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TASK CLOSE OUT DOCUMENT

Task Scope Review and Recommend Meditiations TO Procedure E-110 For Actions To Take The "B" OTSG Solid

To: M. Levenson
S. Levy
E. Zebroski

Task No. 47 Date Complete 5/3/79

Reason felt task is complete:

Procedures Reviewed and Criteria/Actions Defined for Taking the "B" OTSG Solid With the new Long Term OTSG Cooldown System

Members of Committee

S. Levy
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Signed
Committee Leader

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TASK #47

IAG COMMENTS ON PROCEDURE Z-110

Attached are the IAG comments on the procedure for taking the "B" OTSG solid (Z-110). The comments are based upon the initial assumption that the Long Term "B" OTSG Cooldown System is fully installed and available for operation. We do not believe that it will be desirable or necessary to go solid on the "B" OTSG prior to having the Long Term OTSG Cooldown System available. Procedure Z-110 should be re-written or a new procedure should be generated assuming that the new long term cooling system is available rather than using the condensate pumps and condenser.

AP 1001 | Three Mile Island Nuclear Station | SIDE 1

Figure 1001-8 | Special Operating Procedure | SOP No. Z-110 REV. 0 (From SOP Log Index)

NOTE: Instructions and guidelines in AP 1001 must be followed when completing this form.

Unit No. 2

Date 4/24/79

1. Title ESTABLISHING WATER/WATER HEAT REMOVAL MODE ON "B" OTSG

2. Purpose (Include purpose of SOP)

I.A.G. comments on Z-110 B.W. Tucker 5/2/79

3. Attach procedure to this form written according to the following format.

A. Limitations and Precautions
   1. Nuclear Safety
   2. Environmental Safety
   3. Personnel Safety
   4. Equipment Protection

N/A

B. Prerequisites

C. Procedure

4. Generated by _____ Date _____

5. Duration of SOP - Shall be no longer than 60 days from the effective date of the SOP or (a) or (b) below – whichever occurs first.

N/A

(a) SOP will be cancelled by incorporation into existing or new permanent procedure submitted by _____ ☐

(b) SOP is not valid after _____ ☐
(Till in circumstances which will result in SOP being cancelled)

6. (a) Is the procedure Nuclear Safety Related?
If "yes", complete Nuclear Safety Evaluation (Sheet 2 of this Form) . . . . . Yes ☐ No ☐

(b) Does the procedure affect Environmental Protection?
If "yes", complete Environmental Evaluation. (Sheet 3 of this Form) . . . . . Yes ☐ No ☐

(c) Does the procedure affect radiation exposure to personnel? . . . . . Yes ☐ No ☐

N/A

NOTE: If all answers are "no", the change may be approved by the Shift Supervisor. If any questions are answered "yes", the change must be approved by the Unit Superintendent.

7. Review and Approval

B&W _____ Approved – Shift Supervisor _____ Date

NSC _____ Reviewed – List members of PORC contacted _____ Date

ALARA _____ _____ Date

_____ Date

Approved - Unit Superintendent _____ Date

8. SOP is Cancelled

_____ _____ 2004 330

Shift Supervisor/Shift Foreman Date

Z-110

ESTABLISHING WATER TO WATER HEAT REMOVAL ~~[illegible]~~ MODE ON THE B OTSG WITH THE LONG TERM OTSG COOLING SYSTEM

1.0 PURPOSE

1.1 To convert the "B" steam generator from an isolated secondary side condition to a heat removal mode with the secondary side filled with water and rejecting heat to the ~~main condenser~~ long Term OTSG cooling system. ~~[illegible]~~ (INSERT I)

The overall sequence of operations is:

- Fill the feedwater line with water forward to the feedwater isolation valve.
- ~~[illegible]~~
- Back-fill the long term OTSG "B" loop cooling water system with water and the steam piping from OTSG "B" downstream of the MSLIV.
- ~~Fill the secondary side of OTSG "B" with water.~~
- Fill the secondary side of OTSG "B" with water.
- ~~[illegible]~~
- Establish a closed cooling water flow loop between the "B" OTSG and the Long Term (Existing from BACKEND) Cooldown System.

2.0 REFERENCES

2.1 Main And Reheat Steam System; Flow Diagram; 2002

2.2 Feedwater And Condensate; Flow Diagram, 2005

2.3 Long Term OTSG Cooldown; Flow Diagram, Drwg M-021

2.4 Auxiliary Steam; Flow Diagram, 2004

3.0 LIMITATIONS AND PRECAUTIONS

3.1 ✓ Main steam piping supports verified capable of withstanding loads associated with water-filled steam piping. — check periodically ... manually

~~3.2 ✓ [illegible]~~ MSV

3.2 ✓ Determine the need or requirements for lube oil to the main and booster feed pump turbine during windmilling.

Insert II

3.5 ✓ Determine the cause for the original condensate pump trip.

3.6 ✓ Establish optimum condensate pump flow for indefinite operation. If necessary, use the condensate booster pump(s) recirculation lines to the condenser (CO-V35A, B and C and/or their associated manual isolation valves, CO-V36A, B and C) and/or either or both S/G F.W. pump recirculation lines to the condenser (FW-V12A and B).

3.7 Continuously monitor condensate pump suction strainer delta P. Remove strainer if necessary.

~~[illegible]~~

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INSERT I

PURPOSE

It should be noted that we know of no sequence of events which would make going solid on the "B" OTSG prior to the availability of the long term OTSG cooldown system a desireable option. EP-32 has been revised to address this matter further. X

Insert II

3.3 Verify the availability of the long term OTSG cooldown system (Reference 3). This system should not be used prior to completion of the full hydrotest and function test of all system pumps, valves, and instrumentation.

3.4 The OTSG "B" should not be taken solid without steam heating to the feedwater heater for control of the secondary piping water temperature. The feedwater/long term cooling water system temperature should be raised, prior to the filling of the "B" OTSG, such that the bulk water/steam temperature in the OTSG should be within 50°F of the steam generator wall temperature to avoid creating tube sheet stresses. The temperature should closely match the current B loop RCS cold leg temperature so as to minimize the perturbation on the OTSG temperature profile.

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3.8 While filling the B S/G during any operation involving feedwater flow changes to the B S/G, adjustments of the steaming rate from the A S/G shall be made as necessary to maintain a near constant RCS temperature.

Insert III

[illegible] water/steam temperature in the steam generator shell by [illegible] of the steam generator wall temperature [illegible]

[illegible] lines are assumed dry by this procedure. If full, then the time required will be reduced to complete fill. Fill completion will be indicated by increasing steam generator level.

3.12 Since the B OTSG is believed to be contaminated, care must be taken to collect any leakage from the secondary side (drip trays, etc.) while using the B OTSG.

3.13 During the filling of the turbine bypass line (6.1) and the secondary side of "B" OTSG (6.2), carefully monitor "A" OTSG level to make sure it does not decrease while feeding "B".

→ 3.14

4.0 PREREQUISITES

4.1 Initial conditions.

4.1.1 Primary

a. Primary system flow to the "A" steam generator is [illegible] operating on natural circulation and the reactor coolant pump "B" loop is [illegible] stagnant.

b. The primary system temperature is being maintained as low as practical by steaming heat removal methods on steam generator "A" (approximately ~~280°F~~ 170°F).

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Verify Sufficient condensate/condensate makeup is available [illegible] and of the proper chemistry to [illegible]

4.1.2 Secondary

a. The following valves associated with the Feedwater System are closed:

- FW control valve isolation valves; FW-V14B and FW-V17B
- FW control valve; FW-V30B
- FW start-up line isolation; FW-V19B
- S/G emergency FW isolation valves; EF-V12B and EF-V33B
- FW warm-up valve; FW-66B

b. The following valves associated with the Feedwater System are open:

- FW heater 3B isolation valves; FW-V9B and FW-V13B
- FW pump B suction & discharge isolation valves; CO-V52B and FW-V8B

c. The following valves associated with the Main and Reheat Steam System are closed:

- Main steam isolation valves; MS-V4B and MS-V7B
- Turbine bypass isolation valve; MS-V15B
- Turbine bypass control valves; MS-V25B and MS-V26B
- Moisture Separator-Reheater isolation valves; MS-V32A, MS-V33A, MS-V32B and MS-V33B
- Emergency S/G FWP isolation valves; MS-V11A, MS-V11B, and MS-V14
- Gland seal regulator isolation and bypass valves; MS-V17, MS-V266 and MS-V268
- Main Feedwater Pump (FW-P1A) steam inlet isolation and stop valves; MS-V21A, MS-V21B, MS-V49A, and MS-V49B.
- Turbine bypass isolation valves MS-V23B and MS-V24B

d. The following valves associated with the Main and Reheat Steam System are open:

- Turbine bypass isolation valves; MS-V17, MS-V23A, and MS-V24A
- Turbine bypass control valves; MS-V25A and MS-V26A

e. Condenser vacuum is established at approximately 10 "HgA*

*Maintaining condenser vacuum throughout the filling and recirculation modes herein is desirable for two reasons:

- It will facilitate deaeration of the feedwater and minimize build-up of a noncondensible gas bubble in the OTSG.
- It will aid in cooling feedwater that returns from the OTSG.

Insert III

3.8 [redacted] The air bleed operation of the feedwater piping should be performed carefully in order to minimize pushing air pockets, and consequently non-condensibles, into the "B" OTSG

3.9 [redacted] The OTSG "B" filling operation should be performed in stages - 10% of the fill should be entered slowly in each stage.. Between stages the RCS system flow, pressure and "A" loop ($T_{Hot} - T_{cold}$) should be checked. If the disruption evident from any fill stage is substantial ($\pm 3°F$ for $T_{A\,Hot} - T_{A\,cold}$), the steps should be taken slower.

3.10 [redacted] The temperature in the "B" OTSG should be reduced only at a very slow rate (2°F/Hr.) using the long term OTSG cooling

(This is not required if the [illegible] to the OTSG cooldown system is available).

"B"

4.1.3 Modifications to the turbine bypass steam line have been made which permit filling this line with condensate water. These include

a. Installation of a vent at the high point of the bypass line (e.g. 326' 3" at building column locations to T42 1/2). A tap for connection to a pressure gauge is included in the vent line.

b. Installation of fill lines from the condensate booster pump suction CO-V12A, B or C (2" drains) to bypass steam line traps 1" drains, MS-U31B (MS-V128B & V129B) and MS-U34B (MS-V153B & V156B).

~~4.1.4~~ 4.1.3 When filling the steam generator, it may be desirable to vent OTSG "B" through the emergency feedwater inlet line. This can be done by installing a vent valve in the blind flange on the 6-inch flush connection (between containment penetration R-616 and check valve EF-V13B outside containment). This vent valve should be installed prior to beginning the procedure if it is felt that venting the OTSG is required.

~~4.1.5 All necessary modifications to the feed and steam system piping (i.e. isolable flange connections) to facilitate future installation of the proposed OTSG cooling loop are installed.~~

5.0 SPECIAL EQUIPMENT

5.1 None other than ~~add~~ any additional hardware which may be required ~~[illegible]~~ to fill the Long Term OTSG "B" Cooldown System.

6.0 METHOD ← See Attached Sheets

6.1 Filling Turbine Bypass Line

6.1.1 Water source to be used for fill operations is chemically acceptable

6.1.2 Open vent valve installed in step 4.1.3.a.

6.1.3 Observe line pressure at vent line pressure gauge. If initially less than 0 psig, hold subsequent operations until pressure reaches 0 psig.

6.1.4 Initiate flow of condensate to the fill connection at a rate of approximately 50 gpm. (reference step 4.1.3.b)

6.1.5 Continue filling until water is observed at the vent connection. Approximate fill time is one hour. (Expected volume of water required is approximately 2,800 gallons)

6.1.6 Close the vent valve.

6.1.7 Close the fill connection (reference step 4.1.3.b) ~~Close the fill connection.~~

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6.0 METHOD

6.1 Filling Feedwater Piping and Back fill Long Term OTSG Cooldown System Piping

6.1.1 The ~~the~~ chemistry of the condenser water to be used for fill operations ~~must~~ chemical be checked for chemical acceptability.

6.1.2 The condensate pump bypass valve CO-V7 to condenser should be opened and valve CO-V12 and the ~~condensate polishing system valves should be closed.~~ condensate booster pumps bypass valve CO-V96A shall be opened so that the fill operation can be performed at a slow, controllable rate.

6.1.2 Ensure main feed valve FW-V30B is tagged closed and FW-V14B, FW-V17B and FW-66B, ~~and~~ are checked closed.

6.1.3 Align the feedwater and condensate system to provide flow utilizing the condensate pumps feeding through secured feed pumps and through the feedwater heater train.

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6.1.4 Align the auxiliary steam supply system steam valves AS-V20A, AS-V6A and B, AS-V7A and B, AS-V8A and B, and AS-V63A to provide steam for heating the 13TH stage feedwater heater FW-J-2B.

6.1.5 Open all Long Term OTSG Cooldown system process valves (other than sample points, vents, drains, etc.) except for valves LTB-V15 and LTB-V25. This will allow the Long Term "B" OTSG Cooldown system and the section of 24" main steam piping between the isolation valve MS-V78 and the turbine stop valve to be backfilled along with the feedwater piping

6.1.6 Start condensate pump CO-P-1A and establish closed loop flow between the condensate pump, feedwater piping forward to the feedwater containment isolation valves, the long term "B" OTSG Cooldown system and return to condenser. The flow forward should be very slow (≤ 50 gpm) in order to avoid water hammer problems and to slowly feed condensate water through the 13th stage Feedwater heater for heating to match the Tc in the RCS "B" loop. The temperature should be checked in both the feedwater piping and the Long Term "B" OTSG Cooldown System to ensure that the Paragraph 3.5 limitation is met prior to feedline water to OTSG "B". Also at this time the long Term Cooldown System heat exchanger should be bypassed.

6.1.7 All of the filled piping should be carefully checked for air pockets using valves FW-V22, FW-V102, and high point ~~vents~~ vents in the Long Term Cooldown System and Main Steam Piping.

6.1.8 Having established that there are no air pockets anywhere in the system and that the temperature criteria of Paragraph 3.5 is met, open FW start-up line isolation Valves (FW-V19B) and control rate of feeding the "B" OTSG using the start-up proportional control valve FW-V25B and the OTSG fill operation outlined in Paragraph 3.11.

6.1.9 Record steam generator "B" level in inches and utilizing start-up feed regulating valve FW-V25B establish a feed rate to the steam generator of one inch per minute. This will be approximately 42 gpm.

6.1.10 Maintaining the constant feed rate established in step 6.2.4 allow steam generator level to increase. At full range indication of 513" it is expected that level increase will stop since leakage through the tube shroud at the sensing line ~~feeding the~~ should approximately equal the feed rate established. If level continues to rise above 513", reduce feed flow as necessary to maintain ~~level. Do not allow level at this step to increase above 525"~~ level between 513" and 525" until the Main Steam lines are full.

NOTE: ~~Caution:~~ Make no further adjustments to established feed rate. It is expected that it will take 6 hours to completely fill the steam lines if they are dry at start of filling.

6.1.11 Steam generator level will again increase when the steam lines have been filled. Allow the level to rise to the 535 to 537" indication and adjust flow to hold level constant.

S/G pressure may rise prematurely,

NOTE: This will allow the outer shroud annulus to fill

... If noncondensibles have collected in the OTSG in sufficient quantities, the condensate pump head may not be high enough to cause water to flow over the top of the baffle. If that happens, vent through the 6-inch connection on the emergency feedwater line outside containment, or start a booster feedwater pump to increase pressure on the noncondensible bubble.

6.1.12 Isolate main steam feedwater latching pressure switches at root valves MS-224 and MS-225.

6.1.12 Remove pressure switches to create high point vents.

6.1.12 Open root valves and vent steam until water flows from the vent. Close root valves once water flows.

6.1.13 When level starts to rise, the outer annulus level is the same as the indicated level. Allow the level to raise to off scale [redacted]" on the full range indication gauge. Adjust flow, as necessary but do not exceed flow setting established in step [redacted] to maintain this level. At this [redacted] level the auxiliary feed nozzles are being filled.

6.1.14 As the S/G approaches a solid condition, S/G pressure will increase. When pressure has stabilized, slowly open FW-V25B to the full open position

next page for 6.2

6.1.15 Bleed air from the atmospheric dumps, high point vents, or available instrument taps as required to ensure that there are no air pockets between the OTSG and the MSLIV (MS-V7B).

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6.2 Establishment of Feedwater Flow

6.2.1 Upon completion of the fill operation, 100% of the condensate pump flow should be returned to the condenser via 1) the condensate pump bypass (CO-V7) and the condensate booster pump bypass (CO-V36A). The condensate pump should be isolated from the Long Term OTSG Cooldown System by closure of ~~FW~~ Feed Pump discharge valve FW-V8B.

6.2.3 The Long Term Cooldown system pump (LTB-P-1) should be started to establish flow through the "B" OTSG

6.2.2 The MSLIV (MS-V7B) should be openned

6.2.4 The bypass valve LTB-V110 should remain open and be ~~adjusted~~ so that the pressure and flow thru OTSG "B" as measured by feedwater system flow and steam line pressure are ~~gradually~~ slowly increased. All RCS parameters in the "A" OTSG should be carefully monitored throughout the establishment of ~~feedwater~~ Feedwater flow. A Feedwater flow control valve FW-35B should be carefully monitored using the the ~~valve~~ flow element in the FW startup line between valves FW-25B and FW-26B. Final OTSG flow should be 3000 GPM.

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CAUTION: Do not open the valves LTB-V15 and LTB-V25 to and from the Long Term Cooldown System until the temperature throughout the cooling loop between the Long Term OTSG cooldown system and the "B" OTSG is essentially constant (ie. ±2°F) and matches RCS B loop cold leg temperature. Also no effort should be made to reduce the "B" loop temperature until all RCS parameters are in equilibrium

CAUTION: The commencement of condensate flow through the secondary side of steam generator "B" may reduce primary coolant temperatures more rapidly than the pressurizer is capable of compensating for. The operator controlling feed water flow must be in communication with the operator responsible for pressurizer pressure control.

CAUTION: Closely monitor "A" OTSG level during operations involving increases in flow rate to the "B" OTSG.

6.2.6 Start the Long Term OTSG Cooldown System Booster Pump (LTB-P2) and slowly increase pressure in the system to 600 PSIG or 50 PSIG greater than the RCS pressure, whichever is less.

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6.2.5 The Long Term Cooldown system Heat Exchanger (LTB-C1) should be filled using valve LTB-V15 and vent valves LTB-V132, LTB-V133, LTB-V134

6.2.7 The Long Term Cooldown System Heat Exchanger [redacted] is to be controlled to limit the "B" OTSG cooldown rate to (2°F/Hr) by bleeding only a small fraction of the feedwater flow thru the heat exchanger and most of the flow thru the heat exchanger bypass [redacted] valves LTB-V18 and LTB-V80.

6.2.8 Initial cleanup operations of the "B" OTSG water may begin using the Long Term OTSG Cooldown System interconnections with the existing polishing system as soon as all of the RCS parameter stabilize.