failed. The core must be cooled by MU/HPI cooling. This condition can only exist if the core is very close to ICC. For this reason, the initial steps for ICC will be taken.

SG HEAT TRANSFER HAS BEEN RE-ESTABLISHED

6.19 Recover from MU/HPI cooling, if initiated.

6.19.5 Specific rules 1 and 2 are in Specific Rules Tab.

6.20 The intent of this step is to stablize any overcooling as a result of actions to induce heat transfer and not allow the RCS to heat back up.

6.21 Check subcooling.

6.21.2 The RCS is saturated. A small break is indicated. Cooldown with the SG's can be performed while MU/HPI maintains RCS inventory.

ACTIONS

6.22 Check for SG tube rupture

6.22.1 Verify MS line AND/OR vacuum system discharge radiation monitors are NOT alarming

IF ALARMING

6.22.2 Go to SG tube rupture section 8.7.

IF NOT ALARMING

6.22.3 Go to Section 13, Solid Cooldown or Pressurizer Recovery.

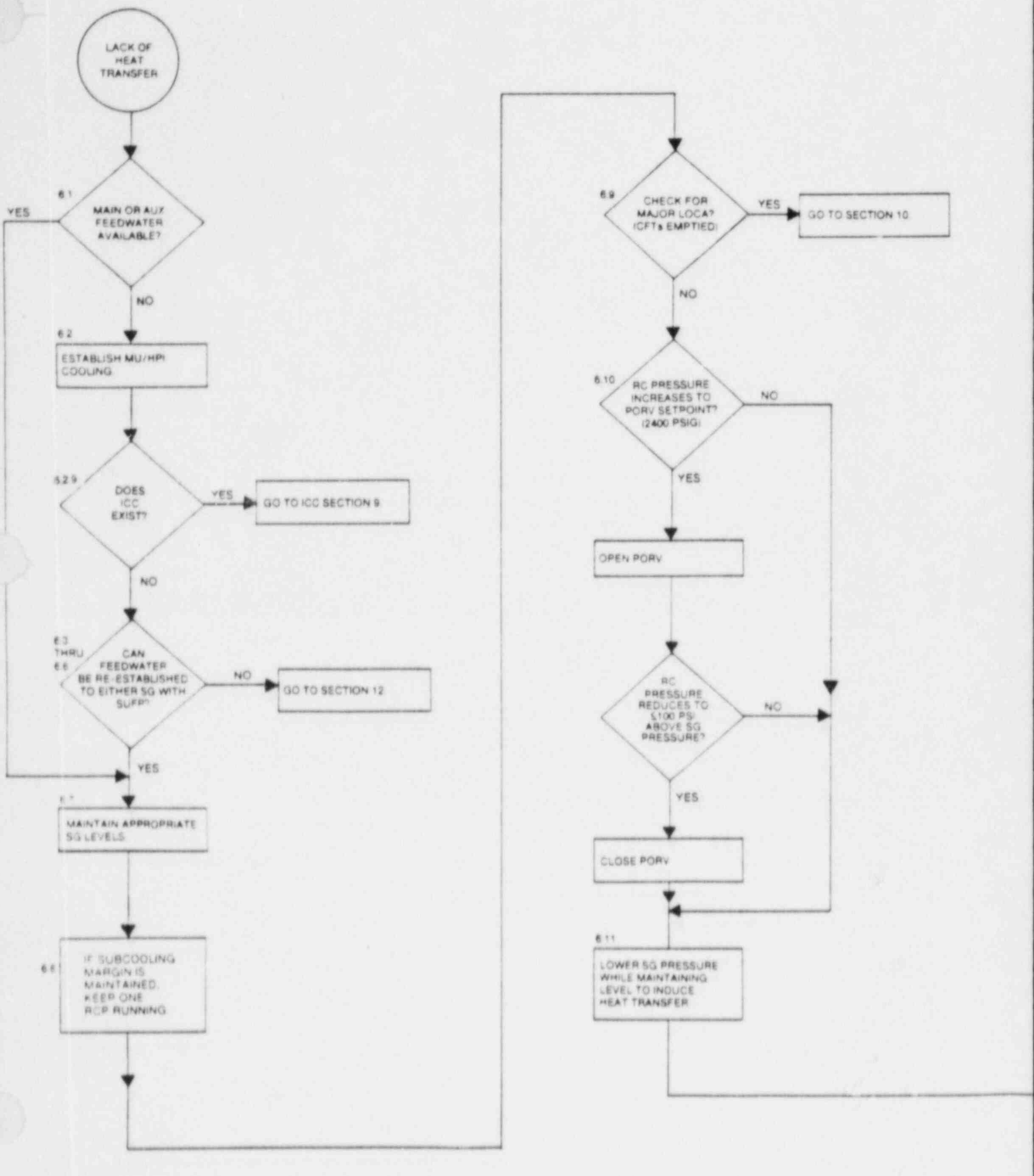
DETAILS

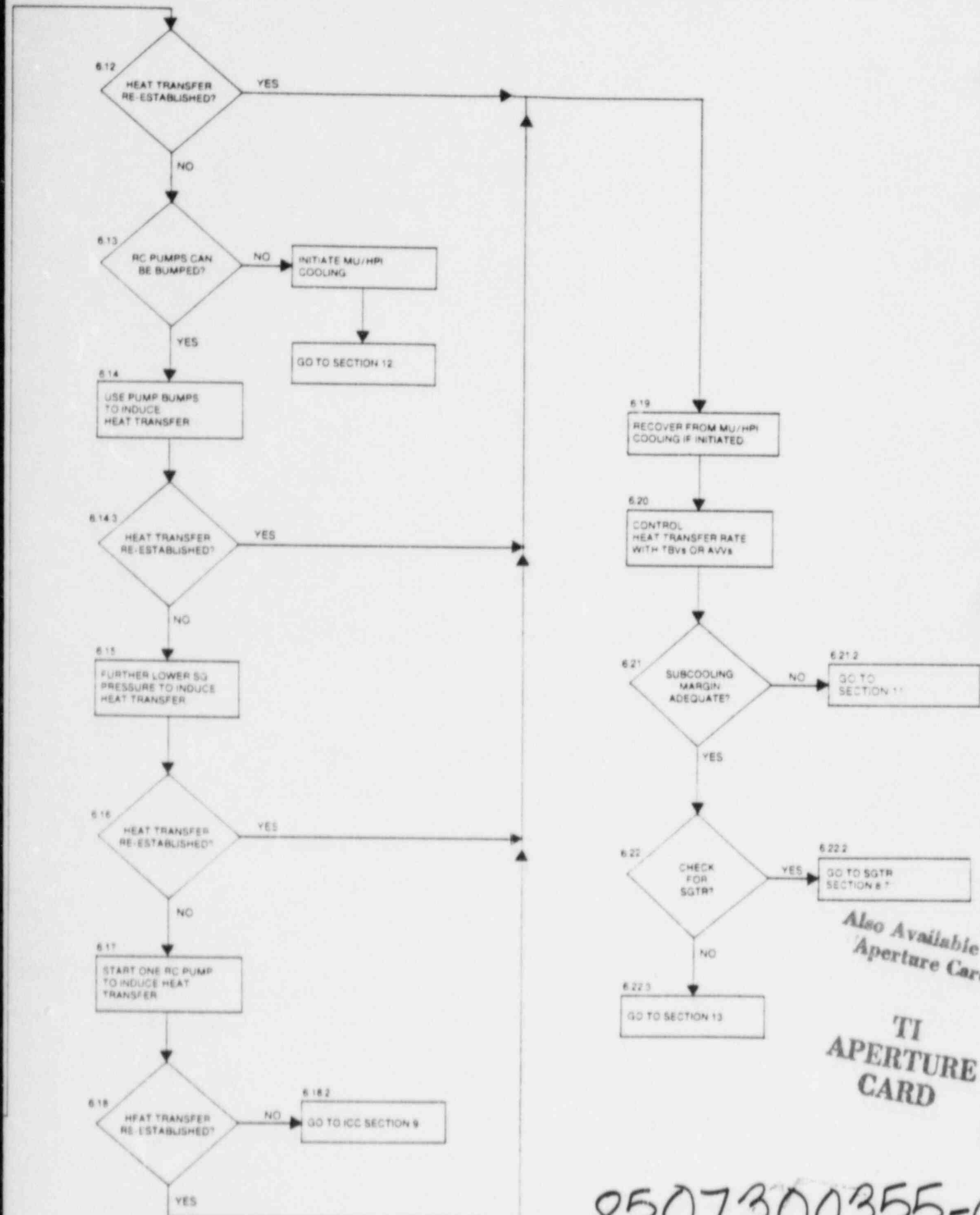
6.22 SG tube rupture should cause alarm of at least one of the following annunciators:

NOTE: Main Steam line RAD monitors will NOT respond in analyze mode with reactor shutdown.

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

6.22.3 The RCS is subcooled. There may or may not be a bubble in the pressurizer. SG heat transfer is controlled. Section 13 provides instructions either to draw a bubble if necessary, then cooldown normally, or cooldown solid if a bubble cannot be drawn.


LACK OF HEAT TRANSFER
6.1
MAIN OR AUX FEEDWATER AVAILABLE?
YES
NO
6.2
ESTABLISH MU/HPI COOLING
6.2.9
DOES ICC EXIST?
YES
GO TO ICC SECTION 9
NO
6.3 THRU 6.6
CAN FEEDWATER BE RE-ESTABLISHED TO EITHER SG WITH SUFF?
NO
GO TO SECTION 12
YES
MAINTAIN APPROPRIATE SG LEVELS
IF SUBCOOLING MARGIN IS MAINTAINED, KEEP ONE RCP RUNNING
6.9
CHECK FOR MAJOR LOCA? (CFTs EMPTIED)
YES
GO TO SECTION 10
NO
6.10
RC PRESSURE INCREASES TO PORV SETPOINT? (2400 PSIG)
NO
YES
OPEN PORV
RC PRESSURE REDUCES TO ≤100 PSI ABOVE SG PRESSURE?
NO
YES
CLOSE PORV
6.11
LOWER SG PRESSURE WHILE MAINTAINING LEVEL TO INDUCE HEAT TRANSFER


6.12
HEAT TRANSFER RE-ESTABLISHED?
YES
NO
6.13
RC PUMPS CAN BE BUMPED?
NO
INITIATE MU/HPI COOLING
GO TO SECTION 12
YES
6.14
USE PUMP BUMPS TO INDUCE HEAT TRANSFER
6.14.3
HEAT TRANSFER RE-ESTABLISHED?
YES
NO
6.15
FURTHER LOWER SG PRESSURE TO INDUCE HEAT TRANSFER
6.16
HEAT TRANSFER RE-ESTABLISHED?
YES
NO
6.17
START ONE RC PUMP TO INDUCE HEAT TRANSFER
6.18
HEAT TRANSFER RE-ESTABLISHED?
NO
6.18.2
GO TO ICC SECTION 9
YES
6.19
RECOVER FROM MU/HPI COOLING IF INITIATED
6.20
CONTROL HEAT TRANSFER RATE WITH TBVs OR AVVs
6.21
SUBCOOLING MARGIN ADEQUATE?
NO
6.21.2
GO TO SECTION 11
YES
6.22
CHECK FOR SGTR?
YES
6.22.2
GO TO SGTR SECTION 8.7
NO
6.22.3
GO TO SECTION 13

7. EXCESSIVE HEAT TRANSFER

ACTIONS

ACTIONS FOR TOO MUCH PRIMARY TO SECONDARY HEAT TRANSFER

7.1 Insure RCS makeup

7.1.1 IF pressurizer level is < 100" AND RCS pressure is decreasing

THEN

7.1.2 Verify MU flow has been increased to recover pressurizer level AND maintain 100" to 110" in the pressurizer.

7.2 Verify letdown is isolated.

7.3 SFRCS actuation

7.3.1 IF a full SFRCS actuation (auto OR manual) has occurred OR occurs while performing Steps 7.4 through 7.8, go to Step 7.14

IF NOT

7.3.2 Continue with Step 7.4.

7.4 Determine which SG is causing overcooling

7.4.1 IF it is apparent which SG is causing the overcooling continue with Step 7.5

IF NOT

7.4.2 Go to Step 7.13.

7.5 Determine the cause of the overcooling.

7.5.1 IF caused by MFW, go to Step 7.6.

7.5.2 IF caused by AFW, go to Step 7.7.

7.5.3 IF caused by steam pressure control, go to Step 7.8.

7.5.4 IF cause can NOT be determined, go to Step 7.13.

7. EXCESSIVE HEAT TRANSFER

DETAILS

ACTIONS FOR TOO MUCH PRIMARY TO SECONDARY HEAT TRANSFER

7.1 At this point two MU pumps, if available, should already be running supplying maximum MU flow to the RCS. If loss of NNI X AC power has caused loss of the pressurizer level recorder, maintain pressurizer level from 110" to 120" using uncompensated level.

7.2 Letdown should be isolated with MU2B, letdown isolation valve (motor operated) or MU3, letdown line stop valve (air operated).

7.3 SFRCS Actuation

7.3.1 SFRCS actuation is confirmed by annunciator alarm SFRCS FULL TRIP (8-6-1) and plant response indications confirm an SFRCS actuation.

7.4 Determine which SG is causing overcooling

7.4.1 The overcooling SG may be apparent after comparing BOTH SG pressures, levels, main and aux feedwater flows, Tc's, and key valve positions (TBV, AVV, and steam release from MSSVs may be heard from the Control Room). Parameters should be compared to each other and to expected values for the plant conditions.

7.5 The cause of the overcooling may be apparent after observing the parameters in the previous step while making the determination of which side is overcooling.

ACTIONS

7.6 MFW overcooling

7.6.1 Attempt manual control of MFW to the overcooling SG.

7.6.2 IF manual control of MFW stops the overcooling, go to Step 7.9

IF NOT

7.6.3 Trip both MFPTs and go to Step 7.13.

7.7 AFW overcooling

7.7.1 IF MFW is available to the overcooling SG, stop AFW flow to the SG, and go to Step 7.9.

7.7.2 If MFW is NOT available to the overcooling SG go to Step 7.13.

7.8 Steam pressure control overcooling

7.8.1 Attempt manual control of any valves causing overcooling. It may be possible to reseat a MSSV by lowering SG pressure with the TBVs or AVVs.

7.8.2 IF manual control stops the overcooling, go to Step 7.9

IF NOT

7.8.3 IF known to be a non-isolable steam leak, go to Step 7.28.

OR

IF isolable OR unknown, go to step 7.13.

7.9 Maintain BOTH SG levels at low level limit (35") with MFW.

7.10 Control turbine bypass valves to maintain RC temperature approximately constant or slightly decreasing.

7.11 Check subcooling

7.11.1 IF there is adequate subcooling margin, continue with Step 7.12

IF NOT

7.11.2 Go to lack of adequate subcooling margin Section 5.

DETAILS

7.6 Manual control of MFW may be required at various valve or pump H/A stations or valve controls depending on the failure. If controlling overcooling by reducing MFPT speed, care must be taken not to underfeed the good SG.

7.7 If AFW is causing SG overcooling, without an SFRCS actuation, there has been some some inadvertent AFW actuation. If MFW is available, AFW flow should be stopped by any available means. AFW can be stopped by taking manual control of the governor and running the speed to minimum, closing the steam supply valve, closing an AFW discharge valve, or locally tripping the AFPT. Depending on the exact failure, it may also be necessary to remove the power to a MOV to stop the AFW flow.

7.8 Manual control of TBV or AVV H/A stations may stop overcooling. If a MSSV has failed to reseat after lifting, lowering the associated SG pressure with the TBVs may get it to reseat, although it will have to be done slowly to minimize the overcooling effects. Failure of a MSR second stage reheat steam supply valve to close after a turbine trip may also cause overcooling.

7.10 The intent of this step is to not allow the plant to heat back up after the overcooling. The heatup, if allowed, might insurge the pressurizer level enough to cause loss of RC pressure control.

7.11 Adequate subcooling margin exists when the TSAT meters indicate ≥
1 | 20°F. If <u>NEITHER</u> TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

ACTIONS

7.12 Check for SG tube rupture

7.12.1 Verify MS line AND/OR vacuum system discharge radiation alarms are NOT alarming

IF ALARMING

7.12.2 Go to SG tube rupture Section 8.7.

IF NOT ALARMING

7.12.3 Go to PP 1102.03, Trip Recovery.

7.13 Manually actuate SFRCS on low SG level.

7.14 Verify proper SFRCS actuation for the trip parameters present.

7.15 Check for overcooling termination by SFRCS

7.15.1 IF SG levels AND pressures are approximately equal and stabilizing in BOTH SGs, go to Step 7.19

IF NOT

7.15.2 Continue with Step 7.16.

7.16 Check for AFW overcooling

7.16.1 IF SG levels are increasing in ONE OR BOTH SG greater than appropriate setpoint

THEN

Go to Step 7.17

OR

DETAILS

7.12 SG tube rupture should cause alarm of at least one of the following annunciators:

NOTE: Main Steam Line RAD monitors will NOT respond in analyze mode with reactor shutdown.

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

7.13 Manually trip SFRCS on low SG level using BOTH SG LVL TRIP buttons.

7.14 SFRCS response should be verified in accordance with Table 1, Tables Tab.

7.15 The intent of this step is to determine if the SFRCS actuation has terminated the overcooling. The operator will have to apply judgment to the many possible plant conditions and possibly even have to monitor plant response for several minutes to make this determination. If the SFRCS has indeed terminated the direct cause of the overcooling, but the SG levels are still below the appropriate setpoint, the steam generator levels will still be increasing and steam pressure may be low due to direct condensing action by the AFW. In this case, the operator will have to wait until SG levels reach their setpoint. Also once the levels reach setpoint, manual control of AFPT speed, by the operator, may be required to "stabilize" the plant. If the SFRCS has terminated the overcooling and SG levels are being maintained at setpoint, the steam pressure may be increasing as the RCS heats back up. In this case, the SG pressure is not "stable" but the overcooling symptom would no longer be present. If a small non-isolable steam leak is present, the levels may be stable but the overcooling symptom would still be present. Also AFW flow, Tc, and SG pressure may be asymmetric.

7.16 Check for AFW overcooling

7.16.1 SG level setpoints are contained in specific rule 3 in the Specific Rules Tab.

ACTIONS

7.16.2 IF SG levels are NOT increasing past the appropriate setpoint but overcooling is still present

THEN

Go to Step 7.23.

7.17 Terminate AFW overfill

7.17.1 Stop the AFW overfill by manual control using the most desirable method available

AND

7.17.2 IF the overfilling SG is required for RCS heat removal, manual control of the SG level will be required after the overfill is stopped

OR

7.17.3 IF the other SG is maintaining RCS heat removal, periodic AFW additions to the previously overfilling SG can be made to maintain a water level, in case it becomes needed, for RCS heat removal.

7.18 With SG levels stabilized in BOTH SGs

7.18.1 IF pressures are also stabilized in BOTH SGs

THEN

Go to Step 7.19

OR

7.18.2 IF pressures have NOT stabilized in BOTH SGs

THEN

Go to Step 7.23.

7.19 Maintain BOTH SG levels at appropriate setpoint with AFW.

DETAILS

7.16.2 Indications of a non-isolable steam leak are present.

7.17 Terminate AFW overfill

7.17.1 SG overfill by AFW can be stopped by taking manual control of the AFPT governor and running the speed to minimum, closing the steam supply valve, closing an AFW discharge valve, or locally tripping the AFPT. Depending on the exact failure with an SFRCS trip present, it may also be necessary to remove the power to a MOV to keep the AFW flow stopped.

7.18 The intent of this step is to determine, after SG level control by AFW is eliminated as a cause of overcooling, if a steam leak is causing overcooling. The operator will have to apply judgment to the plant conditions and possibly even have to monitor plant response for several minutes to make this determination. If "stabilizing" the SG levels has terminated the cause of overcooling, the SG pressures may be increasing as the RCS heats back up. In this case, the SG pressure is not "stable" but the overcooling symptom would no longer be present. If a small non-isolable steam leak is present, the levels may be stable but the overcooling symptom would still be present. Also AFW flow, Tc, and SG pressure may be asymmetric.

7.19 SG level setpoints are contained in specific rule 3 in the Specific Rules Tab.

ACTIONS

7.20 Control atmospheric vent valves to maintain RC temperature approximately constant or slightly decreasing.

7.20.1 IF ICS AC AND DC are available

AND

Instrument air pressure is ≧ 75 PSIG

THEN

BLOCK the SFRCS signal AND manually control SG pressure from the ICS H/A station in HAND

OR

7.20.2 IF ICS AC OR DC is lost

OR

Instrument air pressure is < 75 PSIG

THEN

Dispatch an operator to establish communications with the Control Room and control SG pressure from local control of the atmospheric vent valve handwheels.

7.21 Check subcooling

7.21.1 IF there is adequate subcooling margin, continue with Step 7.22.

IF NOT

7.21.2 Go to lack of adequate subcooling margin Section 5.

7.22 Check for SG tube rupture

7.22.1 Verify MS line AND/OR vacuum system discharge radiation alarms are NOT alarming

IF ALARMING

7.22.2 Go to SG tube rupture Section 8.7.

IF NOT ALARMING

7.22.3 Go to PP 1102.03, Trip Recovery.

DETAILS

7.20 The intent of this step is to not allow the plant to heat back up after the overcooling. The heatup, if allowed, might insurge the pressurizer level enough to cause loss of RC pressure control.

7.20.1

1. Place both atmospheric vent valves H/A stations in HAND and run the demand to minimum.

2. Press both atmospheric vent valves block buttons, HIS-ICS-11D and HIS-ICS-11C.

3. Press AUTO on HIS-ICS-11B and HIS-ICS-11C.

4. Control SG pressure as desired from the H/A station.

7.20.2 Atmospheric vent valves will not operate from the Control Room H/A station if ICS AC <u>OR</u> DC is lost <u>OR</u> instrument air pressure is < 75 PSIG. Local control will be required per Attachment 3, Attachments Tab.

1 7.21 Adequate subcooling margin exists when the TSAT meters indicate ≥ 20°F. If <u>NEITHER</u> TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

7.22 SG tube rupture should cause alarm of at least one of the following annunciators:

<u>NOTE:</u> Main Steam Line RAD monitors will <u>NOT</u> respond in analyze mode with reactor shutdown.

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

ACTIONS

7.23 Non-isolable steam leak.

7.23.1 IF SG level and pressure are stabilizing in one SG AND the other SG is boiling dry, go to Step 7.30

IF NOT

7.23.2 Continue with Step 7.24.

7.24 Non-isolable steam leak NOT actuating SFRCS low MS line pressure trip

7.24.1 IF it is apparent which SG is causing the overcooling, go to Step 7.28

IF NOT

7.24.2 Continue with Step 7.25

7.25 Take manual control of BOTH AFPT governors and run the speed to minimum to stop AFW flow to BOTH SGs.

7.26 Identify the SG with the steam leak by monitoring for the SG with the fastest level AND pressure decrease.

7.27 Immediately restore AFW to the good steam generator.

7.28 Manually actuate SFRCS on low steam line pressure on the side with the steam leak.

7.29 Verify proper SFRCS actuation for the low main steam line pressure trip

AND

If the governors had previously been placed in manual, return BOTH AFPs to service on the good SG.

7.30 Maintain proper SG level in the good SG with AFW.

DETAILS

7.23 At this point if SG level and pressure are stable in one SG and the other is boiling dry, the SFRCS would have to have isolated all feedwater to the SG with the steam leak, on a low main steam line pressure at 612 PSIG.

7.24 The overcooling SG may be apparent after comparing <u>BOTH</u> SG pressures, levels, aux feedwater flows, and Tc's. Parameters should be compared to each other and to expected values for the plant conditions. The steam leak may also be identified from reports from outside the Control Room.

7.25 With a water level present in <u>BOTH</u> SGs, there is a heat sink for the RCS which allows AFW to be temporarily stopped.

7.27 AFW flow is restored by increasing the speed of the AFPT on the good SG with manual control of the governor. The controls can be returned to AUTO if desired.

7.28 To manually actuate SFRCS on low main steam line pressure, press the TRIP switch for the side with the leak in <u>BOTH</u> actuation channels and insure the switches stay in the tripped position.

7.29 SFRCS response should be verified in accordance with Table 1, Tables Tab. The SFRCS trip will realign the AFP steam and feed valves to the good SG. The operator will have to return the steam leak side AFP to service with manual control of the governor.

7.30 SG level setpoints are contained in specific rule 3 in the Specific Rules Tab.

ACTIONS

7.31 When the steam leak side SG boils dry terminating the overcooling, control the atmospheric vent valve on the good SG to maintain RC temperature constant or slightly decreasing.

7.31.1 IF ICS AC AND DC are available

AND

Instrument air pressure is ≥ 75 PSIG

THEN

BLOCK the SFRCS signal AND manually control SG pressure from the ICS H/A station in HAND

OR

7.31.2 IF ICS AC OR DC is lost

OR

Instrument air pressure is < 75 PSIG

THEN

Dispatch an operator to establish communications with the Control Room and control SG pressure from local control of the atmospheric vent valve handwheel.

7.32 Check subcooling

7.32.1 IF there is adequate subcooling margin, continue with Step 7.33.

IF NOT

7.32.2 Go to lack of adequate subcooling margin Section 5.

7.33 Check for SG tube rupture

7.33.1 Verify MS line AND/OR vacuum system discharge radiation alarms are NOT alarming

IF ALARMING

7.33.2 Go to SG tube rupture Section 8.7.

IF NOT ALARMING

7.33.3 Go to PP 1102.03, Trip Recovery.

DETAILS

7.31 The intent of this step is to not allow the plant to heat back up after the overcooling. The heatup, if allowed, might insurge the pressurizer level enough to cause loss of RC pressure control.

7.31.1

1. Place the atmospheric vent valve H/A station in HAND and run the demand to minimum.

2. Press the atmospheric vent valve block button HIS-ICS-11D or HIS-ICS-11C.

3. Press AUTO on HIS-ICS-11B or HIS-ICS-11C.

4. Control SG pressure as desired from the H/A station.

7.31.2 Atmospheric vent valves will not operate from the Control Room H/A station if ICS AC OR DC is lost OR instrument air pressure is < 75 PSIG. Local control will be required per Attachment 3, Attachments Tab.

7.32 Adequate subcooling margin exists when the TSAT meters indicate ≥
1 | 20°F. If NEITHER TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line.

7.33 SG tube rupture should cause alarm of at least one of the following annunciators.

NOTE: Main Steam Line RAD monitors will NOT respond in analyze mode with reactor shutdown

VACM SYS DISCH RAD HI (9-5-1)
MN STM LINE 1 RAD HI (12-6-3)
MN STM LINE 2 RAD HI (12-6-4)

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8. STEAM GENERATOR TUBE RUPTURE

ACTIONS

ACTIONS FOR SG TUBE RUPTURE

8.1 Reactor trip

8.1.1 IF the reactor trips OR must be manually tripped at 100" pressurizer level, return to Step 3.2.

IF NOT

8.1.2 Continue with Step 8.2.

8.2 Manual reactor shutdown

8.2.1 Place the Bailey Reactor Demand H/A Station in HAND

8.2.2 Place the Diamond Rod Control in MANUAL AND insert control rods as continuously as possible without causing a reactor trip on imbalance.

1 8.3 As unit load decreases, perform the following steps:

CAUTION: The reactor must be manually tripped if pressurizer level decreases to 100".

8.3.1 Start Apendix B, C and D of AB 1203.40, SG Tube Leak

8.3.2 Determine which SG has the tube leak.

8.3.3 Fire the Auxiliary Boiler and transfer the auxiliary steam and gland steam headers to the Auxiliary Boiler.

8.3.4 Lineup and start HPI/LPI piggyback operation.

8. STEAM GENERATOR TUBE RUPTURE

DETAILS

ACTIONS FOR SG TUBE RUPTURE

8.1 If this section has been entered prior to reactor trip and then the reactor trips or must be tripped by the operator, stabilizing the plant after the trip has priority over dealing with the SGTR.

8.2 The Bailey Reactor Demand is placed in HAND to force it to "minitrack". Continuous insertion of rods will result in a power decrease of about 20%/minute. The ICS will be in TRACK with Tave controlled by feedwater.

8.3 As unit load decreases, perform the following steps:

8.3.2 Compare RE609 (line 1) and RE600 (line 2) readings. Backup determination can be made by a local survey of the main steam lines.

8.3.3 The Auxiliary Boiler should be ready to assume the auxiliary steam load as soon as possible in order to maintain condenser vacuum after reactor shutdown.

8.3.4 Piggyback operation will allow HPI at RCS pressures below approximately 1850 PSIG.

1. Start HPI Pumps 1-1 AND 1-2.

2. Fully open injection valves
Pump 1-1 open HP2C AND HP2D
Pump 1-2 open HP2A AND HP2B

3. Start LPI Pumps 1-1 AND 1-2.

4. Open LPI to HPI crossconnects
Train 1 open DH64
Train 2 open DH63

5. Start the CCW pump on the non-running side to supply the essential header.

ACTIONS

8.3.5 At approximately 590 MWe, verify MSR 2nd stage reheat pressures are decreasing under low load valve control.

8.3.6 At approximately 450 MWe, remove the MFPT from service on the side with the SGTR.

8.3.7 At approximately 360 MWe, stop all but one condensate pump.

8.3.8 At approximately 270 MWe, transfer the station electrical loads from the auxiliary transformer to the SU transformers.

8.4 At approximately 25% power, stop inserting rods AND hold power at approximately 25%.

8.5 Transfer the reactor power steam generation from the turbine to the TBVs until generator load is <50 MWe.

DETAILS

8.3.5 At approximately 590 MWe (128 PSIG cross-around pressure) MS195A and MS195B (RSHLV) close <u>AND</u> 2nd stage reheat pressure will decrease with turbine load under control of MS338 and MS353 (RSLLV).

8.3.6 If the MFPT on the side with the SGTR is the only one available, it will have to remain in service, but the SUFP should then be put in service as soon as load permits.

8.3.7 One condensate pump will handle the load when condensate flow is <3.5 MPPH.

8.3.8

<u>NOTE</u>: If the auxiliary transformer and the SU transformers are paralleled through the switchyard the synch check relays (25A and 25B) need not be checked at A or B bus, cubicle 5, prior to the transfer.

1. Place Bus A (Bus B) Synch Check Switch to the "X01" ("X02") position.

2. Close HX01A or HX02A (HX02B or HX01B).

3. Place Bus A (Bus B) Synch Check Switch to the "OFF" position.

4. Place Bus A (Bus B) Reserve Source Selector Switch to the position corresponding to the opposite S/U transformer to the one supplying the bus.

8.4 With NI calibration inaccuracies due to the power reduction the exact point for this step will have to be determined by the operator. Additional indications for this point are Tave just starting to ramp down, SGs going on low level limits, and a unit ΔT of about 12°F.

8.5 This step is attempting to get all the reactor power steam generation transferred to the fully open TBVs so there will not be a secondary pressure spike on the reactor-turbine generator trip causing the MSSVs to lift.

1. Place <u>BOTH</u> loop TBV H/A stations in HAND.

2. Place the turbine in MANUAL.

3. Coordinate opening the TBVs with decreasing the turbine load in manual until generator load is <50 MWe.

4. If the TBVs are fully open and the generator load is <u>NOT</u> <50 MWe, bump reactor power down while reducing turbine load until <50 MWe.

ACTIONS

8.6 Manual reactor trip.

8.6.1 Manually trip the reactor AND the turbine

AND

Control TBVs to increase individual SG pressure to 1015 PSIG AND return TBV H/A stations to AUTO

THEN

8.6.2 Return to Step 3.2.

8.7 HPI/LPI piggyback

8.7.1 IF HPI and LPI are already piggybacked, go to Step 8.8

IF NOT

AND

8.7.2 Piggyback operation will help control RCS inventory, lineup and start HPI/LPI piggyback operation.

8.8 Determine RCP availability

8.8.1 IF all RCPs are running, go to Step 8.16.

8.8.2 IF all RCPs are NOT running

AND

A OR B bus is energized

AND

NNI X AC AND DC are energized

THEN

Go to Step 8.9.

DETAILS

8.6 When the reactor is tripped at approximately 25% power the turbine will also trip. TBVs will have to be slowly throttled back to increase individual SG pressures to 1015 PSIG. If the TBVs were transferred to AUTO immediately on the reactor trip, the 145 PSI post trip bias would rapidly close them and possibly cause lifting of MSSVs before the TBVs could respond.

8.6.2 The plant will be stabilized after the reactor trip prior to performing the remainder of this section.

8.7 The need for HPI/LPI piggyback operation at this point is dependent on plant conditions, i.e, RCS pressure and pressurizer level. Piggyback operation will allow HPI at RCS pressures below approximately 1850 PSIG. To piggyback:

1. Start HPI Pumps 1-1 AND 1-2.

2. Full open injection valves.
   Pump 1-1 open HP2C AND HP2D
   Pump 1-2 open HP2A AND HP2B

3. Start LPI Pump 1-1 AND 1-2.

4. Open LPI to HPI crossconnects
   Train 1 open DH64
   Train 2 open DH63

5. Start the CCW pump on the non-running side to supply the essential header.

8.8 Determine RCP availability.

8.8.2 If the conditions of this step are met, at least one RCP in each loop is available for immediate restart.

ACTIONS

8.8.3 IF A AND B bus are NOT energized

AND/OR

NNI X AC OR DC are NOT energized

THEN

Begin steps to regain A OR B bus AND/OR NNI X AC AND DC in parallel with proceeding with Step 8.11.

8.9 RCP restart

8.9.1 IF POSSIBLE, restart all four RCPs.

OR

8.9.2 IF the above pump combination is NOT available, start the next most desirable available pump combination.

8.9.3 IF no RCP can be restarted at this time, go to Step 8.11.

8.10 Determine pressurizer spray availability.

8.10.1 IF pressurizer spray is available, go to Step 8.16

IF NOT

8.10.2 Go to Step 8.11.

DETAILS

8.8.3 If the conditions of this step are met, RCPs are not available for immediate restart but steps are begun to make them available. Refer to AB 1203.28, Loss of AC Bus Power Sources, for restoration of in-house bus power. Refer to AB 1203.41, Loss of NNI Power, and SP 1105.06, NNI Operating Procedure, for restoration of NNI power.

8.9 Forced RC flow is preferred over natural circulation in order to provide pressurizer spray. Pump combinations are listed below in order of preference to provide maximum pressurizer spray. Fourth RC pump temperature limit and NPSH limits should be observed. RC pump starting interlocks apply.

Pump Combination	% Of Full Flow Spray Flow
1. 2/2	100
2. 1/2	92
3. 0/2	84
4. 2/2-2	60
5. either Loop 1/2-2	53
6. 2/2-1	50
7. 0/2-2	41
8. either Loop 1/2-1	38
9. 0/2-1	26
10. 2/0	20
11. 1/0	0

8.10 Pressurizer spray should be available in any RCP combination other than 1/0 unless some known condition exists which would prevent pressurizer spray operation.

ACTIONS

BEGIN COOLDOWN AND DEPRESSURIZATION WITHOUT RCPs (WITHOUT PRESSURIZER SPRAY)

8.11 IF RCPs (pressurizer spray) are regained while performing this section, go to Step 8.16.

8.12 Verify SG levels are controlled at OR increasing to the proper level per specific rule 3.

8.13 Depressurize the RCS to approximately 1700 PSIG to allow HPI and MU to recover pressurizer level.

8.13.1 Turn off all pressurizer heaters.

8.13.2 Start the QT circ pump.

8.13.3 Open RC239A, pressurizer steam space sample valve AND RC200, pressurizer vent to QT isolation, to drop RCS pressure to approximately 1700 PSIG. Manually cycle RC200 AND control pressurizer heaters to maintain RCS pressure from approximately 1700 to approximately 1800 PSIG

OR

IF the pressurizer vent line is NOT available OR depressurizes too slow, open RC2A (PORV) AND RC11 PORV block valve, if closed, to drop RCS pressure to approximately 1700 PSIG. Manually cycle the PORV AND control pressurizer heaters to maintain RCS pressure from approximately 1700 to approximately 1800 PSIG.

8.13.4 Allow HPI and MU to recover pressurizer level AND maintain pressurizer level from 90" to 110" by controlling HPI and MU. Do NOT continue until pressurizer level is restored.

DETAILS

BEGIN COOLDOWN AND DEPRESSURIZATION WITHOUT RCPs (WITHOUT PRESSURIZER SPRAY)

8.12 Specific rule 3 is contained in the Specific Rules Tab.

8.13 RCS pressure is dropped to allow HPI in the piggyback mode to aid in pressurizer level recovery. HPI shutoff head in this mode is approximately 1850 PSIG. The QT circ pump is started to cool the QT although it may not be sufficient to prevent QT pressure buildup. The preferred method for RCS depressurization is via the pressurizer vent line. If this method is not available, or too slow, the PORV should be used. The use of the PORV may lead to lifting of the QT relief (90 PSIG) or failure of the QT rupture disk (100 PSIG). Use of the PORV is left to the judgment of the operator after considering plant conditions at the time. The use of the pressurizer vent line or PORV may affect pressurizer level indication.

8.13.4 Pressurizer level is recovered prior to starting RCS cooldown. At this point, the leak rate can also be estimated by totaling HPI and MU flow with pressurizer level constant.

ACTIONS

8.14 Begin an immediate cooldown and depressurization at 50°F/hr., using BOTH SGs, if both can be steamed, to Th of 520°F AND 1000 PSIG

AND

While proceeding, take the below steps as necessary. Plant conditions may require deviating from the order given.

8.14.1 Establish a 50°F/hr cooldown rate. Use TBVs on BOTH SGs if possible. IF CONDENSER IS NOT AVAILABLE, use AVVs on BOTH SGs if possible.

CAUTION 8.14.2: With the SFAS low RCS pressure trip BLOCKED, the operator is responsible for initiating SFAS should the condition of the leak worsen such that pressurizer level OR RCS pressure can NOT be controlled.

8.14.2 IF SFAS has NOT actuated on low RCS pressure of 1650 PSIG AND the RCS pressure decrease is being manually controlled

THEN

BLOCK the SFAS low RCS pressure trip when the block permit comes in.

DETAILS

8.14 Begin an immediate cooldown and depressurization at 50°F/hr using BOTH SGs, if both are available for steaming, to Th of 520°F AND 1000 PSIG. For guidance, refer to PP 1102.10, Plant Shutdown and Cooldown, as much as possible.

8.14.1 It is desirable to cooldown using BOTH SGs if possible. Place BOTH loop TBV H/A stations in HAND and position them to establish a cooldown at a rate as close to 50°F/hr as can be reasonably controlled. IF the condenser is NOT available, use the AVVs. IF the SFRCS or SFAS has tripped the AVVs, BLOCK the trip and take control as follows:

1. Place the atmospheric vent valve H/A station in HAND and run the demand to minimum.

2. Press the atmospheric vent valve block button HIS-ICS-11D or HIS-ICS-11C.

3. Press AUTO on HIS-ICS-11B or HIS-ICS-11C.

4. Control SG pressure as desired from the H/A station.

Atmospheric vent valves will not operate from the Control Room H/A station if ICS AC OR DC is lost OR instrument air pressure is < 75 PSIG. Local control will be required per Attachment 3, Attachments Tab.

NOTE 8.14.2: SFAS initiation on high containment pressure, high containment radiation and from the manual actuation switches will function normally with the SFAS low RCS pressure trip BLOCKED. To manually actuate the SFAS in response to low RCS pressure, the operator can actuate all the necessary equipment for the required incident level, component by component, from each component control switch OR manual actuation at the SFAS system level from the manual actuation switches.

8.14.2 When RCS pressure is <1800 PSIG and annunciator alarm SFAS RC PRESS <1800 BLK PRMT (5-3-3) comes in, BLOCK all four SFAS channels and insure the SFAS RC press < 1650 TRIP BLOCKED (5-4-3) light comes on. IF manual actuation of SFAS becomes necessary, refer to Table 2 in Tables Tab for component status information.

ACTIONS

8.14.3 Depressurize the RCS down to AND maintain the minimum adequate subcooling margin limit during RCS cooldown until RCS pressure reaches approximately 1000 PSIG,

THEN

Maintain RCS pressure between 975 to 1025 PSIG.

8.14.4 BLOCK SFRCS low main steam line pressure AND SG High level trips when the block permit comes in.

1 8.14.5 IF the tube ruptured SG Operate Range level is approaching the SFRCS high level trip setpoint (94%)

THEN

Increase the steaming rate on the tube ruptured SG to attempt to keep the level below the SFRCS trip setpoint.

1 8.14.6 IF the tube ruptured SG Operate Range level can NOT be maintained <94% on the Operate Range

THEN

Stop steaming the tube ruptured SG

AND close its MSIV

AND continue the cooldown on the good SG

DETAILS

8.14.3 Adequate subcooling margin exists when the TSAT meters
1 indicate ≧ 20°F. If NEITHER TSAT meter is available, adequate subcooling margin exists when the RCS pressure and temperature combination on the P/T display or manual plot is above and to the left of the subcooled margin line. This pressure is below the fuel-in-compression curve, but it is necessary to reduce the driving force on the tube leak. This is also shown on Figure 1 in the Figures Tab.

8.14.4 When SG pressure is <650 PSIG and annunciator alarms SFRCS CH 1 (2) MN STM LO PRESS/HI LVL BLK PRMT (12-3-3(4)) come in, BLOCK all four SFRCS channels and insure both SFRCS CH 1 (2) MN STM LO PRESS/HI LVL TRIP BLKD (12-4-3(4)) annunciator alarms come in.

8.14.5 If cooldown is established using the TBVs and condenser, an SFRCS high level trip would cause SG isolation forcing use of AVVs. If the cooldown is established using the AVVs, an SFRCS high level trip would necessitate closing the AVV to protect it from possible water damage. An increased steaming rate on one SG will require a decreased steaming rate on the other SG to maintain the cooldown rate constant.

1 8.14.6 IF the SFRCS high SG level trip has NOT been BLOCKED, a water level of 94% on the Operate Range will cause a high SG level SFRCS trip. The steam generator cannot be steamed above this level as possible water damage to the MSIV, MS line, TBVs, or AVV might occur, preventing later isolation of the SG. If the water level can't be controlled, the cooldown will have to be shifted to the good SG, and the tube ruptured SG isolated before water enters the MS line.

ACTIONS

8.14.7 When RCS conditions of 520°F Th AND 1000 PSIG are reached, if the non tube ruptured SG can be steamed

THEN

Stop the RCS cooldown.

Close the MSIV on the tube ruptured SG.

Maintain DH removal by steaming the good SG with the TBVs (AVV if condenser is not available), AND go to Step 8.15.

OR

IF the non tube ruptured SG can NOT be steamed

THEN

Go to Step 8.20.

8.15 Proceed with plant operation as directed by PP 1102.10, Plant Shutdown and Cooldown and refer to the appendices of AB 1203.40, SG Tube Leak, for additional guidance on actions and control measures.

BEGIN COOLDOWN AND DEPRESSURIZATION WITH RCPs RUNNING

8.16 Verify SG levels are controlled at OR increasing to the proper level per specific rule 3.

DETAILS

8.14.7 When RCS conditions of 520°F Th and 1000 PSIG are reached, stop the RCS cooldown by closing back on the TBVs (AVVs). Ensure no steam loads are being supplied by the tube ruptured SG MS line and isolate the tube ruptured SG by closing its MSIV. The SG will continue to fill thru the tube rupture. Increase the steaming rate using the TBVs (AVV) on the good SG enough for DH removal as indicated by constant or slightly decreasing Tc.

BEGIN COOLDOWN AND DEPRESSURIZATION WITH RCPs RUNNING

8.16 Specific rule 3 is contained in the Specific Rules Tab.

1. IF MFW is available AND RCPs have been continuously available, SG level should be maintained at low level limit (35") with MFW.

2. IF MFW is available AND RCPs have been restarted, SG level should be maintained at low level limit (35") with MFW and the AFW System shutdown per below steps:

   1) Place both AFP mode selectors in MANUAL and reduce turbine speed to 1500 RPM.

   2) Close the steam supply valve MS106(A) and MS107(A).

   3) Close the AFP to SG stop valves AF3870 and AF3872 (AF3869 and AF3871).

   4) Run the AFPT speed changer to low speed stop, then to high speed limit by holding in raise for 25 seconds.

   5) Return both AFP mode selectors to Auto-Essential.

ACTIONS

8.17 Depressurize the RCS to approximately 1700 PSIG to allow HPI and MU to recover pressurizer level.

8.17.1 Turn off all pressurizer heaters.

8.17.2 Open RC2, pressurizer spray valve AND RC10, pressurizer spray block valve, if closed, to drop RCS pressure to approximately 1700 PSIG. Manually cycle RC2 AND control pressurizer heaters to maintain RCS pressure from approximately 1700 to approximately 1800 PSIG.

8.17.3 Allow HPI and MU to recover pressurizer level AND maintain pressurizer level from 90" to 110" by controlling HPI and MU. Do NOT continue until pressurizer level is restored.

8.18 Begin an immediate cooldown and depressurization at 100°F/hr, using BOTH SGs, if both can be steamed, to Tc of 500°F AND 1000 PSIG

AND

While proceeding, take the below steps as necessary. Plant conditions may require deviating from the order given.

8.18.1 IF possible, go to or remain in a 2/2 RCP combination while above 500°F.

DETAILS

3. SG levels on AFW should be maintained per specific rule 3 in the Specific Rules Tab.

8.17 RCS pressure is dropped to allow HPI in the piggyback mode to aid in pressurizer level recovery. HPI shutoff head in this mode is approximately 1850 PSIG.

8.18 Begin an immediate cooldown and depressurization at 100°F/hr, using BOTH SGs, if both are available for steaming, to Tc of 500°F AND 1000 PSIG. For guidance refer to PP 1102.10, Plant Shutdown and Cooldown, as much as possible.

8.18.1 Forced RC flow is preferred over natural circulation in order to provide pressurizer spray. Pump combinations are listed below in order of preference to provide maximum pressurizer spray. Fourth RC pump temperature limit and NPSH limits should be observed.

Pump Combination	% Of Full Flow Spray Flow
1. 2/2	100
2. 1/2	92
3. 0/2	84
4. 2/2-2	60
5. either Loop 1/2-2	53
6. 2/2-1	50
7. 0/2-2	41
8. either Loop 1/2-1	38
9. 0/2-1	26
10. 2/0	20
11. 1/0	0

ACTIONS

8.18.2 Establish a 100°F/hr cooldown rate. Use TBVs on BOTH SGs if possible. IF CONDENSER IS NOT AVAILABLE, use AVVs on BOTH SGs if possible.

CAUTION 8.18.3: With the SFAS low RCS pressure trip BLOCKED, the operator is responsible for initiating SFAS should the condition of the leak worsen such that pressurizer level OR RCS pressure can NOT be controlled.

8.18.3 IF SFAS has NOT actuated on low RCS pressure of 1650 PSIG AND the RCS pressure decrease is being manually controlled

THEN

BLOCK the SFAS low RCS pressure trip when the block permit comes in.

8.18.4 Depressurize the RCS down to AND maintain the minimum adequate subcooling margin limit during RCS cooldown until RCS pressure reaches approximately 1000 PSIG.

THEN

Maintain RCS pressure between 975 to 1025 PSIG.

DETAILS

8.18.2 It is desirable to cooldown using BOTH SGs if possible. Place BOTH loop TBV H/A stations in HAND and position them to establish a cooldown at a rate as close to 100°F/hr as can be reasonably controlled. IF the condenser is NOT available, use the AVVs. IF the SFRCS or SFAS has tripped the AVVs, BLOCK the trip and take control as follows:

1. Place both atmospheric vent valves H/A stations in HAND and run the demand to minimum.

2. Press both atmospheric vent valves block buttons, HIS-ICS-11D and HIS-ICS-11C.

3. Press AUTO on HIS-ICS-11B and HIS-ICS-11C.

4. Control SG pressure as desired from the H/A station.

Atmospheric vent valves will not operate from the Control Room H/A station if ICS AC OR DC is lost OR instrument air pressure is <75 PSIG. Local control will be required per Attachment 3, Attachments Tab.

NOTE 8.18.3: SFAS initiation on high containment pressure, high containment radiation and from manual actuation switches will function normally with the SFAS low RCS pressure trip BLOCKED. To manually actuate the SFAS in responses to low RCS pressure, the operator can actuate all the necessary equipment for the required incident level, component by component, from each component control switch OR manual actuation at the SFAS system level from the manual actuation switches.

8.18.3 When RCS pressure is <1800 PSIG and annunciator alarm SFAS RC PRESS <1800 BLK PRMT (5-3-3) comes in, BLOCK all four SFAS channels and insure the SFAS RC press <1650 TRIP BLOCKED (5-4-3) light comes on. IF manual actuation of SFAS becomes necessary, refer to Table 2 in Tables Tab for component status information.

8.18.4 Adequate subcooling margin exists when the TSAT meters
1 indicate ≧ 20°F. If NEITHER TSAT meter is available,
adequate subcooling margin exists when the RCS pressure and
temperature combination on the P/T display or manual plot is
above and to the left of the subcooled margin line. This
pressure is below the fuel-in-compression curve, but it is
necessary to reduce the driving force on the tube leak.
This is also shown on Figure 1 in the Figures Tab.

ACTIONS

8.18.5 BLOCK SFRCS low main steam line pressure AND SG high level trips when the block permit comes in.

8.18.6 IF the tube ruptured SG Operate Range level is approaching
1 the SFRCS high level trip setpoint (94%)

THEN

Increase the steaming rate on the tube ruptured SG to attempt to keep the level below the SFRCS trip setpoint.

8.18.7 IF the tube ruptured SG Operate Range level can NOT be
1 maintained <94% on the Operate Range

THEN

Stop steaming the tube ruptured SG

AND close its MSIV

AND continue the cooldown on the good SG.

8.18.8 When RCS conditions of 500°F Tc AND 1000 PSIG are reached, if the non tube ruptured SG can be steamed

THEN

Stop the RCS cooldown.

Close the MSIV on the tube ruptured SG.

Maintain DH removal by steaming the good SG with the TBVs (AVV if condenser is not available), AND go to Step 8.19.

OR

IF the non tube ruptured SG can NOT be steamed

THEN

Go to Step 8.20.

8.19 Proceed with plant operations as directed by PP 1102.10, Plant Shutdown and Cooldown and refer to the appendices of AB 1203.40, SG Tube Leak, for additional guidance on actions and control measures.

DETAILS

8.18.5 When SG pressure is <650 PSIG and annunciator alarms SFRCS CH 1 (2) MN STM LO PRESS/HI LVL BLK PRMT (12-3-3(4)) come in, BLOCK all four SFRCS channels and insure both SFRCS CH 1 (2) MN STM LO PRESS/HI LVL TRIP BLKD (12-4-3(4)) annunciator alarms come in.

8.18.6 If cooldown is established using the TBVs and condenser, an SFRCS high level trip would cause SG isolation forcing use of AVVs. If the cooldown is established using the AVVs, an SFRCS high level trip would necessitate closing the AVV to protect it from possible water damage. An increased steaming rate on one SG will require a decreased steaming rate on the other SG to maintain the cooldown rate constant.

8.18.7 If the SFRCS high SG level trip has <u>NOT</u> been BLOCKED, a
1 | water level of 94% on the Operate Range will cause a high SG level SFRCS trip. The steam generator cannot be steamed above this level as possible water damage to the MSIV, MS line, TBVs, or AVV might occur, preventing later isolation of the SG. If the water level can't be controlled, the cooldown will have to be shifted to the good SG and the tube ruptured SG isolated before water enters the MS line.

8.18.8 When RCS conditions of 500°F Tc and 1000 PSIG are reached, stop the RCS cooldown by closing back on the TBVs (AVVs). Ensure no steam loads are being supplied by the tube ruptured SG MS line and isolate the tube ruptured SG by closing its MSIV. The SG will continue to fill thru the tube rupture. Increase the steaming rate using the TBVs (AVV) on the good SG enough for DH Removal as indicated by constant or slightly decreasing Tc.

ACTIONS

8.20 Transition from SG cooling to MU/HPI cooling.

8.20.1 Stop the RCS cooldown but continue to steam the tube ruptured SG enough to maintain RCS temperature constant or slightly decreasing until it has been at least 1/2 hour since reactor shutdown (or trip).

DO NOT continue until the reactor has been shutdown at least 1/2 hour.

8.20.2 Increase MU/HPI flow to start increasing pressurizer level at a rate as fast as RC pressure can be controlled

AND

At the same time maintain RCS pressure above the minimum adequate subcooling margin limit but below 1000 psig by:

Manually operating RC2, spray valve (RCPs on)

OR

Manually operating RC239A and RC200, pressurizer vent line OR RC2A, PORV (RCPs off)

8.20.3 IF the increased MU/HPI flow, in combination with the steaming on the tube ruptured SG, re-establishes enough cooldown rate to slow pressurizer fill,

THEN

Reduce the SG steaming rate.

DETAILS

8.20 Transition from SG cooling to MU/HPI cooling.

These steps will establish MU/HPI cooling with the RCS solid, the PORV open and, if necessary, 140 gpm letdown in service, while maintaining adequate subcooling margin AND maintaining RCS pressure less than the SG MSSV setpoints. This will permit isolation of the tube ruptured SG AND maintain core cooling without SG heat removal.

8.20.1 The reactor must be shutdown for at least 1/2 hour to allow the decay heat level to be low enough to be matched by MU/HPI cooling. The tube ruptured SG will have to be steamed until this time limit is reached. The cooldown is stopped by closing back on the TBVs (AVVs) when RCS temperature of 500° Tc (520° Th, RCPs off) is reached, but maintaining enough steaming to prevent RCS heatup.

8.20.2 This step is trying to collapse the steam bubble as quickly as possible while still maintaining RCS pressure control. This step will have to be coordinated with Step 8.20.3 below.

8.20.3 This step will have to be coordinated with Step 8.20.2 above. The increased MU/HPI cooling will have to be balanced with the SG heat removal or the RCS contraction will slow pressurizer fill.

ACTIONS

8.20.4 When the pressurizer goes solid, as indicated by a sudden rapid increasing of RCS pressure,

Immediately

Open the PORV.

Throttle MU/HPI flow to maintain RCS pressure greater than the minimium adequate subcooling margin limit but less than 1000 PSIG.

8.20.5 Stop steaming the tube ruptured SG and monitor RCS temperature.

IF the RCS begins to heat back up

THEN

Go to an RCP combination that has a maximum of two RCPs running

AND

Re-establish letdown flow for additional core cooling, up to 140 GPM may be required.

8.20.6 Close the MSIV on BOTH SGs

AND

Isolate the tube ruptured SG per AB 1203.40, Appendix A.

8.20.7 As the RCS cools down, throttle MU/HPI back to maintain RCS pressure close to but greater than the minimum adequate subcooling margin limit.

8.20.8 IF RCPs are NOT running, open the loop high point vents,
Loop 1, RC4608A AND RC4608B
Loop 2, RC4610A AND RC4610B

AND

Maintain adequate subcooling margin based on incore T/C temperature

AND

Continue attempts to regain forced RCS flow.

DETAILS

8.20.4 When the pressurizer goes solid, RCS pressure will begin rapidly increasing. At this time, LOCK OPEN the PORV with its control switch and throttle MU/HPI to maintain RCS pressure greater than the minimum adequate subcooling margin limit but less than 1000 PSIG.

8.20.5 Stop steaming the tube ruptured SG by closing the TBVs (AVVs). At this time, the core is being cooled by MU/HPI injection to the RCS with flow out of the RCS through the PORV. If additional RCS cooling is needed and three or four RCPs are running, going to a 2 running RCP combination will reduce heat input to the RCS. Re-establishing letdown flow will provide additional cooling by removing hot water from the RCS and increasing MU/HPI flow.

8.20.6 When the MSIVs are closed, MFW will be lost, however, it is not needed in this mode of cooling. The tube ruptured SG secondary water level will continue to increase through the leak.

8.20.7 RCS pressure should be maintained as low as possible to minimize the leak rate through the ruptured tube but this will have to be balanced against the core cooling required to maintain decay heat removal. As RCS pressure is lowered, the flow through the PORV will decrease.

8.20.8 With RCPs <u>NOT</u> running and no SG heat removal, there will be no natural circulation flow in the loops. The stagnant hot water in the loops may eventually flash to steam as RCS pressure is lowered. Opening the loop high point vents will provide a small amount of flow in the loops, although it will probably be insufficient to prevent loss of minimum subcooling margin in the loops. Forced RCS flow, even with only one RCP running, should prevent loss of minimum subcooling margin in the loops.

ACTIONS

8.20.9 Transfer MU pump suction between the MU tank and the BWST by shifting MU3971, as necessary, to keep MU tank level between the high and low level alarm points

<u>AND</u>

Insure the MU pumps are injecting greater than the letdown flow to the RCS so MU tank level can be lowered.

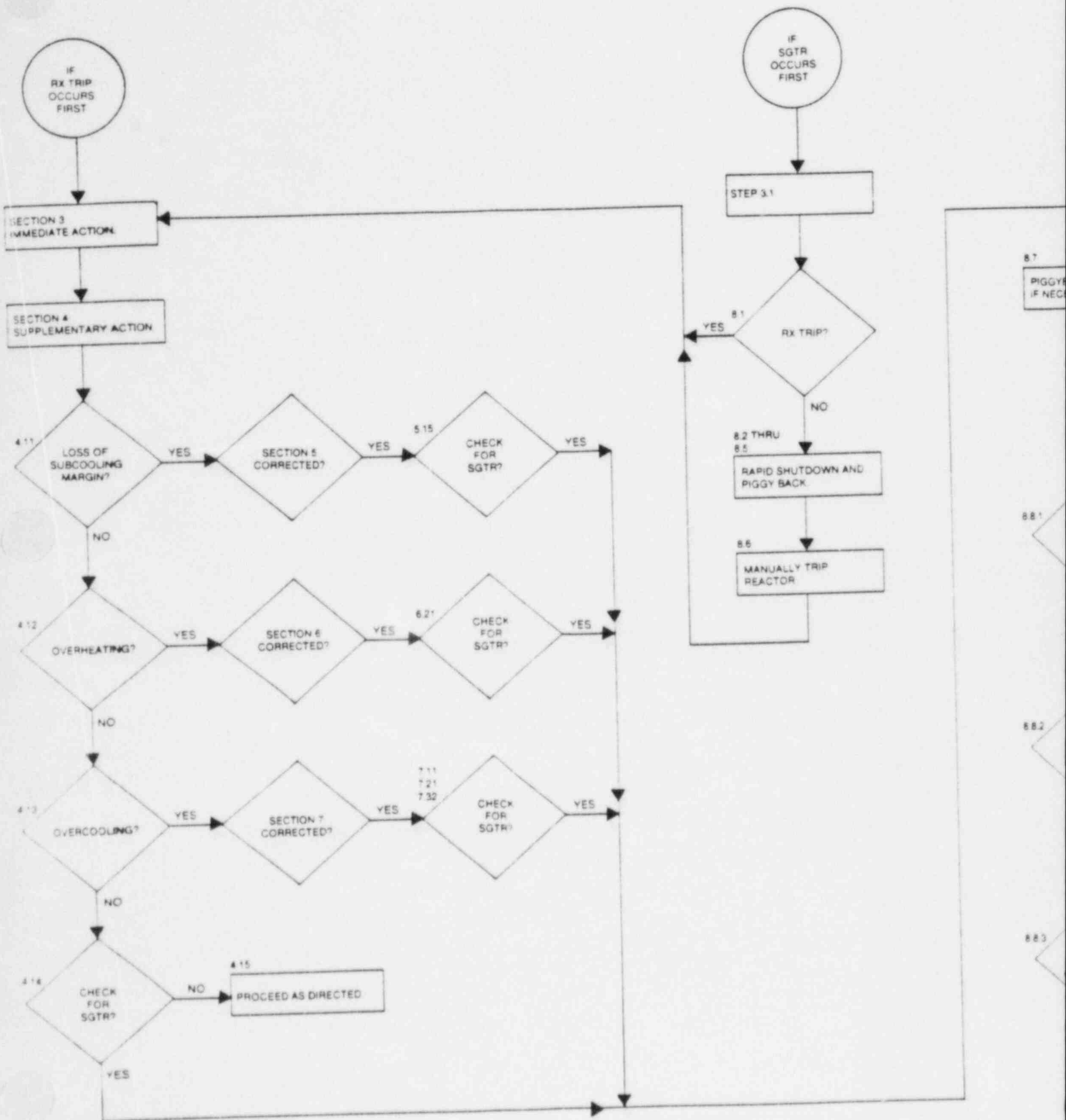
8.20.10 Continue cooldown and depressurization in this manner until plant conditions permit establishing DHR system cooling at 250 PSIG and 280°F. Use PP 1102.10, Plant Shutdown and Cooldown, as a guide as much as possible.

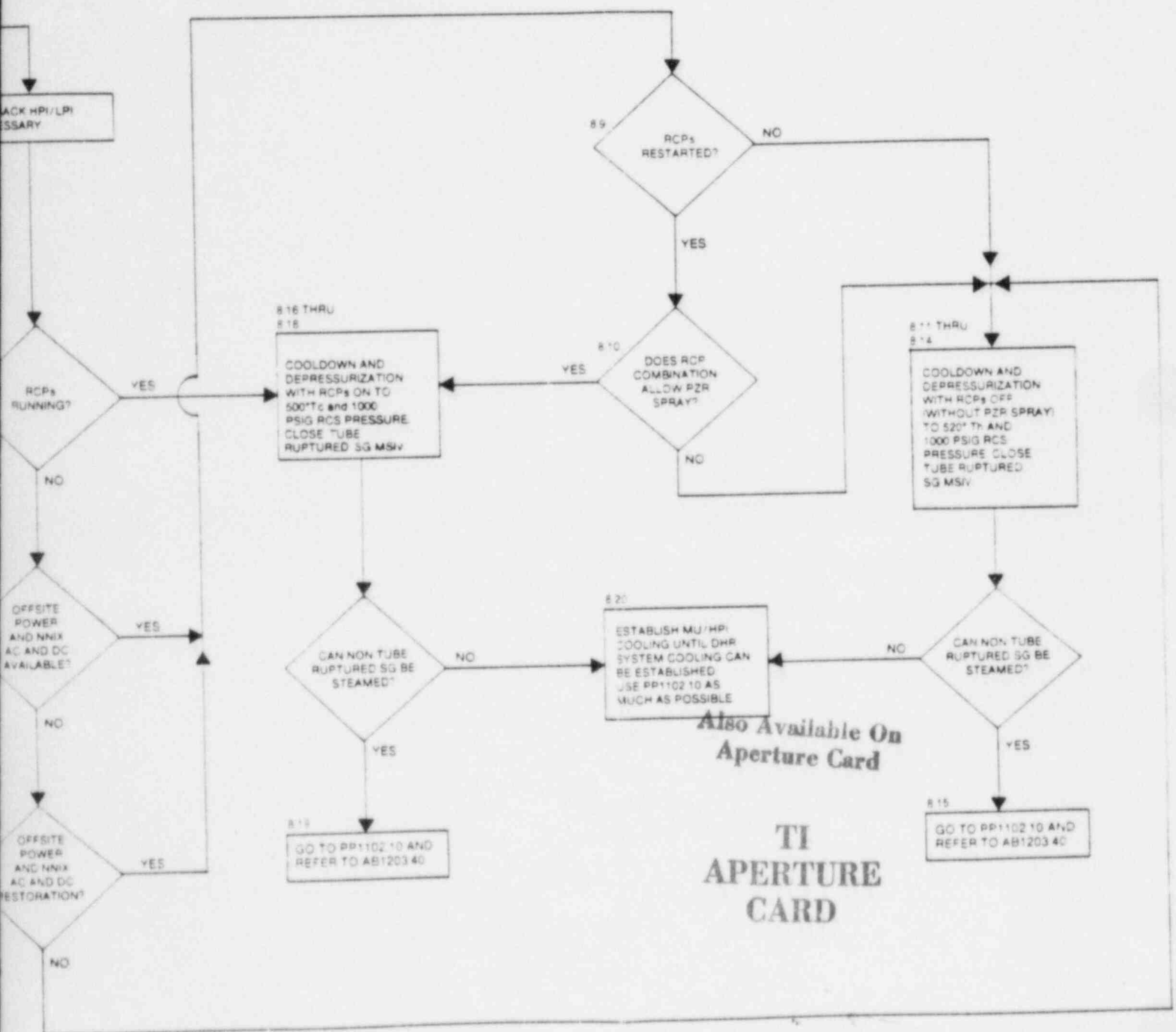
<u>AND</u>

Monitor BWST level. If BWST level decreases to 8 feet before DHR system cooling can be established, piggyback HPI to LPI taking suction on the containment emergency sump per SP 1104.04, Section 11.

DETAILS

8.20.9 With letdown in service, it will be necessary to periodically pump the MU tank level down. It is NOT desirable to divert the letdown to the CWRTs as it will cause more inventory loss from the BWST. When the decay heat level is low enough that core cooling can be maintained by the flow through the PORV alone, letdown can be isolated. The actual time when this will occur will have to be determined by periodic attempts.


IF RX TRIP OCCURS FIRST
SECTION 3 IMMEDIATE ACTION
SECTION 4 SUPPLEMENTARY ACTION
4.11
LOSS OF SUBCOOLING MARGIN?
YES
SECTION 5 CORRECTED?
YES
5.15
CHECK FOR SGTR?
YES
NO
4.12
OVERHEATING?
YES
SECTION 6 CORRECTED?
YES
6.21
CHECK FOR SGTR?
YES
NO
4.13
OVERCOOLING?
YES
SECTION 7 CORRECTED?
YES
7.11
7.21
7.32
CHECK FOR SGTR?
YES
NO
4.14
CHECK FOR SGTR?
NO
4.15
PROCEED AS DIRECTED
YES
IF SGTR OCCURS FIRST
STEP 3.1
8.1
RX TRIP?
YES
NO
8.2 THRU 8.5
RAPID SHUTDOWN AND PIGGY BACK
8.6
MANUALLY TRIP REACTOR
8.7
8.8.1
8.8.2
8.8.3


ACK HPI/LPI
ESSARY
8.9
RCPs
RESTARTED?
NO
YES
8.16 THRU
8.18
COOLDOWN AND
DEPRESSURIZATION
WITH RCPs ON TO
500°Tc and 1000
PSIG RCS PRESSURE.
CLOSE TUBE
RUPTURED SG MSIV
8.10
DOES RCP
COMBINATION
ALLOW PZR
SPRAY?
YES
NO
8.11 THRU
8.14
COOLDOWN AND
DEPRESSURIZATION
WITH RCPs OFF
(WITHOUT PZR SPRAY)
TO 520° Th AND
1000 PSIG RCS
PRESSURE. CLOSE
TUBE RUPTURED
SG MSIV
RCPs
RUNNING?
YES
NO
OFFSITE
POWER
AND NNIX
AC AND DC
AVAILABLE?
YES
NO
CAN NON TUBE
RUPTURED SG BE
STEAMED?
NO
YES
8.20
ESTABLISH MU/HPI
COOLING UNTIL DHR
SYSTEM COOLING CAN
BE ESTABLISHED.
USE PP1102.10 AS
MUCH AS POSSIBLE
NO
CAN NON TUBE
RUPTURED SG BE
STEAMED?
YES
8.15
GO TO PP1102.10 AND
REFER TO AB1203.40
8.19
GO TO PP1102.10 AND
REFER TO AB1203.40
OFFSITE
POWER
AND NNIX
AC AND DC
RESTORATION?
YES
NO

9. INADEQUATE CORE COOLING

ACTIONS

No assumptions have been made on how the inadequate core cooling condition was reached. Obviously the condition could only be the result of a series of equipment failures and/or operational errors. Nevertheless, the condition is assumed to have occurred and this procedure provides guidance on what steps should be taken to correct the problem. Note that some of the equipment called upon is the same equipment which would probably have to have failed in order to reach this condition. Therefore, completion of all of the steps may not be possible, but those steps that can be completed should be. Some directions given in this section are not in agreement with directions in other procedures or other sections of this procedure. If an inadequate core cooling situation exists, the directions of this section supersede all others.

ACTIONS FOR INADEQUATE CORE COOLING

9.1 Actuate AND control MU/HPI per specific rules 1 and 2.

9.2 Verify operable SG(s) Startup Range level is at OR manually increase to 124".

9.3 Lower SG pressure to induce heat transfer.

- 9.3.1 Depressurize SGs, while maintaining secondary side water level, to achieve secondary TSAT 90° to 110°F lower than TSAT for the existing RCS pressure.
- 9.3.2 When heat transfer is restored, continue to depressurize SGs as necessary to achieve a 100°F/hr RCS cooldown rate.

9. INADEQUATE CORE COOLING

DETAILS

ACTIONS FOR INADEQUATE CORE COOLING

9.1 Specific rules 1 and 2 are contained in the Specific Rules Tab.

9.2 Verify operable SG(s) Startup Range level is at OR manually increase to 124".

1. If SFRCS AND SA2 are actuated, SG levels will be auto controlled at 124".

2. If SFRCS is actuated but SA2 has NOT actuated, levels will be auto controlled at 46". Change the SG level setpoint to HIGH on the SFAS valve panel.

3. If MFW is the only FW source available, manually increase SG levels to 124". This may require resetting or overriding SFRCS trip signals to provide a flowpath dependent on the exact failure.

4. If the SUFP is the only FW source available, place it in service on ONLY ONE SG. Refer to Steps 6.4 and 6.5 or 6.6. When the SG level is increased to 124", return to Step 9.2. For remainder of this section, steps directing actions on both SG's will only apply to the SG being fed by the SUFP.

9.3 This step is making the SG a better heat sink by lowering the SG TSAT below the RCS TSAT. Both TSATs must be determined from the corresponding system pressure. If the condenser is available, place TBV H/A stations in HAND and open them slowly to lower SG pressure. If the condenser is NOT available, use AVVs to lower SG pressure. If the SFRCS or SFAS has tripped the AVVs, BLOCK the trip and take control as follows:

ACTIONS

9.4 Ensure core flood tank isolation valves are open CF1A AND CF1B.

9.5 Verify LPI systems are actuated with SFAS Incident Level 3 at 450 PSIG RCS pressure with maximum LPI flow supplied to the core.

9.6 IF RCS pressure is > 1500 PSIG

OR subsequently increases to > 1500 PSIG

THEN

Open RC2A (PORV) AND RC11, PORV block, if closed

AND

Cycle the PORV, as necessary, to maintain RCS pressure 90 to 100 PSIG greater than the highest SG pressure.

9.7 Monitor the incore T/C temperatures AND RCS pressure.

9.7.1 Refer to Figure 2 AND take action according to the following table.

REGION	ACTION
1	Go to Section 11
2	Continue Step 9.1 thru 9.7
3	Go to Step 9.8
4	Go to Step 9.12

9.8 If possible, start one RCP per loop. Do NOT override normal pump starting interlocks. Containment isolation for seal injection and component cooling water may be BLOCKED and opened as necessary.

9.9 Attempt to induce heat transfer from the RCS to the SGs.

DETAILS

1. Place the atmospheric vent valve H/A station in HAND and run the demand to minimum.

2. Press the atmospheric vent valve block button HIS-ICS-11D or HIS-ICS-11C.

3. Press AUTO on HIS-ICS-11B or HIS-ICS-11C.

4. Control SG pressure as desired from the H/A station.

9.5 SFAS incident level response should be verified in accordance with Table 2, Tables Tab.

9.6 This step is attempting to keep RCS pressure as low as possible to allow maximum injection flow, while maintaining the normal ΔP direction on the SG tubes.

9.7 Monitor the incore T/C temperatures AND RCS pressure.

9.7.1 Figure 2 is in Figures Tab. Core outlet temperature is determined from the incore T/C temperatures per Attachment 4, Attachments Tab. RCS pressure is determined from wide range pressure indication (SFAS Channel 1 or 2 can be used as they also input to the TSAT meters).

9.8 If necessary, refer to SP 1103.06, RC Pump Operation, for starting and operating limits.

9.9 Attempt to induce heat transfer from the RCS to the SGs.

ACTIONS

9.9.1 Manually increase <u>AND</u> maintain <u>BOTH</u> SG levels to 85% on the Operate Range.

9.9.2 Rapidly lower <u>BOTH</u> SG pressures to achieve a 100°F step decrease in secondary TSAT. Use the following table for guidance on how far to drop secondary pressure.

INITIAL PRESSURE	FINAL PRESSURE (PSIG)
1000	400
800	300
600	210
400	125

9.10 Further depressurize the RCS by cycling the PORV, as necessary, to keep RCS pressure 40 to 60 PSIG greater than the highest SG pressure <u>AND</u>

Open or verify open the loop <u>AND</u> pressurizer high point vents.

Loop 1	RC4608A <u>AND</u> RC4608B
Loop 2	RC4610A <u>AND</u> RC4610B
Pressurizer	RC239A <u>AND</u> RC200

9.11 Check for re-established SG heat transfer.

9.11.1 <u>IF</u> heat transfer from the RCS to at least one SG <u>IS NOT</u> established

<u>THEN</u>

Lock open RC2A (PORV) control switch to depressurize the RCS until MU/HPI/CF/LPI return incore T/C temperature to saturation

<u>AND THEN</u>

Go to Section 12, MU/HPI Cooling

<u>OR</u>

9.11.2 <u>IF</u> heat transfer from the RCS to at least one SG <u>IS</u> established when incore T/C temperatures return to saturation

<u>THEN</u>

Go to Section 11, RCS Saturated SG Removing Heat.

DETAILS

9.9.1 Using the available feed source, MFW, AFW, or SUFP, increase SG levels to and then maintain 85% on the Operate Range. This SG level may promote boiler condenser cooling while allowing some margin below the SFRCS high SG level trip
1 | setpoint at 94% on the Operate Range. If RCP restart was not possible per Step 9.8, increasing SG level in this step may cause the SG depressurization that will be performed in Step 9.9.2.

9.9.2 This step is attempting to induce heat transfer by lowering the heat sink temperature. At this point, the temperature drop is limited to 100°F to maintain the SG tube to shell ΔT within the 100°F limit.

9.10 This step is attempting to further increase injection flow by lowering RCS pressure while still maintaining the normal ΔP direction on the SG tubes.

9.11 Check for re-established SG heat transfer.

9.11.1 If heat transfer to at least one SG cannot be re-established, core cooling is via the available ECCS injecting water through the core, out the PORV and system high point vents, and into the containment vessel.

9.11.2 If heat transfer to at least one SG is re-established, core cooling is via a combination of ECCS injection water and SG heat removal.

ACTIONS

9.12 If possible, start all four RCPs.

9.12.1 If necessary, jumper RCP start interlocks per Attachment 5

AND

Record the start time for each RCP.

1-1 __________ 1-2 __________
2-1 __________ 2-2 __________

Set the "ST timer" for 30 minute from the time each pump is started.

1 | 9.12.2 If CCW is NOT available to the RCP motor within 30 minutes from the starting time

THEN

Trip the RCP.

9.13 Attempt to induce heat transfer from the RCS to the SGs.

9.13.1 Manually increase AND maintain BOTH SG levels to 85% on the Operate Range.

9.13.2 Rapidly depressurize BOTH SG pressures to 60 to 100 PSIG.

9.14 Depressurize the RCS by opening the PORV and RC11, the PORV block valve, if closed

AND

Open or verify open the loop AND pressurizer high point vents.

Loop 1	RC4608A AND RC4608B
Loop 2	RC4610A AND RC4610B
Pressurizer	RC239A AND RC200

DETAILS

9.12 If possible, start all four RCPs.

9.12.1 RCP starting interlocks are jumpered per Attachment 5, Attachments Tab. If the interlocks must be jumpered, complete the work on one pump and then proceed to the next one, starting each pump as soon as its interlocks are jumpered. The motor overload trip circuit will remain in service. It should be recognized that starting the RCP without cooling and/or injection water will probably fail the pump seals and may cause the pump shaft to break.

9.12.2 To minimize the possibility of a fire in containment, in conjunction with hydrogen in the containment atmosphere, the RCPs must be tripped after 30 minutes of run time without CCW available to the motor.

9.13 Attempt to induce heat transfer from the RCS to the SGs.

9.13.1 Using the available feed source, MFW, AFW, or SUFP, increase SG levels to and then maintain 85% on the Operate Range. This SG level may promote boiler condenser cooling while allowing some margin below the SFRCS high SG level trip
1 | setpoint at 94% on the Operate Range. If RCP restart was not possible per Step 9.12, increasing SG level in this step may cause the SG depressurization that will be performed in Step 9.13.2.

9.13.2 This step is a further attempt to induce heat transfer by lowering the heat sink temperature. SG pressure must be maintained at a minimum of 50 PSIA to drive the AFPT unless its steam is being supplied by the Auxiliary Boiler or the startup feed pump is feeding the SGs.

9.14 This step is a further attempt to increase injection flow by lowering RCS pressure. RCS pressure should eventually drop enough to allow LPI to start injecting water at approximately 150 PSIG.

ACTIONS

9.15 When incore T/C's return to the saturation temperature for the existing RCS pressure AND LPI flow is established

THEN

1. Decrease running RCPs to one per loop.

2. If the core flood tanks have emptied, close the core flood tank isolation valves, CF1A and CF1B.

3. Close the PORV, reopen if RCS pressure increases above 150 PSIG.

9.16 Check for re-established SG heat transfer.

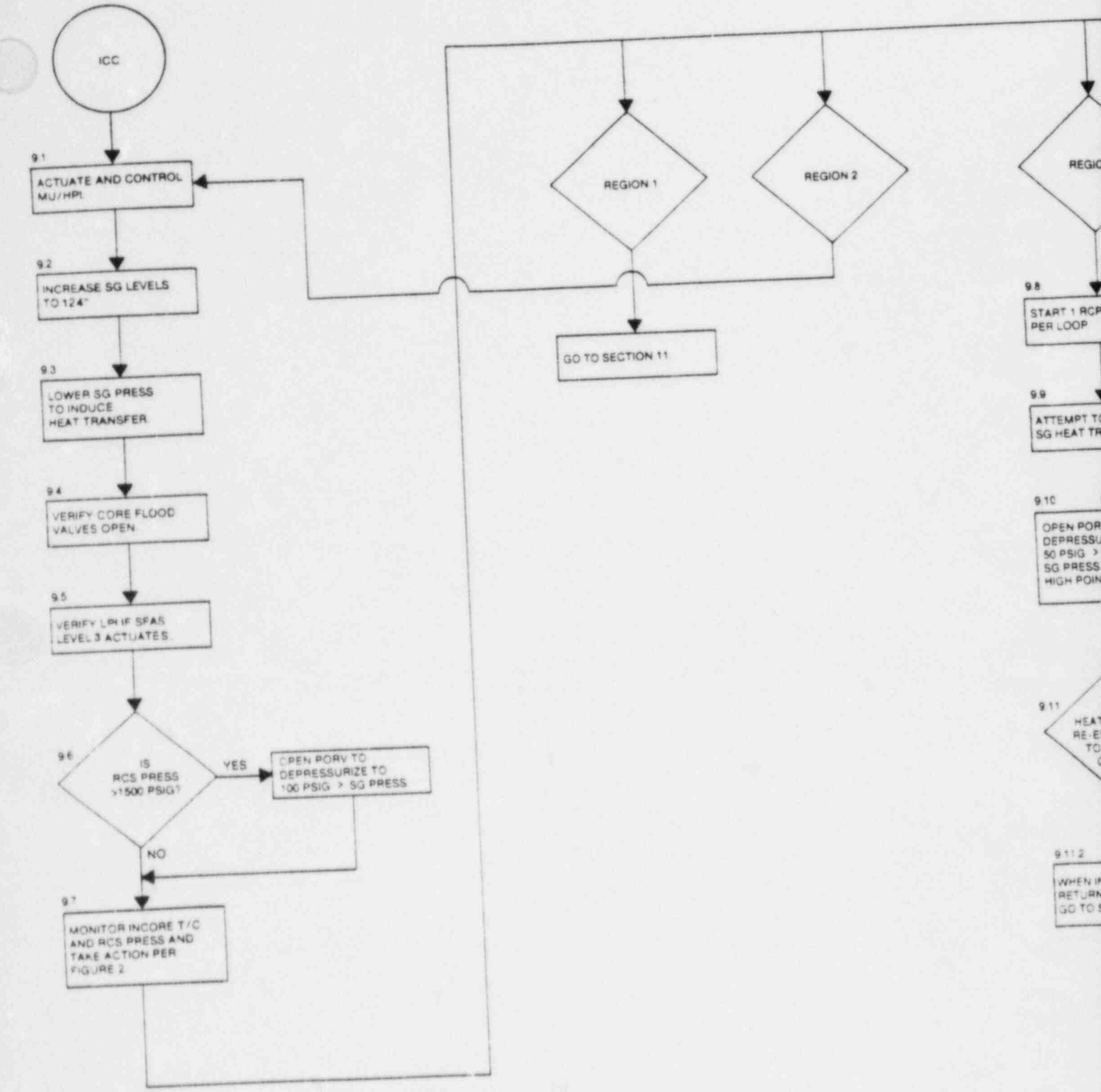
9.16.1 IF heat transfer from the RCS to at least one SG IS established, go to Section 11, RCS Saturated SG Removing heat.

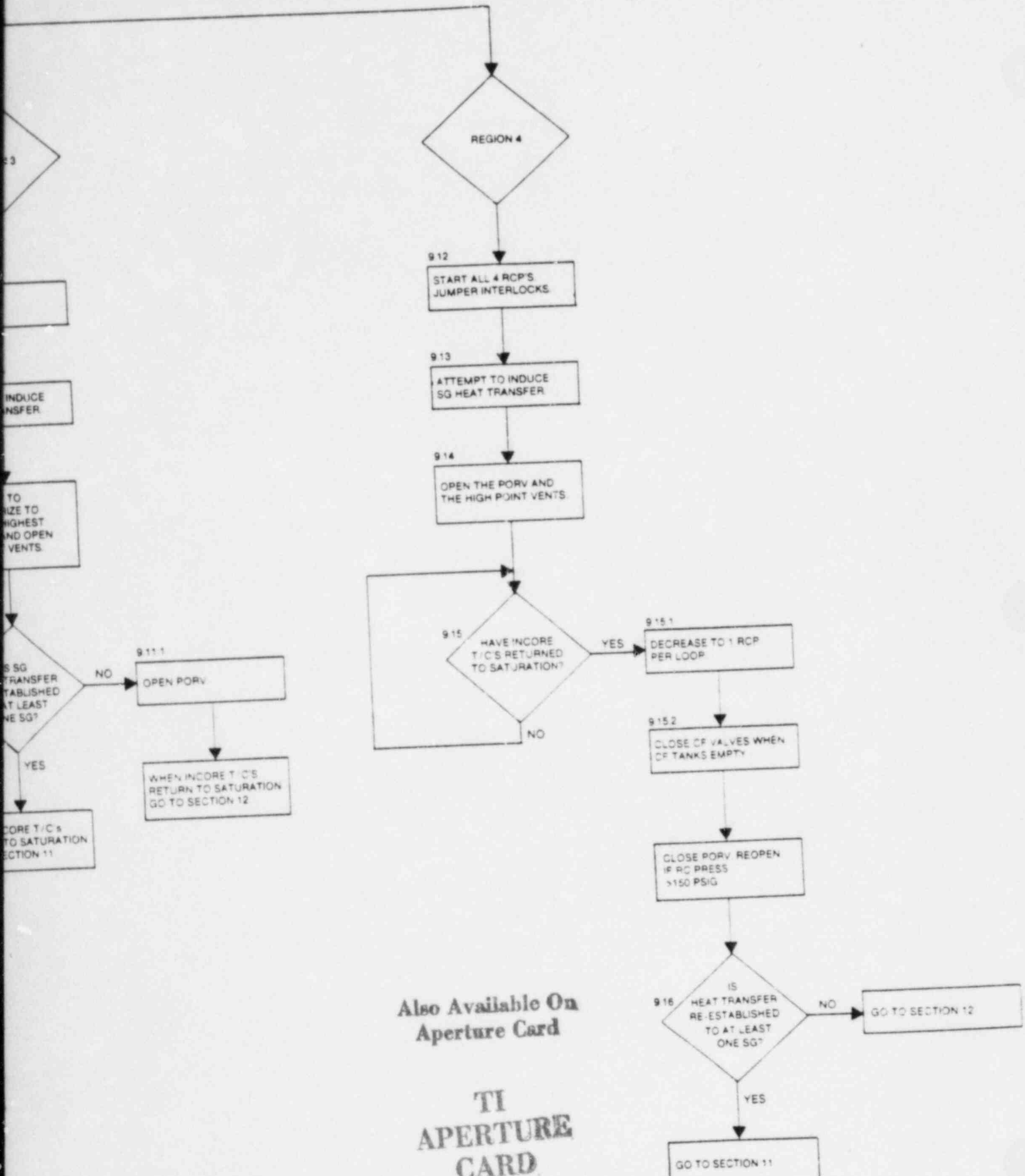
IF NOT

9.16.2 IF heat transfer from the RCS to at least one SG IS NOT established go to Section 12, MU/HPI Cooling.

DETAILS

3. RCS pressure is maintained below 150 PSIG to allow injection by the LPI pumps.


ICC
9.1
ACTUATE AND CONTROL MU/HPI.
9.2
INCREASE SG LEVELS TO 124"
9.3
LOWER SG PRESS TO INDUCE HEAT TRANSFER.
9.4
VERIFY CORE FLOOD VALVES OPEN.
9.5
VERIFY LPI IF SFAS LEVEL 3 ACTUATES.
9.6
IS RCS PRESS >1500 PSIG?
YES
NO
OPEN PORV TO DEPRESSURIZE TO 100 PSIG > SG PRESS.
9.7
MONITOR INCORE T/C AND RCS PRESS AND TAKE ACTION PER FIGURE 2
REGION 1
REGION 2
GO TO SECTION 11
9.8
9.9
9.10
9.11
9.11.2



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10. A LARGE LOCA HAS OCCURRED AND THE CORE FLOOD TANKS ARE EMPTYING

The objective of this section is to provide high level guidance to allow continued plant cooldown using existing procedures for the details of system and equipment operation. This high level guidance is necessary since the end conditions reached in the various sections of this procedure will not necessarily coincide with the assumed entry conditions in the existing plant and system procedures. The time span over which these actions are performed is sufficient to allow consulting other procedures, drawings, and references for the details of operation.

10.1 As time permits, perform the following actions:

1. Notify the STA.

2. Check EI 1300.01, Emergency Plan Activation, to determine if Emergency Action Levels have been exceeded and implement any appropriate procedures.

10.2 Reverify proper SFAS response to all trip parameters present per Table 2, Tables Tab.

1. SFAS equipment may NOT be overridden except as addressed in specific rule 4, Specific Rules Tab.

2. Additional equipment overridden per specific rule 4.2.8, with the Plant Manager's (or designee's) approval, should not be done without a review of the potential release of radioactive gas or liquid from containment.

10.3 IF RCS pressure stabilizes above the maximum injection pressure for LPI (about 200 PSIG)

THEN

1. IF there is heat transfer to at least one SG, go to Section 11, RCS Saturated SG Removing Heat.

2. IF there is NO heat transfer to either SG, go to Section 12, MU/HPI Cooling.

10.4 Refer to PP 1102.10, Plant Shutdown and Cooldown, for the balance of plant operation as much as possible.

10.5 Verify LPI system operation per SP 1104.04 Section 9, DH and LPI Operating Procedure.

1. The referenced procedure includes instructions for cross connecting one LPI pump for injection on both LPI lines in the event one of the LPI pumps is disabled.

10.6 Control HPI flow per specific rules 1 and 2 contained in the Specific Rules Tab.

10.7 IF SFAS Incident Level 4 has actuated, verify CS system operation per SP 1104.05, CS System.

10.8 Stop both MU pumps.

10.9 Prior to the BWST level decreasing to 8', determine if HPI can be stopped per specific rule 2.3 contained in the Specific Rules Tab.

1. IF HPI can be stopped, stop both HPI pumps per SP 1104.07 Section 5, HPI System Procedure.

2. IF HPI can NOT be stopped, piggyback LPI to the HPI pump suction per SP 1104.04 Section 11, DH and LPI Operating Procedure.

10.10 When the BWST level decreases to 8', transfer the LPI (and CS if running) pump suction to recirculation from the containment emergency sump per SP 1104.04 Section 10, DH and LPI Operating Procedure.

1. IF CS pumps are still operating, verify CS discharge valves CS1530 and CS1531 go to the THROTTLE position.

10.11 Continue LPI cooling until further instructions are given.

10.12 When a SG depressurizes to 25 PSIG, shutdown the AFW to that SG per SP 1106.06 Section 5, Auxiliary Feedwater System.

1. Core cooling via SG heat removal will not exist and is not required in a large LOCA. The AFPTs are left running until SG pressure decreases to 25 PSIG for heat removal from the SGs only. If a SG tube leak is known to exist, the AFW to that SG should be shutdown.

10.13 After approval per specific rule 4.2.8 AND if NOT supplying power to the essential electrical buses, return both DGs to the standby condition per SP 1107.11, EDG Operating Procedure.

10.14 Monitor AND control containment conditions per Table 3 in Tables Tab.

10.15 IF MCCE11B OR MCCF11A is NOT powered, in order to allow valve operation in the next step, an emergency tie of MCCE11B and MCCF11A can be accomplished as follows:

1. Insert the draw out units to breaker modules BE1153 (E11B) AND BF1135 (F11A).

   NOTE: These draw out units to be installed into the breaker cubicles are located in the Maintenance Shop storage bin and yellow tagged. Breaker cubicle BE1153 (E11B) is located on Elevation 585' outside the #3 Mechanical Penetration Room. Breaker cubicle BF1135 (F11A) is located on Elevation 603' on the north end of the #2 Electrical Penetration Room.

2. Identify non-energized MCC and open incoming breaker BF1105 for F11A OR BE1166 for E11B.

3. Manually trip all load breakers of the non-energized MCC except the Auxiliary Spray and Decay Heat Cooldown Isolation Valve Breakers BF1125 AND BF1130 if F11A is NOT energized OR BE1155 AND BE1183 if E11B is NOT energized.

4. Close cross tie breakers BE1153 AND BF1135 which completes the tie between E11B and F11A.

10.16 Within seven days, initiate a long term boron dilution flowpath by performing one of the following steps:

1. Open DH11 AND DH12 and verify a minimum total flow of 40 gpm on FI4908 and FI4909. If flow can NOT be verified, close DH11 AND DH12.

2. Close RC10. Open DH2736 AND DH2735 and verify a minimum flow of 40 gpm on FI4999 (located on Elevation 565' in hallway across from MU Pump Room).

11. TRANSIENT TERMINATION FOLLOWING AN OCCURRENCE THAT LEAVES THE RCS SATURATED WITH SGs REMOVING HEAT

The objective of this section is to provide high level guidance to allow continued plant cooldown using existing procedures for the details of system and equipment operation. This high level guidance is necessary since the end conditions reached in the various sections of this procedure will not necessarily coincide with the assumed entry conditions in the existing plant and system procedures. The time span over which these actions are performed is sufficient to allow consulting other procedures, drawings, and references for the details of operation.

11.1 As time permits, perform the following actions:

1. Notify the STA.

2. Check EI 1300.01, Emergency Plan Activation, to determine if Emergency Action Levels have been exceeded and implement any appropriate procedures.

11.2 Reverify proper SFAS response to all trip parameters present per Table 2, Tables Tab.

1. SFAS equipment may <u>NOT</u> be overridden except as addressed in specific rule 4, Specific Rules Tab.

2. Additional equipment overridden per specific rule 4.2.8, with the Plant Manager's (or designee's) approval, should not be done without a review of the potential release of radioactive gas or liquid from containment. 2

11.3 Verify that heat transfer is being controlled.

1. Verify maximum MU/HPI flow per specific rule 1, Specific Rules Tab.

2. Verify SG levels are at or increasing to the appropriate setpoint on the Startup Range per specific rule 1 at full continuous flow per specific rule 3.4, Specific Rules Tab.

11.4 <u>IF</u> RCS pressure decreases to the point where LPI flow starts,

<u>THEN</u>

Go to Section 10, Large LOCA.

<u>IF NOT</u>

Continue in this section.

11.5 Ensure the CF tank isolation valves remain open, CF1A and CF1B.

11.6 Begin a cooldown of the RCS referring to PP 1102.10, Plant Shutdown and Cooldown, as much as possible. IF the RCS cooldown rate due to the HP flow is ≥100°/hr, steaming per step 11.6.1 below will not be necessary until cooldown rate is <100°/hr.

1. Increase SG steaming by MANUAL control of TBVs if the condenser is available OR AVVs if the condenser is NOT available.

2. As cooldown proceeds verify the SGs continue to provide a heat sink for the RCS by checking:

   Incore T/C temperatures decrease as SG pressure is lowered

   AND

   SG pressure remains coupled to Tc.

3. BLOCK SFRCS low main steam line pressure trip when the BLOCK PRMT alarm comes in.

4. IF the RCS does NOT cooldown as the SGs are depressurized resulting in primary to secondary heat transfer being lost,

   THEN

   IF an RCP is running, go to Section 12, MU/HPI Cooling,

   OR

   IF an RCP is NOT already running, go to Section 6, Lack of Heat Transfer, Step 6.13.

5. IF heat transfer to the SGs is maintained or restored

   THEN

   Continue saturated cooldown by decreasing SG pressure.

11.7 IF BWST level decreases to 8'

THEN

IF running, stop the MU pumps

AND

Piggyback LPI to the HPI pump suction per SP 1104.04 Section 11, DH and LPI Operating Procedure.

11.8 After approval per specific rule 4.2.8 AND if NOT supplying power to the essential electrical buses, return both DGs to the standby condition per SP 1107.11, EDG Operating Procedure.

11.9 Monitor AND control containment conditions per Table 3 in Tables Tab.

11.10 IF the RCS becomes superheated, based on the guidance in Step 5.7,

THEN

Go to ICC Section 9.

11.11 IF the RCS remains saturated during the cooldown, go to Step 11.13

OR

IF minimum adequate subcooled margin is regained on the incore T/Cs and the hot legs during the cooldown proceed as directed below:

1. IF an RCP is running, go to Section 13, Solid Cooldown or Pressurizer Recovery.

2. IF an RCP can NOT be started, go to Section 13, Solid Cooldown or Pressurizer Recovery.

NOTE: SUBSTEP 3:
When restarting RCPs on natural circualtion or with possible steam voids in the RCS, anticipate a drop in RCS pressure and pressurizer level.

3. IF an RCP can be started, start an RCP per SP 1103.06, RC Pump Operating Procedure, preferably in Loop 2 to provide pressurizer spray,

   AND

   IF adequate subcooling margin still exists two minutes after the RCP start, go to Section 13, Solid Cooldown or Pressurizer Recovery.

   OR

   IF adequate subcooling margin is lost after the RCP start, allow the pump to continue to run and proceed with Step 11.12. The RC pump may be running with the RCS saturated. If the pump vibration reaches 30 mils stop the pump and start a different pump. It is desirable to maintain one RC pump running if possible.

11.12 When the CF tank levels decrease to 0', close the CF tank isolation valves CF1A and CF1B. Refer to SP 1104.01, Core Flooding System Operating Procedure, for guidance on correcting indicated CF tank level for containment ambient conditions.

11.13 Continue RCS cooldown and depressurization by decreasing SG pressure. WHEN RCS pressure decreases to 250 PSIG (this corresponds to 406° saturation temperature)

THEN

1. Decrease the cooldown rate by throttling back on the TBVs (AVVs).

2. Maintain 250 PSIG RCS pressure with HPI.

3. At this point as the core decay heat level decreases and the core is cooled by HPI and some secondary side cooling, adequate subcooled margin will be regained. When adequate subcooled margin is regained at this time, remain in this section and continue with Step 11.14.

11.14 While maintaining RCS pressure at 250 PSIG with HPI, continue the cooldown by decreasing SG pressure until the operating conditions of the DHR system are met (<250 PSIG and <280°F). When these conditions are met, proceed with Step 11.15.

11.15 Determine the operability of the DH pumps. If both DH pumps are available, go to Step 11.17. If only one DH pump is available, continue with Step 11.16.

11.16 Continued cooldown with only one DH pump initially available.

1. Piggyback the operable DH pump to the suction of the HPI pump(s) per SP 1104.04 Section 11, DH/LPI Operating Procedure.

2. Maintain RCS pressure at 250 PSIG by throttling HPI.

3. IF/WHEN the BWST level decreases to 8', transfer the LPI pump suction to the emergency sump per SP 1104.04 Section 10.

4. Maintain these plant conditions until the second DH pump becomes available.

5. IF the second DH pump is NOT available within seven days, establish a long term boron dilution flowpath per Section 10, Steps 10.15 and 10.16 AND then return to this section, Step 11.16.6.

6. WHEN the second DH pump becomes available, start it in the DH removal mode through DH11 and DH12 using the applicable steps of SP 1104.04 Section 4.

7. With decay heat flow greater than 1000 gpm, any running RCPs may be stopped.

8. As RCS temperature decreases, throttle HPI flow to reduce RCS pressure while maintaining adequate subcooling margin.

9. WHEN RCS pressure is low enough that at least 1000 gpm LPI flow is established on the DH pump in the LPI mode, stop HPI pumps and close the piggyback valves DH63 and DH64.

10. With one DH pump in the DH removal mode and one DH pump in the LPI mode with suction from the emergency sump, maintain this mode of cooling until further instructions are given by Station Management.

11.17 Continued cooldown with both DH pumps available

1. IF/WHEN the BWST level decreases to 8', transfer the LPI pump suction to the emergency sump per SP 1104.04 Section 10, DH/LPI Operating Procedure.

2. Start one DH pump in the DH removal mode through DH11 and DH12 using the applicable steps of SP 1104.04 Section 4.

3. With the decay heat flow greater than 1000 gpm, any running RCPs may be stopped.

4. As RCS temperature decreases, throttle HPI flow to reduce RCS pressure while maintaining adequate subcooling margin.

5. WHEN RCS pressure is low enough that at least 1000 gpm LPI flow is established on the DH pump in the LPI mode, stop HPI pumps and close the piggyback valves DH63 and DH64.

6. With one DH pump in the DH removal mode and one DH pump in the LPI mode with suction from the emergency sump, maintain this mode of cooling until further instructions are given by Station Management.

12. TRANSIENT TERMINATION FOLLOWING AN OCCURRENCE THAT LEAVES THE RCS BEING COOLED BY MU/HPI COOLING

The objective of this section is to provide high level guidance to allow continued plant cooldown using existing procedures for the details of system and equipment operation. This high level guidance is necessary since the end conditions reached in the various sections of this procedure will not necessarily coincide with the assumed entry conditions in the existing plant and system procedures. The time span over which these actions are performed is sufficient to allow consulting other procedures, drawings, and references for the details of operation.

12.1 As time permits, perform the following actions:

1. Notify the STA.

2. Check EI 1300.01, Emergency Plan Activation, to determine if Emergency Action Levels have been exceeded and implement any appropriate procedures.

12.2 Reverify proper SFAS response to all trip parameters present per Table 2, Tables Tab.

1. SFAS equipment may NOT be overridden except as addressed in specific rule 4, Specific Rules Tab.

2. Additional equipment overridden per specific rule 4.2.8,
2 with the Plant Manager's (or designee's) approval,
should not be done without a review of the potential release of radioactive gas or liquid from containment.

12.3 Refer to PP 1102.10, Plant Shutdown and Cooldown, for the balance of plant operation as much as possible.

12.4 IF the RCS becomes superheated, based on the guidance in Step 5.7

THEN

Go to ICC Section 9.

12.5 Monitor AND control containment conditions per Table 3 in Tables Tab.

12.6 Prior to the BWST level decreasing to 8', piggyback LPI to the HPI pump suction per SP 1104.04 Section 11, DH/LPI Operating Procedure.

12.7 When the BWST level decreases to 8', transfer the LPI (and CS if running) pump suction to recirculation from the containment emergency sump per SP 1104.04 Section 10

1. IF CS pumps are operating, verify CS discharge valves CS1530 and CS1531 go to the THROTTLE position.

12.8 Open or verify open the following valves:

1. RC2A, PORV AND RC11, PORV block valve.
2. RC4608A AND RC4608B, Loop 1 high point vents.
3. RC4610A AND RC4610B, Loop 2 high point vents.
4. RC239A AND RC200, pressurizer high point vent.

12.9 While the core is being cooled by MU/HPI cooling flow into the RCS and out the open vent valves, control MU/HPI per specific rules 1 and 2, in the Specific Rules Tab.

AND

Continue efforts, in parallel, to regain heat transfer to a SG

1. IF the SUFP is regained after entering Section 12 without it, return to Section 6, Step 6.4.

2. IF main or auxiliary feedwater is regained after entering Section 12 without it, return to Section 6, Step 6.7.

3. IF the ability to bump or run an RCP is regained after entering Section 12 without it, return to Section 6, Step 6.14.

4. IF heat transfer to at least one SG is regained AND the RCS is saturated, go to Section 11.

5. IF heat transfer to at least one SG is regained AND the RCS has adequate subcooled margin, go to Section 13.

12.10 IF the RCS is saturated, ensure CF1A and CF1B, CF tank isolation valves, remain open until the CF tank level decreases to 0',

THEN

Isolate the CF Tanks. Refer to SP 1104.01, Core Flooding System Operating Procedure, for guidance on correcting indicated CF tank level for containment ambient conditions.

12.11 RCS adequate subcooled margin will eventually be regained allowing MU/HPI throttling for RCS pressure control. As the RCS cools down, throttle HPI flow to decrease RCS pressure.

WHEN

RCS temperature is <280°F AND RCS pressure is <250 PSIG

THEN

Go to Section 11, Step 11.15.

13. TRANSIENT TERMINATION FOLLOWING AN OCCURRENCE THAT MAY REQUIRE PRESSURIZER RECOVERY OR SOLID PLANT COOLDOWN WITH SG(s) REMOVING HEAT AND RCS SUBCOOLED

The objective of this section is to provide high level guidance to allow continued plant cooldown using existing procedures for the details of system and equipment operation. This high level guidance is necessary since the end conditions reached in the various sections of this procedure will not necessarily coincide with the assumed entry conditions in the existing plant and system procedures. The time span over which these actions are performed is sufficient to allow consulting other procedures, drawings, and references for the details of operation.

13.1 As time permits, perform the following actions:

1. Notify the STA.
2. Check EI 1300.01, Emergency Plan Activation, to determine if Emergency Action Levels have been exceeded and implement any appropriate procedures.

13.2 Reverify proper SFAS response to all trip parameters present per Table 2, Tables Tab.

1. SFAS equipment may <u>NOT</u> be overridden except as addressed in specific rule 4, Specific Rules Tab.
2. Additional equipment overridden per specific rule 4.2.8, 2 with the Plant Manager's (or designee's) approval, should not be done without a review of the potential release of radioactive gas or liquid from containment.

13.3 <u>IF</u> the RCS is being vented through the PORV line or high point vents

<u>THEN</u>

Isolate all vent flowpaths

1. Close RC2A, PORV <u>AND</u> RC11, PORV block (if necessary)
2. Close RC4608A <u>AND</u> RC4608B, Loop 1 high point vents
3. Close RC4610A <u>AND</u> RC4610B, Loop 2 high point vents
4. Close RC239A <u>AND</u> RC200, pressurizer high point vents

13.4 <u>IF</u> the SFAS has actuated, if possible reset the SFAS and restore components per PP 1102.03, Trip Recovery.

13.5 Monitor <u>AND</u> control containment conditions per Table 3 in Tables Tab.

13.6 <u>IF</u> there is a bubble in the pressurizer, refer to PP 1102.10, Plant Shutdown and Cooldown as much as possible.

NOTE: 13.7: When restarting RCPs on natural circualtion or with possible steam voids in the RCS, anticipate a drop in RCS pressure and pressurizer level.

13.7 Go to a 0/2 RCP combination, if possible, for plant cooldown. If on natural circulation and RCPs can NOT be started continue with Step 13.8. Start RCPs per SP 1103.06, RCP Operation.
1 RCP restart may be performed after step 13.10 at the Shift Supervisors discretion.

13.8 Control MU/HPI flow

1. Throttle MU/HPI flow to maintain RCS pressure as low as possible without exceeding any limits per Figure 1, Figures Tab. It may be possible to terminate HPI per specific rule 2.3, Specific Rules Tab.

2. Re-establish letdown flow as an aid in RCS pressure control.

13.9 IF the decision is made NOT to establish a bubble in the pressurizer, proceed with a solid plant cooldown at Step 13.13.

13.10 Establish a bubble in the pressurizer

1. Turn on all available pressurizer heaters.

2. Monitor the increase in pressurizer water temperature. When the temperature reaches saturation for the existing RCS pressure, a bubble will begin forming.

3. Increase letdown flow to lower pressurizer level to approximately 200".

13.11 After a bubble is formed, control RCS pressure within the limits of Figure 1, with heaters and spray (RCPs on) or pressurizer vent (RCPs off).

13.12 Refer to PP 1102.10, Plant Shutdown and Cooldown as much as possible.

13.13 If a bubble is NOT formed in the pressurizer, proceed with plant cooldown following PP 1102.10 as much as possible. As the cooldown rate is established using the TBVs (AVVs if condenser is NOT available), RCS pressure will have to be controlled by increasing RCS makeup (or HPI) or decreasing letdown flow to compensate for RCS contraction.

1.0 ACTIONS FOR LOSS OF ADEQUATE SUBCOOLING MARGIN

1.1 If RCS pressure is > 1650 PSIG SFAS trip setpoint, two MU pumps must be run at full MU system capacity taking suction from the BWST as long as BWST level > 8'.

1. Start the second MU pump.
2. Fully open MU32, MU control valve.
3. Shift MU pump suction to the BWST by closing MU3971, MU pump suction 3-way valve.

1.2 HPI must be initiated per specific rule 2.1.

1.3 RCPs must be immediately tripped.

1.4 Operable SG levels must be raised to 124" (128") on the Startup Range using AFW.

2.4 HPI Piggyback Operation

2.4.1 HPI piggyback operation may be initiated at the operators discretion, as an aid to maintaining pressurizer level, at times not specifically called for by the procedure for any plant condition except the following. A large break LOCA has occurred such that there is LPI flow into the RCS and LPI pump suction is from the BWST.

2.0 MU/HPI FLOW INITIATION, THROTTLING, AND TERMINATION

2.1 HPI Initiation

2.1.1 If RCS pressure is ≦ 1650 PSIG SFAS trip setpoint, two HPI pumps must be run at full HPI system capacity.

1. Verify both HPI pumps start.

2. Verify valves HP2A, HP2B, HP2C, and HP2D are fully open.

3. Balance HPI flow between the two lines on each pump such that the higher flow < 1.5 times the lower flow. Throttle only the high flow line and do <u>NOT</u> throttle it below the value on Figure 3. If MU pumps are injecting through line 2-1 (valve HP2A line) flow on FIHP3A may be indicating low.

2.2 MU/HPI Throttling

2.2.1 MU/HPI must be throttled to prevent exceeding the appropriate maximum RCS Pressure/Temperature for cooldown Limit Line on Figure 1.

2.2.2 HPI must be throttled, during piggyback operation, to limit HPI pump flow to < 950 gpm per pump.

2.2.3 HPI must <u>NOT</u> be throttled to < 35 gpm per pump when the pump recirc valve is closed.

2.2.4 HPI may be throttled and normal MU flow established when adequate subcooling margin has been restored and pressurizer level is > 100" and increasing.

2.2.5 MU must be throttled to maintain pump discharge pressure > 1500psig and motor current < 57 amps.

2.3 MU/HPI Termination

2.3.1 HPI may be stopped if the LPI system has been started and flow has been ≧ 1000 gpm/line for ≧ 20 minutes.

2.3.2 If core cooling is <u>NOT</u> being provided by MU/HPI cooling (at least one SG is available as a heat sink), HPI may be stopped and normal MU flow established when adequate subcooling margin has been restored and pressurizer level is > 100" and increasing.

3.0 SG LEVEL SETPOINTS

3.1 If SFRCS has actuated and SA2 has NOT actuated, maintain operable SGs at 46" (50") on the Startup Range using AFW.

3.2 If SFRCS has actuated and SA2 has actuated, maintain operable SGs as 124" (128") on the Startup Range using AFW.

3.3 If SFRCS has NOT actuated, maintain 35" (low level limit) on the Startup Range using MFW.

3.4 If using AFW, when SG level is below setpoint, maintain full continuous AFW flow until the appropriate SG level is reached.

3.5 If using AFW, due to the level error band of AFW level control, it may be necessary to place AFPT controls in MANUAL to control SG level in a narrower band to reduce RCS pressure swings.

4.0 MISCELLANEOUS POST ACCIDENT ACTIONS

4.1 Compensation For Elevated Containment Temperature

If containment temperature is > 150°F as determined by the average of the running containment air cooler suction temperature, manually maintain appropriate level as indicated below.

1. Maintain compensated or uncompensated pressurizer level > 80" or manually de-energize pressurizer heaters.

4.2 Do NOT Override Any SFAS Actuated Equipment Except As Listed Below

1. If RCS pressure is > SFAS 450 PSIG TRIP, the following valves may be overridden to the open position:

   MU33, RCS Makeup Isolation

   MU66A, MU66B, MU66C, and MU66D, RCP Seal Injection Isolations

   MU59A, MU59B, MU59C, MU59D, and MU38, RCP Seal Return Isolations

2. If RCS pressure is > SFAS 450 PSIG TRIP, and no seismic event has occurred, the following valves may be overridden to the open position:

   MU2A and MU3, Letdown Isolations, when needed for RCS inventory control

   CC1460, CCW to MU pump header

3. When there is a need to sample, the following valves may be overridden to the open position.

   CV5010A, CV5010B, CV5010C, CV5010D, CV5010E, CV5011A, CV5011B, CV5011C, CV5011D, and CV5011E, Containment Atmosphere Supply and Return Isolations

   RC240A, RC240B, and RC232, Pressurizer/RCS Sample Supply and Return

4. When needed to control secondary pressure, the following valves may be overridden to the open or throttled position:

   ICS11A and ICS11B, Atmospheric Vent Valves

5. In the event of a failure of one LPI pump which requires the remaining pump feed through both LPI lines, the following valves may be overridden to the throttled position:

   DH14A and DH14B, DH Cooler Outlet Valves

6. HPI pump and valve controls may be overridden as necessary to operate the system per specific rule 2.

7. If plant conditions are stable at normal operating or hot standby conditions after a transient with no evidence of an RCS leak, other systems may be bypassed with the Shift Supervisor's permission.

8. If there are any questionable conditions or any sign of an RCS leak, no other safety systems should be bypassed without approval of Plant Manager or his designee.

4.3 SFAS equipment that has been BLOCKED and overridden after an SFAS trip can be reactivated two ways:

1. At the equipment level, BLOCKED equipment will respond to the individual control switches for that piece of equipment.

2. At the system level, operation of the system level RESET pushbutton will clear any output logic blocks in the system (output logic blocks are the BLOCK switches next to the SAM lights and on the output modules). The equipment will then respond to the system level manual actuation TRIP pushbutton and to automatic actuation signals.

STARTUP FEEDWATER PUMP FLOWPATH VERIFICATION

If the Control Room operator indicates that he is not receiving any flow, check the position of the following valves:

VALVE	POSITION
SUFP Min Recirc Iso Valve, FW 96 657' south end of Heater Bay Area in front of blue guard rail	OPEN
SUFP Min Recirc Iso Valve, FW 97 657' south end of Heater Bay Area in front of blue guard rail	OPEN
SG 1-2 FW SU Control Valve Iso Valve, FW 162 603' north end of Heater Bay next to west wall	OPEN
SG 1-2 FW SU Control Valve Iso Valve, FW 154 603' north end of Heater Bay next to west wall	OPEN
SUFP to Main Feed Line Iso Valve, FW 106 603' southwest corner of Heater Bay above blue guard rail (behind FW 45)	OPEN
SG 1-1 FW SU Control Valve Iso Valve, FW 142 603' south end of Heater Bay in front of blue guard rail (behind FWHs)	OPEN
SG 1-1 FW SU Control Valve Iso Valve, FW 161 603' southwest corner of FW Heater Bay at corner of blue guard rail	OPEN
SUFP to HP Cond Valve, FW 102 585' north end of FWH 1-1-6 next to west wall	CLOSED
Deaerator Storage Tank 1-1 to 1-2 Out Manual Crossover Valve, FW 84 585' on Christmas Tree	OPEN
Deaerator Storage Tanks to AFP Suction Valve, FW 85 585' on Christmas Tree	CLOSED
SUFP Suction From Deaerator Storage Tanks Valve, FW 32 585' on Christmas Tree	CLOSED
SUFP Suction from Cond Storage Tanks, Valve FW 91 north end of AFP Room 1-2, east side of SUFP	OPEN

VALVE	POSITION
SUFP Discharge Valve, FW 100 north end of AFP Room 1-2, west side of SUFP (next to wall)	OPEN
SUFP Min Recirc Valve, FW 93 north end of AFP Room 1-2, west side of SUFP (next to wall)	OPEN

RE-ENERGIZATION OF D2 BUS FOR STARTUP FEED PUMP (SUFP)

This attachment provides guidance for re-energizing D2 bus by providing the necessary major steps without addressing any specific complications. If complications exist, the appropriate procedures will have to be consulted. Also, some steps may be omitted if unnecessary at the time; for example, A or B bus may already be energized from offsite power.

Determine most desirable source for D2 bus and proceed per the below table. Sources are listed in descending order of desirability. When D2 bus is re-energized, return to Step 6.4.

Source	Section	Remarks
B Bus	1.0	Assumes 01 or 02 is energized
A Bus	2.0	Assumes 01 or 02 is energized and DG2—on D1 bus
D1 Bus/DG2	3.0	Assumes offsite power not available, DG2 on D1 bus
C1 Bus/DG1	4.0	Assumes offsite power and DG2 not available, DG1 on C1 bus

1.0 Re-energization of D2 bus from B bus

1.1 Re-energize B bus from offsite power

1. Trip/verify tripped all the load breakers on B bus.
2. Turn the sync selector switch on and close the desired supply breaker for B bus, HX01B <u>OR</u> HX02B.
3. Turn the sync selector switch off.

1.2 Re-energize D2 bus from B bus via BD transformer

1. Trip/verify tripped all the load breakers on D2 bus <u>EXCEPT</u> AD211, lighting feeder breaker
2. Close HBBD
3. Close ABDD2

1.3 Loads on B and D2 buses may be re-energized at the Shift Supervisor's discretion. A turbine plant cooling water (TPCW) pump must be in service to support SUFP operation.

2.0 Re-energization of D2 bus from A bus

2.1 Re-energize A bus from offsite power

1. Trip/verify tripped all the load breakers on A bus

2. Turn the sync selector switch on and close the desired supply breaker for B bus, HX01A OR HX02A

3. Turn the sync selector switch off

2.2 Re-energize D1 via AC transformer

1. Verify AACC2 and AACD1 are tripped

2. Close HAAC

3. Parallel DG2 with AC transformer across AACD1, close AACD1 and trip AD101

2.3 Re-energize D2 from D1

1. Trip/verify tripped all the load breakers on D2 bus EXCEPT AD211, lighting feeder breaker

2. Trip/verify tripped ABDD2

3. Close AD11D

2.4 Loads on A and D2 buses may be re-energized at the Shift Supervisor's discretion. A TPCW pump must be in service to support SUFP operations.

3.0 Re-energization of D2 bus from D1 bus (assuming DG 2 on D1 bus)

3.1 Re-energize D2 from D1

1. Trip/verify tripped all the load breakers on D2 bus EXCEPT AD211, lighting feeder breaker

2. Trip/verify tripped ABDD2

3. Turn sync selector to AD110 and close AD110, turn sync selector off

3.2 Loads on D2 bus may be re-energized at the Shift Supervisor's discretion. A TPCW pump must be in service to support SUFP operation. DG2 load will have to be limited within DG ratings. Half the plant normal lighting is returned to service but may have to be de-energized to limit DG load.

4.0 Re-energization of D2 bus from C1 bus (assumes DG 1 on C1 bus)

4.1 Re-energize D2 from C1

1. Trip/verify tripped all the load breakers on D2 bus <u>EXCEPT</u> AD211, lighting feeder breaker

2. Trip/verify tripped AD110.

3. Trip/verify tripped HBBD

4. Trip/verify tripped ABDD2

5. If C1 is supplying C2, trip AC110.

6. Turn sync selector to ABDC1 and close ABDC1, turn sync selector off

7. Close ABDD2

4.2 Loads on D2 bus may be re-energized at the Shift Supervisor's discretion. A TPCW pump must be in service to support SUFP operation. DG1 load will have to be limited within DG ratings. Half the plant normal lighting is returned to service but may have to be de-energized to limit DG load.

OPERATION OF ATMOSPHERIC VENT VALVES

I. NORMAL OPERATION (ICS)

1. Instrument air is supplied through IA supply valve through both SA1 and SA2. This air positions V1 and V2 open (air ported from boosters to actuator) and V3 closed. V2 and V3 are two-way valve (open/closed). V1 is a three-way valve which ports from booster to actuator or actuator to vent.

2. Modulation is achieved by the transducer which receives the ICS signal. The transducer (I/P) supplies a control air signal to the positioner which in turn supplies a control signal (increased or decreased modulation) to the two boosters.

II. SAFETY FEATURES ACTUATION/STEAM FEEDWATER RUPTURE CONTROL SYSTEM

1. An SFAS or SFRCS signal de-energizes SA1 and SA2 - V1 repositions to vent the actuator while V2 closes. V3 opens and 100# air positions the actuator down through V3.

2. The transducer, positioner, and boosters have no control since V2 is closed and V1 is positioned to vent.

3. To re-establish ICS control, the SFAS/SFRCS actuation must be cleared or blocked. Ensure the H/A station is at 0%. Then press HIS ICS 11A/B AUTO. This energizes SA1 and SA2 and allows either ICS auto control or H/A station manual control.

III. EMERGENCY OPERATION USING THE REMOTE VALVE OPERATORS

A. Operation with SA1 and SA2 energized. This would be the condition with SFAS AND SFRCS NOT tripped.

OR

SFAS OR SFRCS tripped AND trip blocked AND valve control returned to auto.

In this condition, V3 is closed, and it is NOT possible to vent the air off the valve actuator using only valves A and B.

1. IF access to Control Room switches HIS ICS 11A and B is available,

   THEN, press CLOSE on the switches and proceed per Section B.

2. IF access to the Control Room is NOT available,

THEN close the instrument air supply to Main Steam Atmsopheric Vent Valve IA450, located on Turbine Building 585' level next to the emergency isntrument air compressor receiver and proceed as follows:

NOTE: Closing IA450 isolates instrument air to the following valves:

ICS11A	ICS11B
MS375	MS394
MS100A	MS101A

a. Valve A (see drawing) must remain open.

b. Open Valve B (vent valve) to vent supply piping, allowing V3 to open so actuator will also vent.

c. Check the handwheel counter at zero. Then open the handwheel (CCW) to the desired position.

0 turns = closed
253 turns = open

NOTE: Valve does not start to open until approximately 13 turns.

d. If partial closing is desired, simply rotate the manual handwheel in the clockwise direction since the valve is spring assisted in the close direction.

e. If positive shutoff is desired, close the manual handwheel until it reaches the full closed position (zero counts on counter).

f. Close B valve.

CAUTION: Do NOT open IA450 unless BOTH valve's remote manual operator counters are at zero counts as damgae can occur to the lifting fork on the valve stem.

g. Open IA450 to restore closing air to BOTH actuators.

B. Operation with SA1 and SA2 de-energized. This would be the condition with SFAS or SFRCS tripped,

AND

The trip signal has NOT been blocked,

AND

The valve has NOT been returned to auto.

1. Manual control of the atmospheric vent valves is necessary to maintain hot standby conditions.

2. In the radwaste ventilation area outside the Control Room (elevation 623') is located a manual handwheel and two valves for each atmospheric vent valve. Instructions are posted near each handwheel as follows:

   a. Close Valve A (see drawing) which isolates air from Valve V3.

   b. Open Valve B (vent valve) which vents actuator air through V3.

   c. Check the handwheel counter at zero. Then open the handwheel (CCW) to the desired position.

   0 turns = closed
   253 turns = open

   NOTE: Valve does not start to open until approximately 13 turns.

   d. If partial closing is desired, simply rotate the manual handwheel in the clockwise direction since the valve is spring assisted in the close direction.

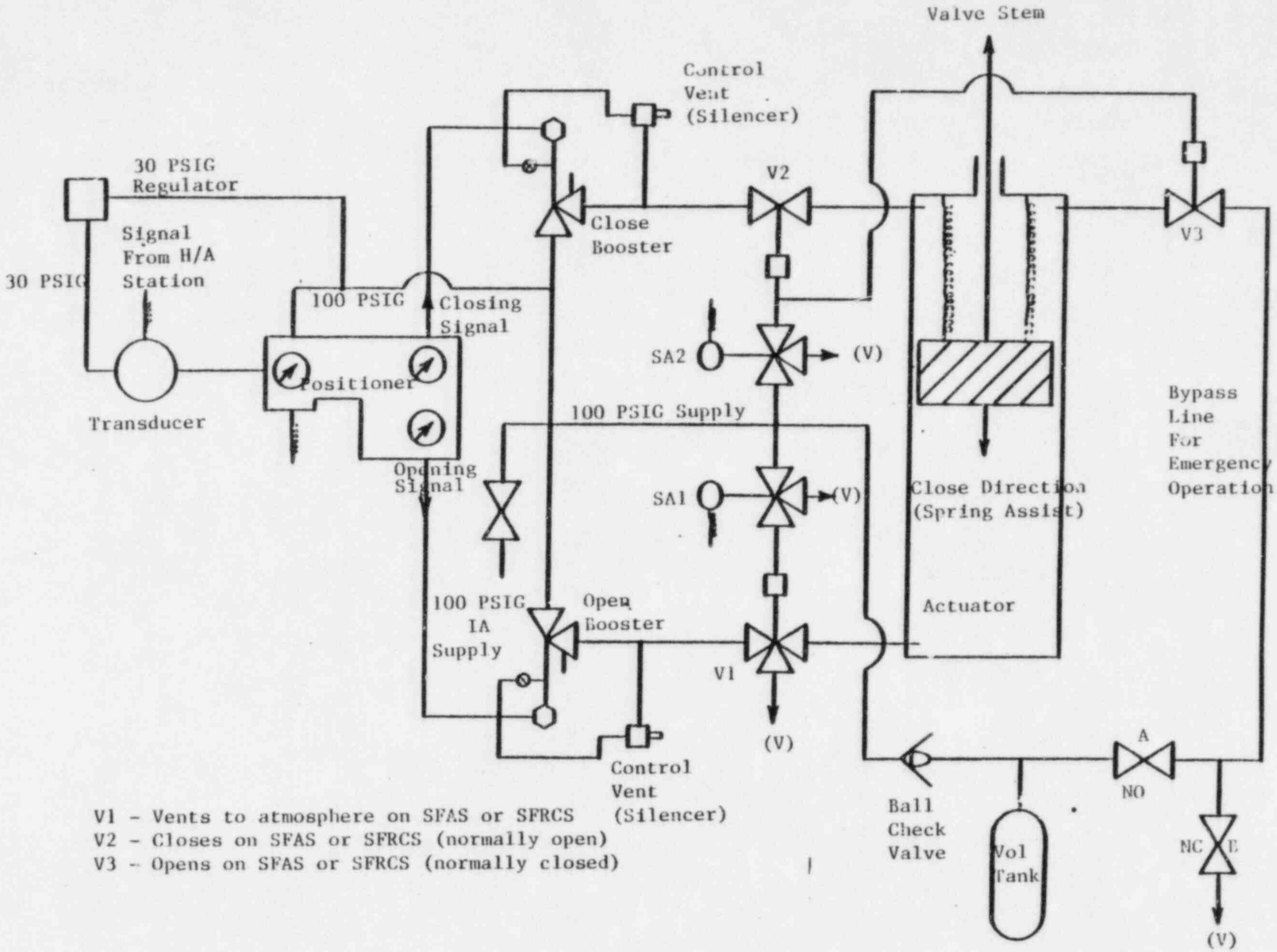
   e. If positive shutoff is desired, close the manual handwheel until it reaches the full closed positoin (zero counts on counter).

   f. Close B valve.

   CAUTION: Do NOT open A valve unless remote manual operator counter is at zero counts as damage can occur to the lifting fork on the valve stem.

   g. Open A valve to restore closing air to the actuator.

AIR CONTROL LOGIC OF ICS 11 A/B



V1 - Vents to atmosphere on SFAS or SFRCS
V2 - Closes on SFAS or SFRCS (normally open)
V3 - Opens on SFAS or SFRCS (normally closed)

DETERMINATION OF CORE OUTLET TEMPERATURE

Core outlet temperature will be determined using the incore T/C's which are the inputs to the TSAT meters. Communications should be established between a person at the Post Accident Monitoring Panel and the Post Accident Monitoring Cabinet. The person recording the readings at each cabinet Test Display Module digital display should note the "as found" position of the Test Display Module thumbwheel switch and then set it to 43. When the readings have been completed the thumbwheel switch should be returned to the "as found" position. The person at the Post Accident Monitoring Panel should rotate the Incore Temperature Selector Switch clockwise through all 8 positions starting at the switch top center position. If both TSAT channels are available, core outlet temperature will be the average of the 5 highest temperatures. If only one TSAT channel is available, core outlet temperature will be the average of the 3 highest temperatures on that channel. If neither TSAT channel is available, have I & C take the 16 T/C temperatures, by point number, per IC2001.07 Manual Measurement of Incore Thermocouples and report them to the control room. Core outlet temperature will be the average of the 5 highest readings.

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
	T539	
	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
[illegible]	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

Channel 1		
Core Location HS 4627	Point Number	Temp C-5763B
E9	T539	
C10	T544	
K11	T551	
L13	T560	
M7	T532	
O6	T527	
G5	T520	
F3	T514	
Channel 2		
Core Location HS 4628	Point Number	Temp C-5755A
E7	T530	
F13	T557	
G11	T550	
O10	T547	
M9	T542	
L3	T515	
K5	T522	
C6	T519	
Average	Time	Date

TO JUMPER RC PUMP START INTERLOCKS

Performing the following will defeat the RCP starting interlocks. All overload protection will be available.

RCP 1-1-1 (HA03)

At RC3717, install jumper on scheme 27X/FS-MU30C, TB20L, Terminal 12 to scheme TSX/RC4B, TB13L, Terminal 11.

RCP 1-1-2 (HB03)

At RC3718, install jumper on scheme 27X/FS-MU30D, TB20R, Terminal 12 to scheme TSX/RC4B, TB13R, Terminal 11.

RCP 1-2-1 (HB01)

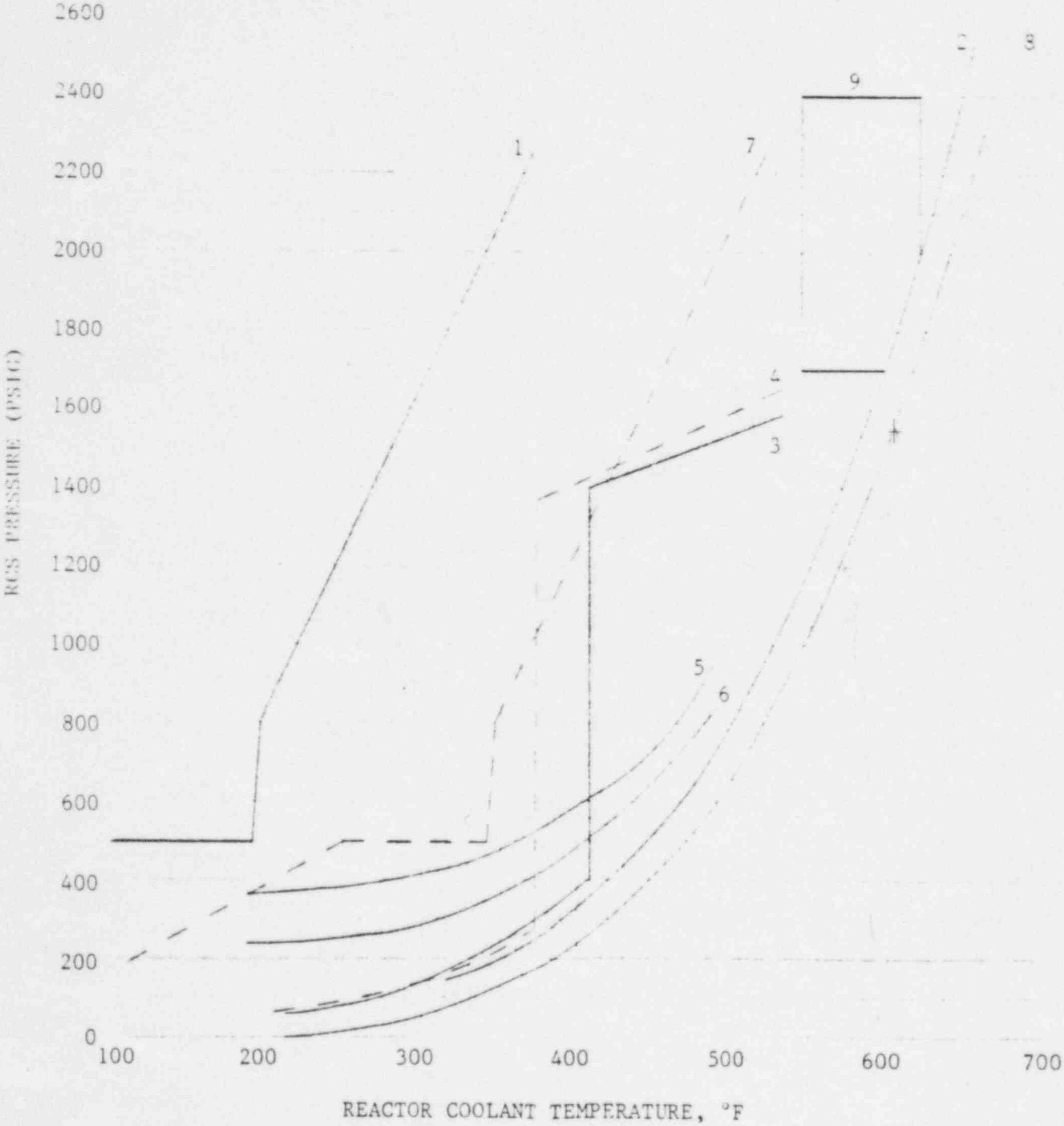
At RC3718, install jumper on scheme 27X/FS-MU30A, TB9R, Terminal 12 to scheme TSX/RC4, TB3R, Terminal 11.

RCP 1-2-2 (HA01)

At RC3717, install jumper on scheme 27X/FS-MU30B, TB9L, Terminal 12 to scheme TSX/RC4A, TB3L, Terminal 11.

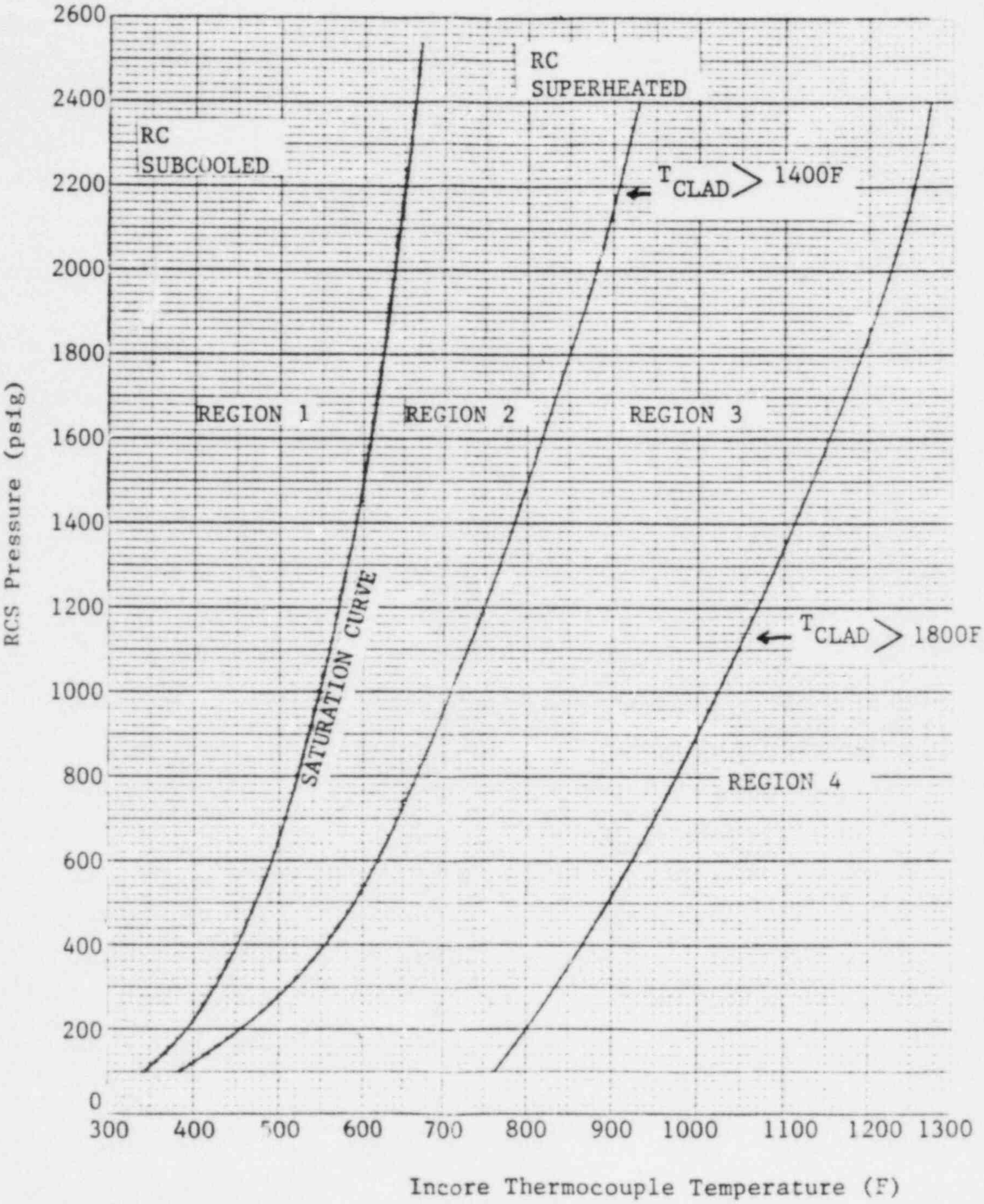
CURVES 1 THROUGH 6 USE PRSRC2A1 AND TIRC4A2 OR TIRC4B2; CURVES ARE ADJUSTED FOR INSTRUMENT ERROR.
CURVE 7 USES PRSRC2A1 AND INCORE T/C TEMPERATURE; CURVE IS ADJUSTED FOR PRESSURE INSTRUMENT ERROR.
CURVE 8 IS A SATURATION CURVE; NO ADJUSTMENTS.

1. MAXIMUM RCS PRESSURE/TEMPERATURE FOR COOLDOWN
2. MINIMUM PRESSURE/TEMPERATURE TO MAINTAIN ADEQUATE SUBCOOLING MARGIN
3. MINIMUM PRESSURE/TEMPERATURE TO MAINTAIN FUEL IN COMPRESSION
4. MINIMUM PRESSURE/TEMPERATURE TO MAINTAIN FUEL IN COMPRESSION DURING COOLDOWN ON NATURAL CIRCULATION
5. MINIMUM PRESSURE/TEMPERATURE TO PROVIDE NPSH WITH ONE RCP IN A LOOP
6. MINIMUM PRESSURE/TEMPERATURE TO PROVIDE NPSH WITH TWO RCPs IN A LOOP
7. MAXIMUM RCS PRESSURE/TEMPERATURE FOR COOLDOWN WITH NO FORCED OR NATURAL CIRCULATION IN RCS (HPI/MU COOLING)
8. SATURATION CURVE.
9. ABNORMAL TRANSIENT ENVELOPE.



EP 1202.01.0
FIGURE 2

INCORE T/C TEMPERATURE
vs. RC PRESSURE FOR
INADEQUATE CORE COOLING



EP 1202.01.0
FIGURE 3
HPI THROTTLING LIMIT
(FOR HIGH FLOW HPI LINE)

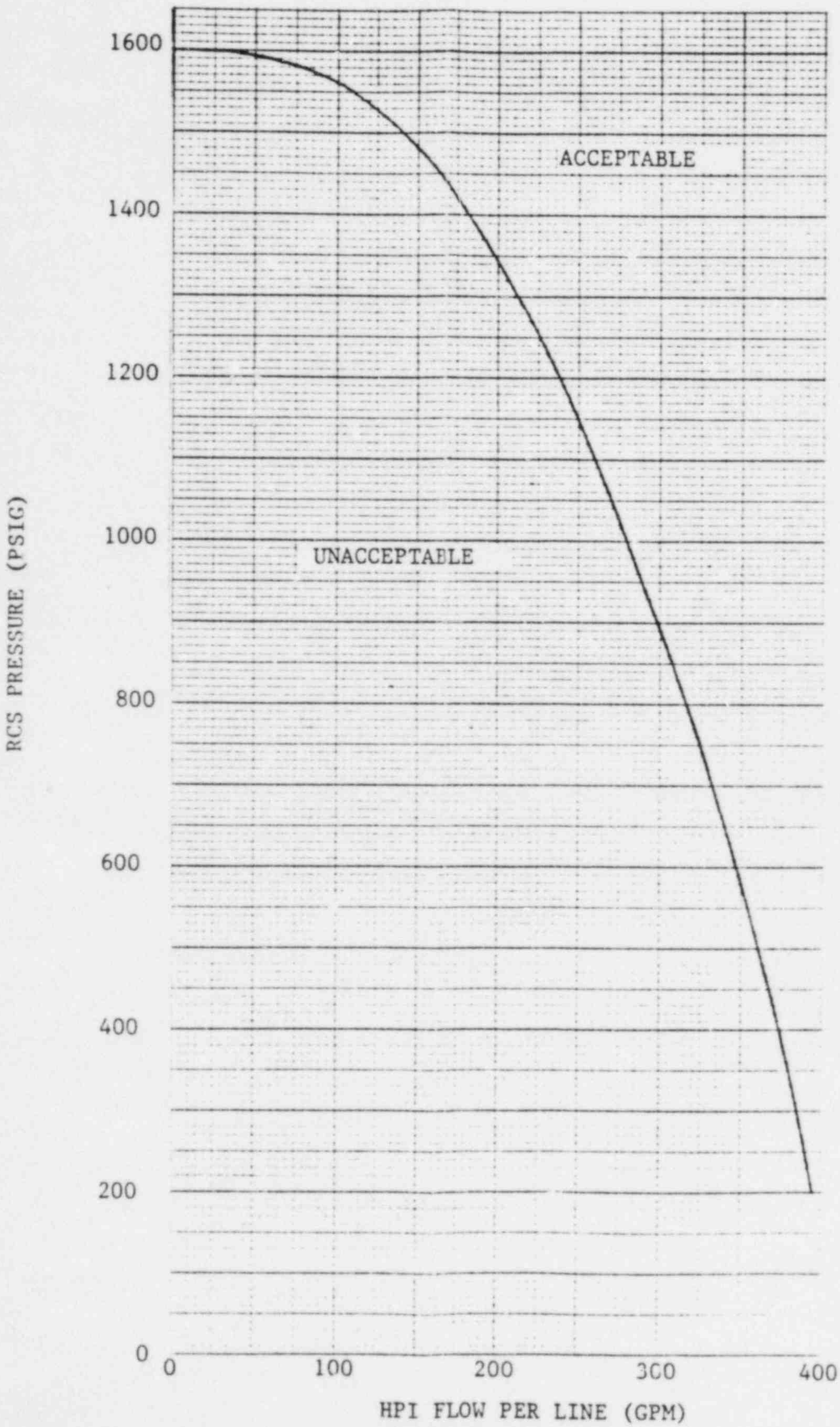


Table 1: SFRCS EQUIPMENT ACTUATION
(SHEET 1 OF 2)

ACTUATION CHANNEL 1

FULL TRIPS

STEAM LINE 1 LOW PRESSURE (OVER-RIDING ACTION)	SG LOW/HIGH LEVEL REVERSE FW TO SG dP STEAM LINE 2 LOW PRESS	LOSS OF FOUR RCPs ONLY
CHECK CLOSED:	CHECK CLOSED:	CHECK CLOSED:
ICS-11B AVV #1	ICS-11B AVV #1	AF-3869 AFP #1 DISCH TO SG #2
MS-101-1 MSIV BYPASS #1	MS-101-1 MSIV BYPASS #1	*MS-106A #2 MS TO AFPT #1
MS-394 MS DRAIN #1	MS-394 MS DRAIN #1	CHECK OPEN:
	MS-611 SG Drain #1	
SP-7B SU FW CONT VLV #1	SP-7B SU FW CONT VLV #1	AF-608 AFW #1 DISCH TO SG #1
FW-612 MFW STOP VLV #1	FW-612 MFW STOP VLV #1	MS-106 #1 MS TO AFPT #1
	*MS-106A #2 MS TO AFPT #1	
MS-106 #1 MS TO AFPT #1		AF-3870 AFP #1 DISCH TO SG #1
MS-101 MSIV #1	MS-101 MSIV #1	
MS-100 MSIV #2	MS-100 MSIV #2	
AF-3870 AFP #1 DISCH TO SG #1	AF-3869 AFP #1 DISCH TO SG #2	
FW-780 MFW BLK VLV #1	FW-780 MFW BLK VLV #1	
SP-6A MFW CONT VLV #2	SP-6A MFW CONT VLV #2	
AF-608 AFW #1 DISCH TO SG #1		
CHECK OPEN:	CHECK OPEN:	
MS-106A #2 MS TO AFPT #1	MS-106 #1 MS TO AFPT #1	
AF-3869 AFP #1 DISCH TO SG #2		
	AF-3870 AFP #1 DISCH TO SG #1	
	AF-608 AFW #1 DISCH TO SG #1	
CHECK TRIPPED:	CHECK TRIPPED:	
MAIN TURBINE	MAIN TURBINE	
REACTOR (via ARTS)	REACTOR (via ARTS)	

HALF TRIP

STEAM LINE LOW PRESSURE
SG LOW/HIGH LEVEL
REVERSE FW TO SG dP

CHECK CLOSED:

ICS-11B AVV #1
MS-101-1 MSIV BYPASS #1
MS-394 MS DRAIN #1
MS-611 SG DRAIN #1

*If open at the time of the trip, valve must be manually closed.

Table 1: SFRCS EQUIPMENT ACTUATION
(SHEET 2 OF 2)

ACTUATION CHANNEL 2

FULL TRIPS

STEAM LINE 2 LOW PRESSURE (OVER-RIDING ACTION)

CHECK CLOSED:

ICS-11A AVV #2

MS-100-1 MSIV BYPASS #2

MS-375 MS DRAIN #2

SP-7A SU FW CONT VLV #2

FW-601 MFW STOP VLV #2

MS-107 #2 MS TO AFPT #2

MS-101 MSIV #1

MS-100 MSIV #2

AF-3872 AFP #2 DISCH TO SG #2

FW-779 MFW BLK VLV #2

SP-6B MFW CONT VLV #1

AF-599 AFW #2 DISCH TO SG #2

CHECK OPEN:

MS-107A #1 MS TO AFPT #2

AF-3871 AFP #2 DISCH #1

CHECK TRIPPED:

MAIN TURBINE

REACTOR (via ARTS)

**SG LOW/HIGH LEVEL
REVERSE FW TO SG dP
STEAM LINE 1 LOW PRESS**

CHECK CLOSED:

ICS-11A AVV #2

MS-100-1 MSIV BYPASS #2

MS-375 MS DRAIN #2

MS-603 SG DRAIN #2

SP-7A SU FW CONT VLV #2

FW-601 MFW STOP VLV #2

*MS-107A #1 MS TO AFPT #2

MS-101 MSIV #1

MS-100 MSIV #2

AF-3871 AFP #2 DISCH TO SG #1

FW-779 MFW BLK VLV #2

SP-6B MFW CONT VLV #1

CHECK OPEN:

MS-107 #2 MS TO AFPT #2

AF-3872 AFP #2 DISCH TO SG #2

AF-599 AFW #2 DISCH TO SG #2

CHECK TRIPPED:

MAIN TURBINE

REACTOR (via ARTS)

LOSS OF FOUR RCPs ONLY

CHECK CLOSED:

AF-3871 AFP #2 DISCH TO SG #1

*MS-107A #1 MS TO AFPT #2

CHECK OPEN:

AF-599 AFP #2 DISCH TO SG #2

MS-107 #2 MS TO AFPT #2

AF-3872 AFP #2 DISCH TO SG #2

HALF TRIP

**STEAM LINE LOW PRESSURE
SG LOW/HIGH LEVEL
REVERSE FW TO SG dP**

CHECK CLOSED:

ICS-11A AVV #2
MS-100-1 MSIV BYPASS #2
MS-375 MS DRAIN #2
MS-603 SG DRAIN #2

*If open at the trime of the trip, valve must be manually closed.

Table 2: SFAS EQUIPMENT ACTUATIO
(Sheet 1 of 2)

ACTUATION CHANNEL 1

SFAS INCIDENT LEVEL 1

VLV #	EQUIPMENT DESCRIPTION	POSITION
	Emer Vent Fan 1	Start
HV5439	ECCS Room 105 HV&AC Iso Vlv	Closed
HV5440	ECCS Room 105 HV&AC Iso Vlv	Closed
HV5024	Emer Vent Fan 1 Vlv From Aux Bldg	Closed
HV5716	ECCS Room 115 Iso Dmpr	Closed
CV5008	CTMT Purge Out Iso Vlv	Closed
CV5011A	CTMT Air Sample Iso Vlv	Closed
CV5011B	CTMT Air Sample Iso Vlv	Closed
CV5011C	CTMT Air Sample Iso Vlv	Closed
CV5011D	CTMT Air Sample Iso Vlv	Closed
CV5006	CTMT Purge In Iso Vlv	Closed
CV5009	Mech Pent Room 4 Purge Vlv	Closed
CV5016	Mech Pent Room 4 Purge Vlv	Closed
CV5011E	CTMT Air Smpl Ret Iso Vlv	Closed
	CTMT Ret Fan & HV/AC Unit 1	Stop

SFAS INCIDENT LEVEL 3

VLV #	EQUIPMENT DESCRIPTION	POSITION
	DH Pump 1	Start
CC1467	CC From DH Clr 1 Out Vlv	Open
DH2733	DH Pump 1 Suct Vlv From BWST	Open
DH14B	DH Clr 1 Out Vlv	Open
DH13B	DH Clr 1 Bypass Vlv	Closed
CC1495	CC Aux Equip In Vlv	Closed
MU33	RC MU Iso Vlv	Closed
MU66B	RCP 2-2 Seal In Iso Vlv	Closed
MU66C	RCP 1-1 Seal In Iso Vlv	Closed
MU59A	RCP 2-1 Seal Ret Vlv	Closed
MU59B	RCP 2-2 Seal Ret Vlv	Closed
MU59C	RCP 1-1 Seal Ret Vlv	Closed
MU59D	RCP 1-2 Seal Ret Vlv	Closed

SFAS INCIDENT LEVEL 4

VLV #	EQUIPMENT DESCRIPTION	POSITION
	CS Pump 1	Start
CC1411A	CC In Iso Vlv to CTMT	Closed
CC1407A	CC Out Iso Vlv From CTMT	Closed
CC1567A	CC In Iso Vlv to CRD	Closed
CC1328	CC CRD Booster Pump 1 Suct Vlv	Closed
MS101	Mn Stm Line 1 Iso Vlv	Closed
FW612	Mn FW 1 Stop Vlv	Closed
MS100-1	Mn Stm Line 1 WU Iso Vlv	Closed

SFAS INCIDENT LEVEL 2

VLV #	EQUIPMENT DESCRIPTION	POSITI
	HP Inj Pmp 1	Start
HP2C	HP Inj 1-1 Vlv	Open
HP2D	HP Inj 1-2 Vlv	Open
	CTMT Clr Fan 1	Slow
	CTMT Clr Fan 3	Slow
	CC Pump 1	Start
	CC Pump 3	Start
CV5070	CTMT Vacm Rlf Iso Vlv	Closed
CV5071	CTMT Vacm Rlf Iso Vlv	Closed
CV5072	CTMT Vacm Rlf Iso Vlv	Closed
CV5073	CTMT Vacm Rlf Iso Vlv	Closed
CV5074	CTMT Vacm Rlf Iso Vlv	Closed
	SW Pump 1	Start
	SW Pump 3	Start
SW1424	SW From CC HX 1 Iso Vlv	Open
SW1429	SW From CC HX 3 Iso Vlv	Open
CS1530	CS 1 Iso Vlv	Open
	Emer DG 1	Start
MU2A	RC Letdown Delay Coil Out Vlv	Closed
DR2012A	CTMT Norm Sump Iso Vlv	Closed
RC240A	RC Przr Sample Vlv	Closed
SW1399	SW Iso Vlv to Clng Wtr	Closed
RC1773A	RC DT Hdr Iso Vlv	Closed
RC1719A	CTMT Vent Hdr Iso Vlv	Closed
SS607	SG 1 Sample Iso Vlv	Closed
ICS11B	SG 1 Atm Stm Vent Vlv	Closed
SS235A	Przr Qnch Tk Sample Iso Vlv	Closed
CF1544	CF Tk 1 Wtr & Nitrogen Fill Iso Vlv	Closed
DH9B	CTMT Emer Sump Vlv	Closed
DH7B	BWST Out Vlv	Open
NN236	Nitrogen CTMT Iso Vlv	Closed
RC229A	Przr Qnch Tk Out Iso Vlv	Closed
MS394	Mn Stm Line 1 WU Drn Iso Vlv	Closed
CV5065	CTMT Hydrogen Dilution In Iso Vlv	Closed
DW6831A	RCP STDP Demin Wtr Iso Vlv	Closed
CV5038	CTMT Hydrogen Dilution Out Iso Vlv	Closed

Table 2: SFAS EQUIPMENT ACTUATION
(SHEET 2 of 2)

ACTUATION CHANNEL 2

SFAS INCIDENT LEVEL 1

VLV #	EQUIPMENT DESCRIPTION	POSITION
	Emer Vent Fan 2	Start
HV5441	ECCS Room 115 HV&AC Iso Vlv	Closed
HV5442	ECCS Room 115 HV&AC Iso Vlv	Closed
HV5025	Emer Vent Fan 2 Vlv from Aux. Bldg.	Closed
HV5715	ECCS Room 105 Iso Dmpr	Closed
CV5010D	CTMT Air Sample Iso Vlv	Closed
CV5004	Mech Pent Room 3 Purge Vlv	Closed
CV5021	Mech Pent Room 3 Purge Vlv	Closed
CV5005	CTMT Purge In Iso Vlv	Closed
CV5007	CTMT Purge Out Iso Vlv	Closed
CV5010A	CTMT Air Sample Iso Vlv	Closed
CV5010B	CTMT Air Sample Iso Vlv	Closed
CV5010C	CTMT Air Sample Iso Vlv	Closed
CV5010E	CTMT Air Sample Ret Iso Vlv	Closed
	CTRM Ret Fan & HV/AC Unit 2	Stop

SFAS INCIDENT LEVEL 3

VLV #	EQUIPMENT DESCRIPTION	POSITION
	DH Pump 2	Start
CC1469	CC From DH Clr 2 Out Vlv	Open
DH2734	DH Pump 2 Suct Vlv From BWST	Open
DH14A	DH Clr 2 Out Vlv	Open
DH13A	DH Clr 2 Bypass Vlv	Closed
CC1460	CC Vlv to Emer Inst Air Cmps	Closed
MU38	RCP Seal Ret Iso Vlv	Closed
MU66A	RCP 2-1 Seal In Iso Vlv	Closed
MU66D	RCP 1-2 Seal In Iso Vlv	Closed

SFAS INCIDENT LEVEL 4

VLV #	EQUIPMENT DESCRIPTION	POSITION
	CS Pump 2	Start
CC1411B	CC In Iso Vlv to CTMT	Closed
CC1407B	CC Out Iso Vlv From CTMT	Closed
CC1567B	CC In Iso Vlv to CRD	Closed
CC1338	CC CRD Booster Pump 2 Suct Vlv	Closed
MS100	Mn Stm Line 2 Iso Vlv	Closed
FW601	Mn FW 2 Stop Vlv	Closed
MS100-1	Mn Stm Line 2 WU Iso Vlv	Closed

SFAS INCIDENT LEVEL 2

VLV #	EQUIPMENT DESCRIPTION	POSITIC
	HP Inj Pmp 2	Start
HP2A	HP Inj 1-2 Vlv	Open
HP2B	HP Inj 2-2 Vlv	Open
	CTMT Clr Fan 2	Slow
	CTMT Clr Fan 3	Slow
	CC Pump 2	Start
	CC Pump 3	Start
CV5075	CTMT Vacm Rlf Iso Vlv	Closed
CV5076	CTMT Vacm Rlf Iso Vlv	Closed
CV5077	CTMT Vacm Rlf Iso Vlv	Closed
CV5078	CTMT Vacm Rlf Iso Vlv	Closed
CV5079	CTMT Vacm Rlf Iso Vlv	Closed
	SW Pump 2	Start
	SW Pump 3	Start
SW1434	SW From CC HX 2 Iso Vlv	Open
SW1429	SW From CC HX 3 Iso Vlv	Open
CS1531	CS 2 Iso Vlv	Open
	Emer DG 2	Start
MU3	RC Letdown Hi Temp Vlv	Closed
DR2012B	CTMT Norm Sump Iso Vlv	Closed
RC240B	RC Przr Vapor Sample Vlv	Closed
CF1542	CF Tk Vent Iso Vlv	Closed
SW1395	SW Iso Vlv to Clng Wtr	Closed
RC1773B	RC DT Hdr Iso Vlv	Closed
RC1719B	CTMT Vent Hdr Iso Vlv	Closed
SS598	SG 2 Sample Iso Vlv	Closed
ICS11A	SG 2 Atm Stm Vent Vlv	Closed
SS235B	Przr Qnch Tk Sample Iso Vlv	Closed
CF1541	CF Tk 2 Wtr & Nitrogen Fill Iso Vlv	Closed
RC232	Przr Qnch Tk In Iso Vlv	Closed
RC229B	Przr Qnch Tk Out Iso Vlv	Closed
CC1545	CF Tk Sample Vlv	Closed
DH9A	CTMT Emer Sump Vlv	Closed
DH7A	BWST Out Vlv	Open
IA2011	CTMT Instr Air Iso Vlv	Closed
SA2010	CTMT Serv Air Iso Vlv	Closed
MS375	Mn Stm Line 2 WU Drn Iso Vlv	Closed
CV5090	CTMT Hydrogen Dilution In Iso Vlv	Closed
DW6831B	RCP STDP Demin Wtr Iso Vlv	Closed
CV5037	CTMT Hydrogen Dilution Out Iso Vlv	Closed

NOTES
1. Frequency of readings should be established by Shift Supervisor based on plant conditions.
2. Hydrogen analyzers must be returned to service after SFAS actuation.
3. Containment recirc fans should be in operation to keep containment atmosphere thoroughly mixed.
4. Accuracy of containment wide range level indication is ± 6.6 feet.
5. If containment water level must be lowered, follow guidance below.

CTMT PRESS

Action Level 1
1. Verify SFAS INC LEVEL 1 through 3 per Table 2.

Action Level 2
1. Shutdown Hydrogen Dilution Blowers per SP 1104.55.

Action Level 3
1. Verify SFAS INC LEVEL 1 through 4 per Table 2.

CTMT RAD

Action Level 1
1. Verify SFAS INC LEVEL 1 per Table 2.

Action Level 2
1. Stop hydrogen purge per SP 1104.55.
2. Request offsite support evaluation prior to using Hydrogen Purge System.

CTMT HYDROGEN

Action Level 1
1. Inform offsite support groups; TSC and ECC

Action Level 2
1. Initiate one hydrogen control system in the order listed below:
   1) Operate hydrogen recombiner
   2) Operate Hydrogen Dilution Blowers per SP 1104.55
   3) Operate Hydrogen Purge System per SP 1104.55

CTMT VESSEL WR LEVEL

Action Level 1
1. Check for fluid systems leaking into containment, SW, CCW, MFW, AFW, DW, or PW, and isolate.
2. Refer to M-509 for equipment elevations inside containment for potential failures.

Action Level 2
1. DH valve pit will begin to flood thru vent pipe. Open DH11 and DH12 for long term boron dilution flowpath prior to valve failure or use alternate flowpath - See Section 10 Step 10.16.

Action Level 3
1. Hydrogen purge penetration will begin to flood. Shutdown Hydrogen Purge System per SP 1104.55.

CTMT SUMP BORON

Action Level 1
1. Insure long term boron dilution flowpath is established.
2. Check for indication of non-borated fluid leakage into containment (increasing level).
3. If no problems are found, request offsite support group evaluation on need for boron addition.

A gross curie limit has been evaluated for the BWST in the event the BWST must be used for temporary storage of radioactive water. This might occur, for example, after a LOCA when for operational reasons it is desired to pump some water from containment back to the BWST. The limits and assumptions are as follows:

Time After Shutdown	Average Gamma Energy	BWST Curie Limit
<5 hr	1.0 Mev	2500 Ci
>5 hr	0.8 Mev	3300 Ci

These curie limits have been evaluated to result in a dose rate of 2.0 mrem/hr at the exterior of the Personnel Processing Facility (PPF). If the gallon amount allowed is too restrictive for the desired plant evolution, consult Chem and HP Management for a more detailed calculation or to allow a change in the dose rate basis.

To calculate the allowable transfer amount in gallons using the following formula, the operator will need to know the time since reactor shutdown and the gross activity of the containment sump water.

$$\text{Gallons} = \frac{(\text{Ci limit*})\left(\frac{10^6 \mu ci}{ci}\right)}{(\text{CTMT Sample } \frac{\mu ci}{cc})\left(3785 \frac{cc}{gal}\right)}$$

* per above based on time since reactor shutdown.

This would give the maximum amount within the assumptions. Any lesser amounts would, therefore, be conservative. The actual amount transferred would have to then be based on the BWST level change during the transfer.

Table 3: CTMT MONITORING AND CONTROL

	CTMT PRESS PSIA	CTMT RAD MR/HR	CTMT RAD R/HR		CTMT H_2 %	CTMT VES WR LEVEL FEET		CTMT BORON PPM
	PI2000 PI2001 PI2002 PI2003	RI2004 RI2005 RI2006 RI2007	RI4596A	RI4596B	AI5027 AI5028	LI4594	LI4595	FROM C&HP SAMPLE
ACTION LEVEL 1	≧18.4	≧ SFAS TRIP SETPOINTS	N/A		≧0.5	INCREASING ON RECIRC		≦1500
ACTION LEVEL 2	≧33	N/A	≧100 at ≦5 hr ≧50 at ≦10 hr		≧3	≧ 33.7		N/A
ACTION LEVEL 3	≧38.4	N/A	N/A		N/A	≧ 36.1		N/A
TIME								

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SECTION 1

PROCEDURE TITLE AND NUMBER

Auxillary Feedwater System SP 1106.06.22

REASON FOR CHANGE

Aux feed pump 1-2 governor valve must be in the high speed stop position to ensure response time requirement. AF3872 changed from open to closed position to keep speed changer motor at high speed stop position. See FCR 84-190

CHANGE

See attached pages of rev.22, page numbers 5,12,13,and 18.

IS PROCEDURE REVISION REQUIRED Yes [XX] No [ ] If no, this modification is valid until ______

	DATE
PREPARED BY Peter John Senuik	4-8-85
APPROVED BY John Johnson	4/8/85
APPROVED BY Peter J. Senuik	4-8-85
SUBMITTED BY (Section Head) W T O'Connor/gjd	4/11/85
RECOMMENDED BY (SRB Chairman) [signature]	APR 17 1985
QA APPROVED BY (Manager of Quality Assurance) N/A	DATE
APPROVED BY (Station Superintendent) [signature]	APR 17 1985

Ojpr

22 ____ ____2. Turn the trip throttle valve handwheel clockwise until the sliding nut rises and engages the latch up lever to the trip hook.

NOTE: It may be necessary to pull on the trip throttle valve linkage to fully engage the latch up lever to the trip hook.

____ ____3. Verify the latch up lever and the trip hook are fully engaged.

____ ____4. Turn the trip throttle valve handwheel counterclockwise until the trip throttle valve is fully open.

____ ____5. Turn the trip throttle valve handwheel 1/4 turn clockwise.

____ ____6. Seal the trip throttle valve handwheel.

Independently Verified________________

____ ____7. Verify computer point Z001 (Z002) AFPT 1 (2) Stop Valve reads "OPEN".

____ ____8. Verify the red IL ICS 38E (38J) AFPT 1 (2) Governor Valve fully open light is on.

4.2.9 For AFPT 1-2 only, perform the following:

____1. Verify the speed droop control knob is set at <u>later</u>.

____2. Verify the load limit control knob is set at 10.

____ ____4.2.10 Place the AFPT speed changers HIS 520A ~~and~~ (HIS 521A) in the raise position. Hold in this position for 25 seconds (90 SECONDS).

____ ____4.2.11 Place the AFP mode selector switches HIS-520B ~~and~~ (HIS-521B) in the "Auto-Essen" mode.

4.2.12 In the Control Room, ensure that the following valves have a closed indication.

NOTE: If the closed light is not present, verify by other means power to the valve and closed valve position.

____AF 3869	____MS 106
____AF 3870	____MS 106A
____AF 3871	____MS 107
____SW 1382	____MS 107A
____SW 1383	____~~MS~~ AP 3872

22

Davis-Besse Nuclear Power Station

Unit No. 1

System Procedure SP 1106.06

AUXILIARY FEEDWATER SYSTEM

NUCLEAR SAFETY RELATED

Record of Approval and Changes

Prepared By T. Lehman, T. Poremski, R. Clark — 1/14/76 Date

Submitted By Terry D. Murray, Section Head — 4/6/76 Date

Recommended By Jack Evans, SRB Chairman — 4/20/76 Date

QA Approved N/A, Quality Assurance Director — Date

Approved By Jack Evans, Plant Manager — 4/20/76 Date

Revision No.	SRB Recommendation	Date	QA Approved	Date	Plant Manager Approval	Date
22	[signature]	[illegible]	NA		[signature]	12/28/87

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SECTION 1

PROCEDURE TITLE AND NUMBER

Auxiliary Feedwater Procedure SP 1106.06.22

REASON FOR CHANGE

There is no way for an operator to verify these FI'S and PI'S in the control room are in service. They are not mechanical gages.

CHANGE

on valve verification list A, sheet 1 of 12, delete FI 4521, PI 505; FI 4522 and PI 509.

IS PROCEDURE REVISION REQUIRED Yes [X] No [ ] If no, this modification is valid until ______

PREPARED BY TK Wagner	DATE 3/31/85
APPROVED BY TK Wagner	DATE 3/31/85
APPROVED BY [signature]	DATE 3/31/85
SUBMITTED BY (Section Head) WSOlm	DATE 4/3/85
RECOMMENDED BY (SRB Chairman) [signature]	DATE APR 3 1985
QA APPROVED BY (Manager of Quality Assurance) N/A	DATE
APPROVED BY (Station Superintendent) [signature]	DATE APR 3 1985

Ops

For AFPT 1-2 receiving steam from:

_____SG 1-2 - Close "Mn Stm Line 1-2 to AFPT 1-2 Inlet Isolation Valve" MS-107 using HIS-107A.

_____SG 1-1 - Close "Mn Stm Line 1-1 to AFPT 1-2 Inlet Isolation Valve" MS-107A using HIS-107E

_____Aux Steam System - Close "AFPT 1-1 Stm Inlet Hdr "X" Connect Isolation Valve" MS-728 (manually operated valve).

NOTE: If the auxiliary steam system is no longer needed for steam to either AFPT(s), close AS-273, "Secondary Isolation Valve from 235# Aux Steam Header to AFPT's and MS 733 Xconnect isolation. 22

As steam pressure decreases, the governor control valve opens to maintain AFPT speed. When the control valve is fully open, the red governor control valve fully open light above the speed changer switch(s) (HIS-520A and/or HIS-521A) will light. AFPT speed will then decrease. Due to the loss of hydraulic control oil pressure to the governor control valve as the AFPT speed decreases, the governor control valve will remain open.

_____7.2.4 Determine which AFP was supplying feedwater and to which SG; then close the desired AFP to SG stop valve as listed below:

22 AFP 1-1 to SG 1-1 Stop Valve AF-3870 using HIS-3870
AFP 1-1 to SG 1-2 Stop Valve AF-3869 using HIS-3869
AFP 1-2 to SG 1-1 Stop Valve AF-3871 using HIS-3871
AFP 1-2 TO SG 1-2 STOP VALVE AF-3872 USING HIS-3872

_____7.2.5 Using the AFPT speed changer (HIS-520A ~~and/or~~ (HIS-521A), exercise speed changer to the low speed stop using the "lower" position, then position the AFPT governor to the high speed limit by holding in the "Raise" position for 25 seconds (90 SECONDS).

_____7.2.6 Crack open MS 748 (MS 749) and MS 750 (MS 751), MS 745A (MS 744A) and MS 746A (MS 747A). Allow condensate to drain off, then close each valve.

22 ____4.2.13 ~~Open AF 3872.~~ DELETED

Section 4.2 completed by______________________________Date___________

5. REMOVING THE AFWS FROM SERVICE FOR PLANT SHUTDOWN

5.1 Prerequisites

____5.1.1 Plant is in Operational Modes 4, 5, or 6.

5.2 Procedure

____5.2.1 Place both AFWS mode selector switches HIS-520B and HIS-521B in the "MANUAL" mode.

____5.2.2 Close both AFPT trip throttle valves.

____5.2.3 Ensure AFPT turbine drains are cracked open.

22 ____5.2.4 ~~Close AF 3872.~~ DELETED

____5.2.5 At the following MCC's, open the below listed breakers:

INITIAL	MCC	BREAKER NO.	NAME	VLV NO.
	In Diesel Generator Room #1:			
______	E-12-B	BE-1271	SG 1-2 to AFPT 1-1 In Stm Vlv	MS-106A
	In Diesel Generator Room #2:			
______	F-12-B	BF-1262	AFP 1-2 Disch to SG 1-2	AF-3872
	In the Low Voltage Switchgear Room #1:			
______	D1PA	D-107	AFP 1-1 Disch to SG 1-1	AF-3870
______	D1NA	D-135	AFPT 1-1 Mn Stm In Iso Vlv	MS-106
______	E-12-A	BE-1218	SW 1382 SW to AFP 1-1	SW-1382
	In the Low Voltage Switchgear Room #2:			
______	F-12-A	BF-1201	AFP 1-2 Disch to SG 1-1	AF-3871
	In the #2 Electrical Penetration Room:			
______	F-11-A	BF-1124	AFP 1-2 Mn Stm In Iso Vlv	MS-107
	In the Fuel Handling Storage Room 405, East of the Equipment Hatch:			
______	F-11-B	BF-1188	SG 1-1 to AFPT 1-2 In Stm Vlv	MS-107A
	In the #1 Electrical Penetration Room:			
______	E-11-E	BE-1146	AFP 1-1 Disch to SG 1-2 Vlv	AF-3869
	To the Right of the Door Inside the #2 Mechanical Penetration Room:			
______	F-11-C	BF-1177	SW 1383 SW to AFP 1-2	SW-1383

22 Section 5 completed by______________________________Date___________