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## TURBINE TRIP

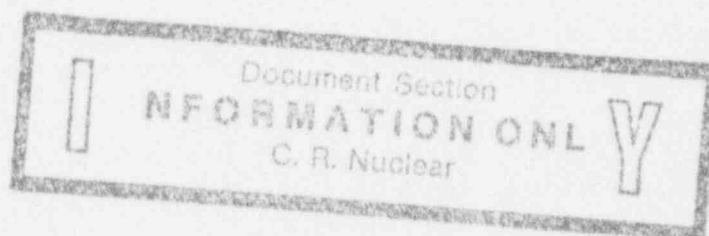
### 1.0 ENTRY CONDITIONS

IF Rx power is < 45% FP,

AND any of the following conditions exist:

- o Turbine trip
- o  $\geq 50^{\circ}\text{F}$   $\Delta T$  between condensers
- o  $\geq 55^{\circ}\text{C}$  Generator Avg cold gas TEMP
- o  $\geq 104^{\circ}\text{C}$  Generator stator bar discharge TEMP
- o Condenser vacuum is  $\geq 10$  in-Hg absolute,

THEN use this procedure.



This Procedure Addresses Safety Related Components		
Approved by MNPO <u><i>D. J. [Signature]</i></u> (SIGNATURE ON FILE)	Date <u>7-22-94</u>	
AP-660	PAGE 1 of 13	TT

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## 2.0 IMMEDIATE ACTIONS

### ACTIONS

- 2.1 \_\_\_\_ Depress "TURB AUTO STOP  
TRIP" push button.
- 

- 2.2 \_\_\_\_ Ensure TVs OR GVs are  
closed.

IF NOT,  
THEN close MSIVs.

### DETAILS

1. Select all MSIVs closed:

\_\_\_\_ Close MSV-411

\_\_\_\_ Close MSV-412

\_\_\_\_ Close MSV-413

\_\_\_\_ Close MSV-414

- 2 \_\_\_\_ Control OTSG PRESS using  
ADV's:

o MSV-25 "STM GEN A ADV"

o MSV-26 "STM GEN B ADV"

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- 2.3 \_\_\_\_ Stabilize RCS PRESS.

Stabilize RCS PRESS using:

\_\_\_\_ PZR heaters

\_\_\_\_ PZR spray

\_\_\_\_ PORV

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### 3.0 FOLLOW-UP ACTIONS

ACTIONS	DETAILS
3.1 — Notify personnel of plant conditions as required.	<ul style="list-style-type: none"><li>— SOTA</li><li>— Plant operators</li><li>— SSOD to evaluate plant conditions for potential entry into the Emergency Plan</li><li>— System Dispatcher</li></ul>
3.2 — CONCURRENTLY PERFORM VP-54C, Runback Verification Procedure.	
3.3 — Ensure ICS runback to $\leq 15\%$ FP.	
3.4 — Ensure output Bkrs are open.  <u>IF NOT,</u> <u>THEN</u> select the Backup Trip Coils and attempt to open the Output Bkrs.  <u>IF</u> Output Bkrs fail to open using Backup Trip Coils, <u>THEN</u> notify Dispatcher to separate CR-3 from the 500KV grid.	<ul style="list-style-type: none"><li>o Ensure open Bkr 1661</li><li>o Ensure open Bkr 1662</li><li>1 — At rear of MCB TGF, select "BKR TRIP COIL SELECTOR SWITCH" to "BACKUP":<ul style="list-style-type: none"><li>o Bkr 1661 on "BACKUP"</li><li>o Bkr 1662 on "BACKUP"</li></ul></li><li>2 — Open Output Bkrs:<ul style="list-style-type: none"><li>o Bkr 1661 open</li><li>o Bkr 1662 open.</li></ul></li></ul>
3.5 — Ensure RCS PRESS stabilizes from 2130 to 2180 psig.	Stabilize RC PRESS using: <ul style="list-style-type: none"><li>— PZR Heaters</li><li>— PZR Spray</li><li>— PORV.</li></ul>

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### 3.0 FOLLOW-UP ACTIONS (CONT'D)

#### ACTIONS

#### DETAILS

- 3.6 — IF at any time while performing this procedure, the Rx trips, THEN GO TO EOP-02, Vital System Status Verification, beginning with step 2.1.
- 

- 3.7 — Ensure the main generator "FIELD BKR" is open.
- 

- 3.8 — Select the "VOLT REG" to "OFF".
- 

- 3.9 — Ensure the main turbine oil pumps have Auto started.

Ensure started:

- o TBP-2 "TG BRG OIL PP AC"
  - o TBP-8 "HP SEAL OIL B/U PUMP".
- 

- 3.10 — Isolate the MSR high pressure bundles.

- 1 — Depress "RESET" push button on RH control panel.

2. Isolate MS to the high pressure bundles by closing:

— MSV-29 "RH TK 3A ISO"

— MSV-30 "RH TK 3B ISO"

— MSV-31 "RH TK 3C ISO"

— MSV-32 "RH TK 3D ISO".



Applicable Carry-over steps:
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3.6 IF the Rx trips, <u>THEN</u> GO TO EOP-02...
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### 3.0 FOLLOW-UP ACTIONS (CONT'D)

<u>ACTIONS</u>	<u>DETAILS</u>
3.11 ____ Ensure MS Hdr PRESS stabilizes 870 to 900 psig.	
3.12 ____ Maintain PZR level 200 to 240".	<ul style="list-style-type: none"><li>o Adjust "PZR LEVEL CONTROL" "SETPOINT" to adjust PZR level.</li><li>o Adjust MUV-51 "LETDOWN FLOW" controller to adjust letdown flow.</li></ul>
3.13 ____ Ensure Tave stabilizes 577 to 581°F.	
3.14 ____ Ensure OTSG levels are maintained at LLL.	
3.15 ____ Notify SPO to isolate DFT vent to atmosphere.	SPO to close HVV-103 DFT vent to atmosphere.
3.16 ____ Notify SPO to isolate FWHE-5A and FWHE-5B drains to DFT.	<ul style="list-style-type: none"><li>____ SPO to close:<ul style="list-style-type: none"><li>o HDV-47 FWHE-5A drain to DFT</li><li>o HDV-48 FWHE-5B drain to DFT.</li></ul></li></ul>

Applicable Carry-over steps:
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3.6 IF the Rx trips, <u>THEN</u> GO TO EOP-02...
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### 3.0 FOLLOW-UP ACTIONS (CONT'D)

#### ACTIONS

- 3.17 — Ensure Turbine Drain Valves are open.

#### DETAILS

Ensure turbine drain valves are open and not isolated:

##### Turbine Drain Valves

___TDV-1	___TDV-6
___TDV-2	___TDV-7
___TDV-3	___TDV-8
___TDV-4	___TDV-9
___TDV-5	___TDV-10
TDV isolation valves	
___TDV-104	___TDV-105

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- 3.18 — IF power reduction was  $\geq 15\%FP$  in 1 hr,  
THEN notify chemistry to perform ITS required RCS sampling.

- 3.19 — Notify SPO to isolate MSR high pressure and LP bundle vents to FWHEs.

SPO to select "CLOSE" at "MSR REHEATER DRAINS CONTROL PANEL" located 119 ft TB.

##### High Pressure and LP Vents to FWHEs:

___HDV-539	___HDV-540
___HDV-543	___HDV-544
___HDV-547	___HDV-548
___HDV-551	___HDV-552

Applicable Carry-over steps:
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3.6 IF the Rx trips, <u>THEN</u> GO TO EOP-02...
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### 3.0 FOLLOW-UP ACTIONS (CONT'D)

<u>ACTIONS</u>	<u>DETAILS</u>
3.20 — Notify SPO to isolate MSR high pressure drain tank drains to FWHEs.	SPO to close locally: — HDV-1 — HDV-3 — HDV-5 — HDV-7.
3.21 — <u>WHEN</u> "TURB AT ZERO SPEED" alarm is actuated, <u>THEN</u> ensure turbine goes on turning gear.	1 — Ensure turning gear control switch is in "AUTO". 2 — Ensure TBP-6, "TG BRG OIL LIFT PUMP" is running.  <u>IF</u> turning gear does <u>NOT</u> Auto engage, <u>THEN</u> select "TG TURNING GEAR MOTOR" control switch to "MAN", <u>AND</u> notify SPO to engage turning gear locally.
3.22 — <u>IF</u> turbine was tripped due to exceeding condenser vacuum limits, <u>THEN</u> notify Systems Engineering to evaluate per vendor instructions.	
3.23 — <u>IF</u> plant shutdown is required, <u>THEN</u> GO TO OP-208, Plant Shutdown.  <u>IF</u> NOT, <u>THEN</u> GO TO OP-203, Plant Startup.	

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## POST-TRIP STABILIZATION

### 1.0 ENTRY CONDITIONS

This EOP is referenced from other procedures.

### 2.0 IMMEDIATE ACTIONS

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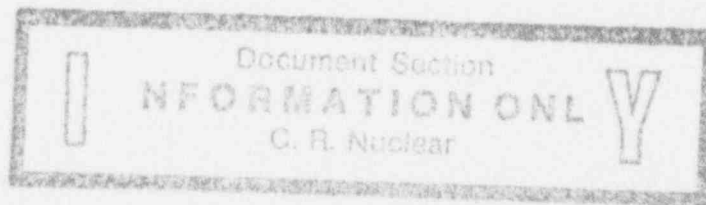
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#### Note

There are no immediate actions for this procedure.

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This Procedure Addresses Safety Related Components		
Approved by MNPO	<u><i>D. Jones</i></u> (SIGNATURE ON FILE)	Date <u>7/22/94</u>
EOP-10	PAGE 1 of 25	PS

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### 3.0 FOLLOW-UP ACTIONS

#### ACTIONS

#### DETAILS

##### PLANT STATUS:

- o Adequate Subcooling Margin exists.
- o Controlled primary to secondary heat transfer exists.

3.1 \_\_\_\_ Verify MSSVs fully seated.

IF MSSVs are NOT fully seated,  
THEN attempt to reseal any MSSV NOT fully seated.

IF MSSVs do NOT reseal,  
THEN notify maintenance to initiate repair efforts.

- o Momentarily lower affected OTSG PRESS to  $\approx 800$  psig to reseal valve.

OTSG PRESS control:

N/A	A OTSG	B OTSG
TBVs	MSV-9 MSV-10	MSV-11 MSV-14
ADVs	MSV-25	MSV-26

3.2 \_\_\_\_ Ensure "MAIN FW BLOCK" and "LO LOAD FW BLOCK" valves are closed.

FW BLOCK valves:

N/A	A OTSG	B OTSG
MAIN	__FWV-30	__FWV-29
LO LOAD	__FWV-31	__FWV-32

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### 3.0 FOLLOW-UP ACTIONS (CONT)

<u>ACTIONS</u>	<u>DETAILS</u>
3.3    Verify NNI power is available.  IF NNI power is <u>NOT</u> available, <u>THEN</u> CONCURRENTLY PERFORM the appropriate procedure.	o AP-581, Loss of NNI-X  o AP-582, Loss of NNI-Y
3.4    Isolate MSR HP bundles.	o Depress "RESET" pushbutton on reheat control panel.  o CLOSE: ___ MSV-29, MS to "A" MSR ___ MSV-30, MS to "B" MSR ___ MSV-31, MS to "C" MSR ___ MSV-32, MS to "D" MSR
3.5 <u>WHEN</u> Intermediate Range flux lowers to $\approx 5E-10$ amps, <u>THEN</u> verify SR energizes.  Continue in this procedure.	
3.6    Ensure main turbine oil pumps have started.	o TBP-2, "TG BRG OIL PP AC"  o TBP-8, "HP SEAL OIL B/U PUMP"
3.7    Notify Health Physics and Chemistry to perform post Reactor Trip actions.	o Health Physics to survey MU filters for increased radiation levels.  o Chemistry to perform STS required sampling for > 15% power change in any hour.

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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.8 — IF > 1 safety or  
regulating control rod is  
NOT fully inserted,  
THEN start boration of the  
RCS from either the BAST  
or BWST.

o IF borating from the BAST,  
THEN perform the following:

- 1 — Start CAP-1A or CAP-1B.
- 2 — Open CAV-60.
- 3 — Ensure makeup system flow is  
≥ 10 gpm.

o IF borating from the BWST,  
THEN perform the following:

- 1 — Ensure MUP suction from BWST.  
o MUV-58 open  
o MUV-73 open
- 2 — Open HPI valve to establish  
≥ 55 gpm.
- 3 — Divert letdown flow to the  
RCBTs as necessary to allow  
continued boration.

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3.9 — Ensure MUT level is  
between 55" and 86".

IF MUT is > 86",  
THEN bleed to RCBT.

IF MUT is ≤ 55",  
THEN feed from RCBT,  
AND ensure MUV-112 is  
selected to MUT.

IF MUT level decreases  
below 30",  
THEN open both BWST  
suction valves to MU.

IF feed from RCBT does NOT restore low  
MUT level,  
THEN open both BWST suction valves to  
MU:

- o MUV-73, A Train
- o MUV-58, B Train

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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.10 — IF a PZR steam bubble does NOT exist,  
THEN establish a PZR steam bubble if possible.

Continue in this procedure

1 — Turn on all PZR heaters, cycling them as required to maintain  $\leq$  100°F/hr heatup rate.

2 — WHEN PZR TEMP is  $T_{sat}$  for desired RC PRESS,  
THEN establish a PZR bubble by lowering level to 80 - 120"

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3.11 — Control PZR level between 80 and 120".

IF PZR level < 80",  
THEN close MUV-51, Block Orifice Byp.

o Adjust MUV-31 setpoint or position as required to maintain PZR level between 80 and 120".

o Ensure PZR heater control is in AUTO.

Table 1, OTSG Tube to Shell  $\Delta T$  Limits:

Tensile $\Delta T$ Limit: Avg $T_{shell}$ - $T_{cold}$	$\leq 100^{\circ}F$
Compressive $\Delta T$ Limit: $T_{hot}$ - Avg $T_{shell}$	$\leq 60^{\circ}F$
"A" OTSG shell Temps: A-730, 731, 732, 733, 734, Avg: R-771	
"B" OTSG shell Temps: A-735, 736, 737, 738, 739, Avg: R-772	



### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

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#### NOTE

Starting an RCP could result in a temporary loss of adequate subcooling margin due to collapsing of voids. All RCPs must be secured if ASCM does not recover within 2 minutes.

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3.12 — IF, at any time while performing this EOP, NO RCPs are running, AND RCPs become available, THEN start at least 1 RCP.

RCPs are available when ALL of the following conditions exist:

- 6900V Rx Aux Busses Energized
- $\geq 70^{\circ}\text{F}$  Subcooling Margin exists
- All RCP start permissives are met
- Compressive Tube to Shell  $\Delta T$  is  $< 60^{\circ}\text{F}$ . Refer to Table 1.

RCP starting:

- 1 — IF RCPs were tripped due to loss of Subcooling margin, THEN establish PZR level  $\geq 200''$
- 2 — IF either OTSG is available, THEN start 1 RCP in each loop, starting the RCP in the loop with the highest OTSG level first.

IF NO OTSG is available, THEN start 1 RCP.

Applicable Carry-over steps:
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3.12 Start at least 1 RCP when available...
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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.13 — Ensure required OTSG levels.

RCP Status	Required Level
$\geq 1$ RCP	Low Level Limits
No RCPs	60 - 70%

3.14 — Establish Mode 3 Condensate system operation.

- 1 — Perform the following to stop one CDP:
  - o Reduce CDP controller load to zero.
  - o Stop associated CDP.
- 2 — Open CD heater bypass, CDV-242.
- 3 — Close CD heater isolation valves:
  - o CDV-44, A-Train
  - o CDV-43, B-Train
- 4 — Throttle CDV-242 to control Dearator level between 7' and 11'.
- 5 — Maintain CD system pressure between 90 and 150 PSIG using the controller for the operating CDP.

Applicable Carry-over steps:
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3.12 Start at least 1 RCP when available...
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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.15 — Establish Mode 3 FW system operation by reducing to 1 operating MFWP.

Stop 1 MFWP:

- 1 — PPO to select "EFIC CHANNEL A MAIN FW ISOLATION MAIN FW PUMP TRIP" key switch to "BOTH". Located in CRD room, "RR3A".
  - 2 — PPO to select "EFIC CHANNEL B MAIN FW ISOLATION MAIN FW PUMP TRIP" key switch to "BOTH". Located in B EFIC room, "RR5B1".
  - 3 — Open FWV-28, FW Cross-tie.
  - 4 — Reduce FW pump demand to 0.
  - 5 — Reduce MFWP Governor Speed Control to Low Limit.
  - 6 — Trip associated MFWP.
  - 7 — Open associated turbine drain valves.
  - 8 — Ensure turning gear control switch is selected to "Engage".
- 

3.16 — WHEN operating MFWPs have been reduced to 1,  
THEN reduce to 1 operating MFWBP.

Stop 1 MFWBP:

- 1 — Start associated Aux Oil Pump.
- 2 — Secure 1 MFWBP.
- 3 — Ensure associated MFWBP discharge valve closes.

Applicable Carry-over steps:
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3.12 Start at least 1 RCP when available...
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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

- 3.17 — Ensure turbine drain valves are open.

#### DETAILS

Ensure turbine drain valves are open and unisolated.

##### Turbine Drain Valves

___ TDV-1	___ TDV-6
___ TDV-2	___ TDV-7
___ TDV-3	___ TDV-8
___ TDV-4	___ TDV-9
___ TDV-5	___ TDV-10
TDV isolation valves	
___ TDV-104	___ TDV-105

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- 3.18 — WHEN "TURBINE AT ZERO SPEED" alarm is actuated, THEN ensure turbine goes on turning gear.

Continue in this procedure.

- o Ensure turning gear control switch is "AUTO".
- o Ensure TBP-6, "TG BRG OIL LIFT PUMP" is running.

IF turning gear does NOT Auto engage,  
THEN select turning gear control switch to "MAN",  
AND notify TB Operator to engage turning gear locally.

Applicable Carry-over steps:
3.12 Start at least 1 RCP when available...
3.18 Ensure turbine goes on turning gear at zero speed...



### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.19 — Notify SPO to isolate MSR high pressure and LP bundle vents to FWHEs.

SPO to select "CLOSE" at "MSR REHEATER DRAINS CONTROL PANEL" located 119 ft TB.

High Pressure and LP Vents to FWHEs

___ HDV-539	___ HDV-540
___ HDV-543	___ HDV-544
___ HDV-547	___ HDV-548
___ HDV-551	___ HDV-552

3.20 — Notify SPO to isolate MSR high pressure drain tank drains to FWHEs.

SPO to close locally:

\_\_\_ HDV-1  
\_\_\_ HDV-3  
\_\_\_ HDV-5  
\_\_\_ HDV-7.

3.21 — IF any safety or regulating control rod is NOT fully inserted, THEN determine boration requirements to ensure  $\geq$  1% shutdown margin.

IF 1 control rod is stuck, THEN refer to OP-103C, Curve 18

IF > 1 control rod is stuck, THEN continue boration until either of the following conditions exist:

o Actual boron concentration  $\geq$  1925 ppmB

OR

o Actual boron concentration  $\geq$  value determined by the Reactor Engineer or designee

Applicable Carry-over steps:
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3.12 Start at least 1 RCP when available...
---

3.18 Ensure turbine goes on turning gear at zero speed...
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### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.22 — IF MFW is available,  
AND EFW or AFW are no  
longer required,  
THEN restore MFW,

EFW or AFW is required when any of the  
following conditions exist:

- o No RCPs operating
- o Adequate subcooling margin does NOT  
exist
- o Feeding a dry OTSG

Refer to Enclosure 8, MFW Restoration.  
Refer to Enclosure 3, Dry OTSG  
Recovery.

Applicable Carry-over steps:
3.12 Start at least 1 RCP when available...
3.18 Ensure turbine goes on turning gear at zero speed...

### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

- 3.23 — IF an isolated OTSG exists,  
AND the reason for isolation has been locally isolated or repaired,  
THEN open MSIVs.

#### DETAILS

- 1 — Ensure TBVs are closed on affected lines.
- 2 — Notify TB Operator to bypass affected MSIVs:

MSIV Bypass Valves:

A OTSG		B OTSG	
MSV-411	MSV-412	MSV-413	MSV-414
CGV-38	CGV-37	CGV-36	CGV-35
CGV-47	CGV-48	CGV-49	CGV-50
MSV-498	MSV-499	MSV-500	MSV-501

- 3 — IF OTSG PRESS is < 800 psig,  
THEN use local indicators to determine PRESS downstream of the MSIVs.
- o MSV-411, use MS-119-PI, 119' TB near TBV - MSV-10.
  - o MSV-412, use MS-118-PI, 119' TB under the HP Turbine.
  - o MSV-413, use MS-121-PI, 119' TB under the HP Turbine.
  - o MSV-414, use MS-120-PI, 119' TB near TBV - MSV-11.
- 4 — WHEN  $\Delta P$  across affected MSIV is < 200 psid,  
THEN either bypass or reset MS line isolation.
- 5 — Select affected MSIV SV1 "TEST/NORM/RESET" switches to reset,  
AND open affected MSIVs.
- 6 — Maintain stable RCS TEMP while transferring OTSG PRESS control to TBVs from ADVs.

Applicable Carry-over steps:

3.12 Start at least 1 RCP when available...

3.18 Ensure turbine goes on turning gear at zero speed...

Table 1, OTSG Tube to Shell  $\Delta T$  Limits:

Tensile $\Delta T$ Limit: Avg $T_{shell} - T_{cold}$	$\leq 100^{\circ}F$
Compressive $\Delta T$ Limit: $T_{hot} - \text{Avg } T_{shell}$	$\leq 60^{\circ}F$
"A" OTSG shell Temps: A-730, 731, 732, 733, 734, Avg: R-771	
"B" OTSG shell Temps: A-735, 736, 737, 738, 739, Avg: R-772	

Table 2, Cooldown Limits:

RCP Status	RCS Temp	Cooldown Limit
$\geq 1$ RCP Running	$> 280^{\circ}F$	$\leq 50^{\circ}F \frac{1}{2} \text{ hr}$
	280 - 150 $^{\circ}F$	$\leq 25^{\circ}F \frac{1}{2} \text{ hr}$
No RCPs Running	RC Press maintained above Nat Circ Curve	$\leq 25^{\circ}F \frac{1}{2} \text{ hr}$
	$> 280^{\circ}F$	$\leq 5^{\circ}F \frac{1}{2} \text{ hr}$
	280 - 150 $^{\circ}F$	$\leq 2.5^{\circ}F \frac{1}{2} \text{ hr}$

### 3.0 FOLLOW-UP ACTIONS (CONT)

#### ACTIONS

#### DETAILS

3.24 — IF NO RCPs are running,  
THEN GO TO EOP-09, Natural  
Circulation Cooldown,  
beginning with step 3.1.

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3.25 — IF a dry OTSG exists,  
THEN ensure tube-to-shell  
 $\Delta T$  is maintained within  
limits.

Refer to tables 1 and 2.

IF tensile limit is approached,  
THEN reduce cooldown rate.

IF compressive limit is approached,  
THEN increase cooldown rate using TBVs  
or ADVs without exceeding cooldown  
rate limits.

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3.26 — IF cooldown is required,  
THEN GO TO OP-209, Plant  
Cooldown.

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3.27 — GO TO OP-202, Plant  
Heatup.