Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

February 26, 2007
NOC-AE-07002104
10CFR50.90

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Response to NRC Request for Additional Information on
Proposed Change to Technical Specification 3.3.3.6, "Accident Monitoring Instrumentation"

References:
1. Letter from T. J. Jordan, STPNOC, to NRC Document Control Desk dated October 2, 2006, "Revision to Proposed Change to Technical Specification 3.3.3.6, 'Accident Monitoring Instrumentation'" (TAC Nos. MD0934 and MD0935, ML062830032, NOC-AE-06002060)
2. Informal NRC Request for Additional Information, E-mail from Mohan Thadani, NRC, to A. Harrison and S. Head, STPNOC, dated October 23, 2006 (ML062980024)

In Reference 1, STP Nuclear Operating Company (STPNOC) submitted a proposed amendment to South Texas Project Operating Licenses NPF-76 and NPF-80 to revise Technical Specification 3.3.3.6, "Accident Monitoring Instrumentation" with respect to the required action for inoperable Wide Range Reactor Coolant Temperature, Wide Range Steam Generator Level, and Auxiliary Feedwater Flow.

In Reference 2, the NRC staff requested additional information on with regard to the STPNOC application. The attachment to this letter responds to the NRC questions.

There are no commitments in this letter.

STI: 32105401

A001

If there are any questions regarding the proposed amendment or the responses, please contact Mr. A. W. Harrison at (361) 972-7298 or me at (361) 972-7454.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 2/26/07.
Date

Charles T. Bowman
General Manager, Oversight

Attachments:

1. Response to NRC Request for Additional Information
2. Reactor Trip or Safety Injection (0POP05-EO-EO00)
3. Reactor Trip Response (0POP05-EO-ES01)

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Attachment 1
Response to NRC Request for Additional Information

SOUTH TEXAS PROJECT REQUEST FOR AMENDMENTS
PROPOSED CHANGES TO TECHNICAL SPECIFICATIONS FOR
ACCIDENT MONITORING INSTRUMENTATION
TAC NOS. MD0934 AND MD0935

AFW FLOW INSTRUMENT CONCERNS

Question #1: How does an INOPERABLE AFW flow instrument channel affect the OPERABILITY and function of its associated AFW train? Per the South Texas license amendment request, it appears that an INOPERABLE AFW flow instrument channel may prevent the associated AFW train from automatically delivering a pre-set range of feed flow to its associated S/G, since the AFW regulator valve is controlled by QPDS using AFW flow. Is this correct?

Response: That is correct. If the inoperable AFW flow affects the control function, then application of the definition of OPERABILITY would require an operability evaluation for the associated train of AFW, which is governed by TS 3.7.1.2. Note that the accident analyses do not credit automatic AFW flow control; however, the associated AFW train would be inoperable if the condition prevented AFW actuation or flow. In any case, the proposed Post-Accident Monitoring System (PAMS) actions apply only for inoperable indication of AFW flow.

For all questions, consider a range of malfunctions which would cause an AFW flow instrument to be considered INOPERABLE, to include: instrument failed high, instrument failed low, instrument failed at an intermediate AFW flow, and no signal from the AFW flow instrument to QPDS.

Question #1.a: Does an INOPERABLE AFW flow instrument channel cause the associated AFW train to be INOPERABLE?

Response: If the condition prevents AFW actuation or flow or the ability to regulate the flow between 550 gpm and 675 gpm, the associated train of AFW would be inoperable per TS 3.7.1.2.

Question #1.b: Isn't it a part of the current design basis for an AFW train to AUTOMATICALLY deliver a pre-set range of feed flow given a valid AFW actuation signal? (e.g., SI signal, LOOP with S/G low-low water level). How does an INOPERABLE AFW flow instrument channel affect this design basis?

Response: Yes. See response to 1.a above.

Question #1.c: For accidents where AFW actuation occurs (i.e., many events from the South Texas FSAR chapter 15 accident analysis), a value of AFW flow had to be assumed. Per the proposed new TS action statements, one AFW flow channel instrument could be INOPERABLE indefinitely. How does an INOPERABLE AFW flow instrument affect the AFW flow(s) assumed in the chapter 15 accident analysis?

Example: Consider a steam generator tube rupture accident on say S/G A, as described in STP's FSAR. Add in a failed low AFW flow instrument for S/G A, which would be allowed indefinitely per the proposed TS change. Without operator action, will the AFW flow regulator valve to S/G A be open too far (due to the failed low AFW flow instrument) and perhaps lead to overfill on S/G A?

Response: An inoperable AFW flow indication channel does not affect the Chapter 15 analyses. Only the indication function is affected by the proposed TS change. If only indication is affected, the AFW train will function as designed. If the condition affects the ability of the AFW train to start or for the regulating valve to control flow between 550 gpm and 675 gpm, then TS 3.7.1.2 applies. With AFW flow indication available in the other loops or alternate indication of SG level, then adequate level can be maintained in the SG for decay heat removal and cool down.

A failed low AFW flow transmitter will cause the regulating valve to open to its 675 gpm upper limit. The analysis assumes full flow for 10 minutes before the steam generator is isolated in accordance with the Emergency Operating Procedure (EOP). The EOP directs the operators to isolate AFW flow to the faulted steam generator.

Question #2: When an AFW flow instrument channel becomes INOPERABLE, it appears that operators can take manual action to control the associated AFW regulator valve. Is this correct?

Response: Yes. The Operator can take manual control of the regulator valve from the Control Room after AFW actuation by resetting the actuation signal. The EOPs direct the operators to monitor narrow range steam generator level and manually control AFW flow to maintain the level to greater than 14% narrow range. The wording below is typical for management of steam generator level. Note that the AFW flow rates are called out in the "Response Not Obtained" column. However, even if the AFW flow rate indication is not available, AFW operation will be indicated by the control board indication for the AFW pump and regulator valve position. Flow can be confirmed by observing the steam generator level indication.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__14	MONITOR Intact SG Levels: __a. NR levels - GREATER THAN 14%[34%]	a. PERFORM the following: 1) MAINTAIN total AFW flow GREATER THAN 576 GPM to restore NR level GREATER THAN 14% [34%] in at least one SG. 2) any AFW pump fails to start. THEN: a) RESET all SG LO-LO level AFW actuations. b) CLOSE applicable AFW regulating valve. c) OPEN applicable AFW cross connects. d) CONTROL AFW flow to LESS THAN 675 GPM per AFW pump

Question #2.a: Is this what operators do when an AFW flow channel instrument becomes INOPERABLE? If so, answer these associated questions:

No. Manual control is taken after AFW actuation by resetting the actuation signal, then taking manual control of the valve at the control board. There is not a manual/auto selector for the regulator valve.

Question #2.a.1: How do operators know that an AFW flow channel instrument has become inoperable with AFW not running? Consider an AFW flow instrument failed high, failed low, instrument failed at an intermediate AFW flow, and no signal from the AFW flow instrument to QPDS. How would operators be alerted to these conditions? Alarms? Flow meter indications?

Response: PAMS TS surveillance requirements include a monthly channel check and 18 month channel calibration for AFW Flow. Flow is observed in the TS surveillance for the AFW pumps that is performed once per 31 days on a staggered test basis.

Question #2.b.1: Is taking manual control required by plant procedures? If so, please explain the procedure(s) entered (alarm procedure(s), operating/abnormal procedure(s)) and provide the procedures to the NRC.

Response: See the response to Question 2 above.

Question #2.b.2: If taking manual control is an action required by procedures, in what amount of time after an AFW flow instrument is determined to be INOPERABLE will this action be taken?

Response: See the response to Question 2 above. Taking manual control of AFW is a response to steam generator level indication, not a response to a loss of AFW flow indication.

Question #2.b.3: Does taking manual control of the AFW regulator valve restore that AFW train to OPERABLE?

Response: No. With the AFW flow input to the regulator valve inoperable, the associated train of AFW would be inoperable because it would not be able to meet its surveillance requirements. However, this question does not relate to the proposed TS change for PAMS, but pertains to the application of TS 3.7.1.2 for the AFW system.

Question #2.c: Does taking manual control of the AFW regulator valve allow that train of AFW to return to being able to perform its design function of delivering a pre-set range of feed flow given a valid AFW actuation signal?

Response: As described above, the Operator can only take manual control of AFW flow by resetting the AFW actuation signal after an AFW actuation. The Operators can control AFW Flow to perform its design function to maintain SG level based on SG level indication. AFW will actuate after being reset if it receives an actuation signal.

Question #2.d: **Consider an INOPERABLE AFW flow channel instrument, with the associated AFW regulator valve in manual. What would be the response of that AFW train to a LOOP (and associated loss of normal feedwater)? Compare this to the FSAR analysis, where that train's AFW pump will start on the LOOP, but go into recirculation until a valid S/G low-low level signal is received. Please justify any differences in AFW response.**

Response: This question relates to the actuation and flow control function for AFW which is governed by TS 3.7.1.2, not by the PAMS TS that STPNOC is seeking to change.

However, the response of the AFW system would not be significantly affected. As previously described, the regulator valves are normally open and control flow between the limits of 550 gpm and 675 gpm when in automatic mode. With the valves in manual, upon receipt of an AFW actuation signal and a LOOP, the pump would start as required and initial flow to the SG would occur at a rate established by the AFW regulator valve position at the time of actuation (normally full-open). As discussed in the responses to Questions 2 and 5, the operators will manually manage AFW flow using SG level indication.

OTHER CONCERNS

Question #3: **Please provide a listing for how the plant uses/where the output signal goes for each of the instruments considered in the proposed TS change:**

RCS Loop Thot wide range
RCS Loop Tcold wide range
S/G water level wide range
AFW flow

Use plant drawings as necessary, and include any alarms, feeds to other instruments, interlocks, and displays where the outputs of the instruments are utilized. (The NRC would like to verify that Thot, Tcold, S/G level are primarily for indication ONLY, and that only AFW flow serves another purpose (regulator valve control).

Response: The STPNOC application identifies the other functions provided by the PAMS instrumentation.

- The wide range reactor coolant inlet and outlet temperatures are input to the cold overpressure mitigation system (COMS). However, the TS for the COMS

function is not applicable in MODE 1, 2 & 3 where the Accident Monitoring Instrumentation TS applies.

- Steam Generator Level WR provides no control or protective function.
- AFW flow functions were described in the application and are the subject of other questions in this RAI. As discussed in the STPNOC responses, where the control functions are affected, the actions of TS 3.7.1.2 for the associated AFW train would apply.

Question #4: **Although in the LAR for STP it was stated how these instruments are used during an accident (e.g., EOP implementation, emergency action level classification), the NRC would like to conduct an independently verification. Would it be possible for STP to provide their entire EOP network to the NRC on a CD-rom? By entire EOP network, the NRC means:**

1. The "baseline" EOPs (e.g., E-0, E-1, E-2, E-3).
2. Critical safety function status trees.
3. Functional restoration procedures.
4. Emergency contingency procedures (i.e., loss of all AC power, loss of ECCS recirculation, uncontrolled depressurization of all steam generators, LOCA outside containment, steam generator tube rupture without pressurizer pressure control, etc.)
4. Event specific procedures (i.e., reactor trip response, re-diagnosis, natural circulation cooldown, SI termination, post LOCA cooldown and depressurization, transfer to cold leg recirculation, etc.).
5. Emergency action level classification procedure which includes what plant data are used and how to classify events.

Response: As discussed with the NRC staff in teleconference on November 8, 2006, STPNOC resolved this request by agreeing to provide pertinent excerpts from the procedures in the responses to these questions.

Specifically, STPNOC agreed to provide the procedural guidance and references to respond to a loss of off-site power with a reactor trip and loss of normal feedwater, assuming a failure of Train A and Train D actuation. The relevant procedural requirements are the procedure for Reactor Trip or Safety Injection (0POP05-EO-EO00) and Reactor Trip Response (0POP05-EO-ES01). These procedures are provided in Attachment 2 and Attachment 3, respectively. The operator action to manage AFW flow is highlighted. STPNOC considers this event successfully mitigated when the plant is stable in MODE 3, which is the licensing basis safe shutdown condition for STP. Success criteria includes keeping the pressurizer from going water-solid.

STP EOPs also contain certain conditions where AFW flow value is specified. For an ATWS, AFW flow of greater than 1080 gpm is required due to the heat load. For uncontrolled depressurization of all steam generators, AFW flow of 100 gpm per SG is required to maintain the SGs in a wetted condition and to minimize the cooldown. However, with AFW flow indication to two SGs still available in the control room, STP has adequate information to cooldown to RHR conditions.

OTHER EVENT-SPECIFIC CONCERNS

Question #5: For a Loss of Normal Feedwater flow event, as described in section 15.2.7 of the licensee's UFSAR, a LOOP is assumed with a failure of ESFAS train A to actuate. This results in only the B and C motor-driven AFW pumps running, with operator action required within 15 minutes to manually start either the A motor-driven AFW pump or the D steam-driven AFW pump. Explain how the operator action to manually start these AFW pumps would be affected assuming that the associated AFW flow indicator was INOPERABLE. Specifically:

Question #5.a: Do you believe operators can successfully manually start an AFW pump without flow indication?

Response: Yes. Not having AFW flow indication does not affect the ability of the operator to manually start the AFW pumps. Indication of AFW flow will be evidenced by control board indication of the running AFW pumps, regulator valve position, and by observing increasing steam generator water level.

In discussion with the staff, STPNOC agreed that the Bases for the PAMS AFW flow indication would be improved by identifying the alternate indications of AFW flow. The alternate flow indications on the control board (AFW pump running, regulator valve position, and steam generator water level), are STPNOC's pre-planned alternate indication of AFW flow should one channel of AFW flow be expected to be inoperable for longer than 30 days or if more than one channel of AFW flow is inoperable. Operators will be briefed on the use of the alternate indications if their use is required.

The STPNOC license amendment request dated October 2, 2006 included the Bases changes excerpted below. STPNOC will enhance these Bases with the highlighted additions.

For channels of AFW flow instrumentation, ACTION 35 applies only for loss of the indication function. If the control function of an AFW flow channel is inoperable, TS 3.7.1.2 is applicable.

ACTION 35.b requires entry into the 7-day shutdown action if two or more of the four required SG wide range level instruments or two or more of the four required AFW flow instruments are inoperable. The Completion Time of 7 days is based on the relatively low probability of an event requiring PAM instrument operation and the availability of alternate means to obtain the required information. There is safety margin in this requirement in the availability of the functionally diverse indications and that unavailability of the level indication or the AFW flow indication does not make the associated steam generator unavailable as a heat sink if it is receiving flow. In the absence of direct AFW flow indication, AFW flow is evidenced by control board indication of the running AFW pumps, the regulator valve position, and by observation of increasing steam generator water level. With respect to the LONF event, the 7-day action is conservative because control board indication of running AFW pumps and steam generator level can still be used to confirm AFW flow to the

steam generator in the absence of direct AFW flow indication in the unlikely event of an accident with two of the AFW flow channels inoperable. The alternate flow indications on the control board (AFW pump running, regulator valve position, and steam generator water level), are STPNOC's pre-planned alternate indication of AFW flow should one channel of AFW flow be expected to be inoperable for longer than 30 days or if more than one channel of AFW flow is inoperable. Operators will be briefed on the use of the alternate indications if their use is required.

With respect to the post-accident decay heat removal and determination of the need to initiate feed and bleed, the 7-day action is conservative because it can reasonably be expected that AFW flow and indication and steam generator level indication will be available for at least one generator in the unlikely event of an accident with two or more channels of either function inoperable. Continuous operation with two or more required channels inoperable in a function is not acceptable because the alternate indications may not fully meet all performance qualification requirements applied to the PAM instrumentation. Therefore, requiring restoration of at least three operable channels of the function limits the risk that the PAM function will be in a degraded condition should an accident occur.

Question #5.b: **How will operators verify that they have successfully started an AFW pump without flow indication?**

Response: See response to #5.a

Question #5.c: **Is there adequate guidance in plant procedures to ensure that operators can manually start an AFW pump without flow indication?**

Response: Yes. See Addendum 7 of attached procedure 0POP05-EO-ES01 as an example.

Question #5.d: **Are operators adequately trained such that they will be able to manually start an AFW pump without flow indication?**

Response: Yes. Operators understand that AFW flow can be determined by observing steam generator level and pump running indication.

Question #5.e: **Will operators be able to meet the 15-minute required action time, assuming one INOPERABLE AFW flow indicator (i.e., AFW flow indicator A is INOPERABLE, and operators choose to start the A AFW pump)**

Response: Yes. Inoperable AFW flow indication has no effect on operator response time.

Question #5.f: **Will operators be able to meet the 15-minute required action time, assuming two INOPERABLE AFW flow indicators (AFW flow indicators A and D INOPERABLE).**

Response: Yes. Inoperable AFW flow indication has no effect on operator response time.

Question #6: **Consider again a steam generator tube rupture accident, assuming the ruptured tube occurs on S/G A. Also assume that the AFW flow indicator for train A is failed high and INOPERABLE, such that the AFW regulator valve for train A will be more closed due to the failed instrument. Under these circumstances, AFW flow to the A S/G will be less than the AFW flow to the B, C, and D S/Gs. Could this lower AFW flow to the A S/G perhaps mask the A S/G level increasing from the tube rupture, when compared to the B, C, and D S/Gs which have higher AFW flow?**

Response: This question is relevant to the flow regulating function governed by TS 3.7.1.2 rather than the flow indication function governed by the PAMS TS that STPNOC is seeking to change. However, in addition to rising steam generator level, the operators will use the steam line radiation monitors, the N-16 monitors, and the steam generator blowdown radiation monitors to identify the ruptured steam generator. Consequently, any difference in AFW flow would not be expected to affect the proper identification of the ruptured steam generator.

Attachment 2
Reactor Trip or Safety Injection (0POP05-EO-EO00)

Adobe Acrobat 7.0
Document

The AFW Flow references are highlighted on the following pages:
Step 8 on p. 9 of 23
Step 22 on p. 18 of 23
Addendum 5, Step 5 on p. 3 of 8
Conditional Information Pages (last two pages of the procedure)
Note that management of SG level is the success criteria for AFW flow.
Isolation of AFW on the Conditional Information Pages does not require flow indication.

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SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

0POP05-EO-EO00 Rev. 19

REACTOR TRIP OR SAFETY INJECTION

DEPARTMENT PROCEDURE

SAFETY RELATED (Q)

USAGE CONTROL: In Hand Controlling Station

LIST OF ATTACHMENTS:

- o Addendum 1, Phase A Isolation Verification
- o Addendum 2, Establishing Alternate Charging Flow Control
- o Addendum 3, Emergency Electrical Loading Requirements
- o Addendum 4, Sequencer Loading Verification - Mode III
- o Addendum 5, Verification of SI Equipment Operation
- o Conditional Information Page

This procedure is applicable in Modes 1, 2, and 3 with RCS pressure GREATER THAN 1000 PSIG.

PURPOSE

This procedure provides actions to verify proper response of the automatic protection systems following manual or automatic actuation of a Reactor Trip or Safety Injection, to assess plant conditions, and identify the appropriate recovery procedure.

SYMPTOMS OR ENTRY CONDITIONS

1) The following are symptoms that require a REACTOR TRIP, if one has not occurred:

- o SR High Flux, 1/2 channels GREATER THAN OR EQUAL TO 10^5 CPS
- o IR High Flux, 1/2 channels current GREATER THAN OR EQUAL TO 25% power
- o PR (Low Setpoint), 2/4 channels GREATER THAN OR EQUAL TO 25% power
- o PR (High Setpoint), 2/4 channels GREATER THAN OR EQUAL TO 109% power
- o PR High Rate, 2/4 channels rise GREATER THAN OR EQUAL TO 5% in LESS THAN OR EQUAL TO 2 SECONDS
- o OTDT, 2/4 channels GREATER THAN setpoint
- o OPDT, 2/4 channels GREATER THAN setpoint
- o Pressurizer Low Pressure, 2/4 channels LESS THAN OR EQUAL TO 1870 PSIG
- o Pressurizer High Pressure, 2/4 channels GREATER THAN OR EQUAL TO 2380 PSIG
- o Pressurizer High Level, 2/4 channels GREATER THAN OR EQUAL TO 92%
- o Single Loop Low Flow, 2/3 channels on 1/4 loops LESS THAN OR EQUAL TO 91.8% flow when power is GREATER THAN P-8
- o Two Loop Low Flow, 2/3 channels on 2/4 loops LESS THAN OR EQUAL TO 91.8% flow when power is GREATER THAN P-7
- o RCP Undervoltage, 2/4 sensors LESS THAN OR EQUAL TO 10,014 V
- o RCP Underfrequency, 2/4 LESS THAN OR EQUAL TO 57.2 HZ
- o SG LO-LO Level, 2/4 channels on 1/4 SG(s) LESS THAN OR EQUAL TO 20% of NR
- o Turbine Trip, 2/3 channels auto stop oil pressure LESS THAN OR EQUAL TO 1245.8 psig OR 2/4 turbine throttle valves shut
- o Safety Injection, 1/2 trains
- o SSPS Urgent Failure, 2/2 logic train General Warning alarms

2) The following are symptoms of a REACTOR TRIP:

   - o Any reactor trip annunciator lit
   - o Rapid lowering in neutron level
   - o All shutdown and control banks fully inserted with rod bottom lights lit

3) The following are symptoms that require a REACTOR TRIP AND SAFETY INJECTION, if one has not occurred:

   - o Pressurizer Low Pressure, 2/4 channels LESS THAN OR EQUAL TO 1857 PSIG and NOT BLOCKED
   - o Containment High Pressure, 2/3 channels GREATER THAN OR EQUAL TO 3 PSIG
   - o Low Compensated SG Pressure, 2/3 channels LESS THAN OR EQUAL TO 735 PSIG on any SG and NOT BLOCKED

4) The following are symptoms of a REACTOR TRIP AND SAFETY INJECTION:

   - o Any SI annunciator lit
   - o SI pumps running
   - o Phase A isolation
   - o STBY DGs running

5) The following are entry conditions for 0POP05-EO-E000, REACTOR TRIP OR SAFETY INJECTION:

   - o A Reactor Trip resulting from the Manual actuation of 1/2 Reactor Trip handswitches.
   - o A Safety Injection resulting from the Manual actuation of 1/2 Safety Injection handswitches.
   - o An automatic Reactor Trip or Safety Injection.

ADVERSE CONTAINMENT CONDITIONS

IF any of the following conditions are met, THEN USE adverse containment values:

- o Containment pressure GREATER THAN OR EQUAL TO 5 PSIG.
- o Containment radiation levels GREATER THAN OR EQUAL TO 10^5 R/HR.
- o Containment integrated radiation dose GREATER THAN OR EQUAL TO 10^6 RADS.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- **Steps 1 through 4 are IMMEDIATE ACTION steps.**
- **Foldout CIP page should be open.**

___1 **VERIFY Reactor Trip:**

- o Rod bottom lights - LIT
- o Reactor trip and bypass breakers - OPEN
- o Neutron flux - LOWERING

PERFORM the following:

a. Manually TRIP reactor using both reactor trip switches.

b. IF reactor will NOT trip, THEN:

1) OPEN 480V LC 1K1(2K1) and 1L1(2L1) feeder breakers.

2) IF reactor will NOT trip, THEN GO TO 0POP05-EO-FRS1, RESPONSE TO NUCLEAR POWER GENERATION - ATWS, Step 1 AND MONITOR Critical Safety Functions.

3) IF reactor trip and bypass breakers DO NOT open, THEN DISPATCH an operator to open reactor trip and bypass breakers.

(60 ft EAB RM 323)

"REACTOR TRIP BREAKER R"

"REACTOR TRIP BREAKER S"

"BYPASS BREAKER R"

"BYPASS BREAKER S"

4) WHEN the reactor is verified tripped, THEN CLOSE 480V LC 1K1(2K1) and 1L1(2L1) feeder breakers.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___2	**VERIFY Turbine Trip:**	
	___a. VERIFY all turbine throttle valves - CLOSED	a. PERFORM the following: 1) Manually TRIP turbine. 2) IF turbine will NOT trip, THEN: a) PLACE EH pumps in PULL TO LOCK. b) Manually RUNBACK turbine. c) IF turbine throttle valves can NOT be closed, THEN CLOSE MSIVs and MSIBs.
	___b. Main generator output breaker - OPEN	b. Manually OPEN breaker.
	___c. Main steam to deaerator valves - CLOSED	c. Manually CLOSE valves.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___3	**VERIFY Power To AC ESF Busses:**	
	___a. AC ESF busses - AT LEAST ONE ENERGIZED o 4.16KV ESF bus o 480V ESF LCs o 480V ESF MCCs	a. PERFORM the following: 1) RESTORE power to at least one AC ESF bus by EMERGENCY STARTING STBY DG. 2) WHEN STBY DG is running, THEN ENSURE STBY DG Output Breaker CLOSED. 3) ENSURE "SPLY" and "OUTP" breakers for "4.16KV/480V XFMR"(s) - CLOSED. 4) IF power can NOT be restored to at least one AC ESF bus, THEN GO TO 0POP05-EO-EC00, LOSS OF ALL AC POWER, Step 1 AND MONITOR Critical Safety Functions
	___b. AC ESF busses - ALL ENERGIZED o 4.16KV ESF busses o 480V ESF LCs o 480V ESF MCCs	b. TRY to restore power to deenergized AC ESF busses. o Emergency START STBY DG. o WHEN STBY DG is running, THEN ENSURE STBY DG Output Breaker CLOSED. o ENSURE "SPLY" and "OUTP" breakers for "4.16KV/480V XFMR"(s) - CLOSED.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___4	**CHECK SI Status:**	
	___a. CHECK if SI is actuated o SI reactor trip first out annunciator - LIT o ESF status monitoring red SI status lights - LIT	a. PERFORM the following: 1) CHECK if SI is required: o Pressurizer pressure - LESS THAN OR EQUAL TO 1857 PSIG AND NOT BLOCKED. OR o Containment pressure - GREATER THAN OR EQUAL TO 3 PSIG. OR o Any SG pressure - LESS THAN OR EQUAL TO 735 PSIG AND NOT BLOCKED. OR o As directed by US/SS. 2) IF SI is required, THEN manually ACTUATE. 3) IF SI is NOT required, THEN GO TO 0POP05-EO-ES01, REACTOR TRIP RESPONSE, Step 1 AND MONITOR Critical Safety Functions.
	___b. VERIFY all trains of SI - ACTUATED o Train A ESF status monitoring red SI status lights - LIT o Train B ESF status monitoring red SI status lights - LIT o Train C ESF status monitoring red SI status lights - LIT	b. Manually ACTUATE SI.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

ADDENDUM 5, VERIFICATION OF SI EQUIPMENT OPERATION is required to be completed before Functional Restoration Procedures are implemented. Addendum 5 ensures that the ESF systems are functional.

___5 **VERIFY Proper SI Equipment Operation**
Per ADDENDUM 5, VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___6	**MONITOR If Containment Spray Is Required:**	
	___a. Containment pressure - GREATER THAN 9.5 PSIG (QDPS)	a. PERFORM the following: 1) CHECK Containment pressure - HAS EXCEEDED 9.5 PSIG (CP-018) o "PRESS PR-0934" OR o "EXTD RNG PRESS PR-9759" 2) IF containment pressure HAS EXCEEDED 9.5 PSIG, THEN GO TO Step 6.b. 3) IF containment pressure HAS REMAINED LESS THAN 9.5 PSIG, THEN GO TO Step 7.
	___b. VERIFY containment spray - INITIATED	b. Manually INITIATE containment spray.
	___c. VERIFY containment isolation Phase B valves - CLOSED ___o "INL OCIV MOV-0318" ___o "INL OCIV MOV-0291" ___o "OUTL ICIV MOV-0542" ___o "OUTL ICIV MOV-0403" ___o "OUTL OCIV MOV-0404" ___o "OUTL OCIV FV-4493"	c. Manually CLOSE valve(s).
	___d. STOP ALL RCPs	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___7	**CHECK RCP Seal Cooling:**	
	___a. Seal injection flow - NORMAL o MAINTAIN seal injection flow between 6 and 13 gpm	a. PERFORM the following: 1) VERIFY CCW flow to RCPs. 2) IF CCW to the RCP(s) is lost, THEN: a) TRIP the RCP(s). b) ENSURE one charging pump running and supplying seal injection. c) MAINTAIN seal injection flow between 6 and 13 gpm

NOTE

WHEN RCS temperature is controlled by the SG PORVs in AUTO, THEN RCS temperature will be maintained at approximately 571°F at the SG PORV setpoint.

___8	**MONITOR RCS Temperatures** o WITH ANY RCP RUNNING, RCS TAVG STABLE AT OR TRENDING TO 567°F OR o WITHOUT ANY RCP RUNNING, RCS TCOLD STABLE AT OR TRENDING TO 567°F	PERFORM Substep a. OR Substep b. based on RCS temperature: a. IF temperature LESS THAN 567°F AND lowering, THEN: 1) MAINTAIN total AFW flow GREATER THAN 576 GPM until NR level is GREATER THAN 14% [34%] in at least one SG.

Step 8 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 8 continued from previous page.

2) ISOLATE steam loads as follows:

- o ISOLATE steam dump drains.
- o ISOLATE steam chest drains.
- o ISOLATE steam to MSR and steam line drains to MSRs.
- o TRIP all SGFPTs.
- o STOP dumping steam.
- o ISOLATE SGBD.

3) IF cooldown continues, THEN CLOSE MSIVs and MSIBs.

b. IF temperature GREATER THAN 567°F AND rising THEN:

1) IF condenser is available, THEN DUMP steam to condenser.

2) IF condenser NOT available, THEN ENSURE SG PORVs controlling temperature in AUTO.

a) VERIFY SG PORV setpoints at 1225 psig.

b) IF SG PORVs are NOT controlling temperature in AUTO, THEN:

1) Place SG PORV in MANUAL.

2) CONTROL temperature STABLE AT 567°F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___9	**CHECK Pressurizer Status:**	
	___a. PORVs - CLOSED	a. WHEN pressurizer pressure LESS THAN 2335 PSIG, THEN: 1) Manually CLOSE PORVs. 2) IF any PORV can NOT be closed, THEN manually CLOSE its isolation valve. 3) IF isolation valve can NOT be closed, THEN PERFORM the following: o GO TO OPOP05-EO-E010, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1. o MONITOR Critical Safety Functions. o WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.
	___b. Normal pressurizer spray valves - CLOSED	b. WHEN pressurizer pressure LESS THAN 2260 PSIG, THEN: 1) Manually CLOSE normal spray valve(s). 2) IF spray valve(s) can NOT be closed, THEN PERFORM the following: a) STOP RCP 1A(2A). b) STOP RCP 1D(2D). c) IF RCS pressure continues to lower, THEN STOP all but one RCP.

Step 9 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 9 continued from previous page.

___c. Auxiliary spray valve - CLOSED

c. Manually CLOSE auxiliary spray valve.

___d. Excess letdown isolation valves - CLOSED

d. Manually CLOSE excess letdown isolation valves.

___10 **MONITOR If RCPs Should Be Stopped:**

___a. HHSI pump - AT LEAST ONE RUNNING

a. GO TO Step 11.

___b. RCS pressure - LESS THAN 1430 PSIG

b. GO TO Step 11.

___c. STOP all RCPs

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___11	**VERIFY The Following Containment Isolation Valves - CLOSED**	
	___a. Seal return isolation valves	a. IF neither seal return isolation valve CAN be verified closed, THEN DISPATCH operator to ensure seal return OCIV closed (29 ft MAB RM 108C) "1(2)-CV-MOV-0079" "RCP SEAL WATER RETURN ORC" "CONTAINMENT ISOLATION MOV" "OPERATOR"
	___b. Containment atmosphere radiation monitor isolation valves	b. IF neither valve in the supply line OR neither valve in the return line CAN be verified closed, THEN DISPATCH operator to ensure OCIVs closed. (41 ft MAB RM 216 Mezz.) "1(2)-RA-MOV-0004" "RCB EXHAUST RT-8011 SUPPLY" "ORC ISOLATION MOV OPERATOR" "1(2)-RA-MOV-0006" "RCB EXHAUST RT-8011 RETURN" "ORC ISLOATION MOV OPERATOR"

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___12	**CHECK If SG Secondary Pressure Boundary Intact:**	
	___a. CHECK pressures in all SGs - o CONTROLLED OR RISING o GREATER THAN CONTAINMENT PRESSURE	a. IF any faulted SG is NOT isolated, AND is NOT needed for RCS cooldown, THEN PERFORM the following: o GO TO 0POP05-EO-E020, FAULTED STEAM GENERATOR ISOLATION, Step 1. o MONITOR Critical Safety Functions. o WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.
___13	**CHECK If SG Tubes Are Intact:** o Main steamline radiation - NORMAL o IF SG blowdown in service, THEN SG blowdown radiation - NORMAL o CARS pump radiation - NORMAL o NO SG level rising in an uncontrolled manner	GO TO 0POP05-EO-E030, STEAM GENERATOR TUBE RUPTURE, Step 1. o MONITOR Critical Safety Functions. o WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.
___14	**CHECK If RCS Is Intact:** o Containment radiation - NORMAL o Containment pressure - NORMAL o Containment wide range water level - NORMAL	GO TO 0POP05-EO-E010, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1. o MONITOR Critical Safety Functions. o WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___15	**MONITOR If SI Flow Should Be Terminated:**	
	___a. RCS subcooling based on core exit T/Cs - GREATER THAN 35°F	a. GO TO Step 16.
	___b. Secondary heat sink criteria - SATISFIED o Total AFW flow to SGs - GREATER THAN 576 GPM OR o NR level in at least one SG - GREATER THAN 14%	b. GO TO Step 16.
	___c. RCS pressure criteria - SATISFIED o Pressure - GREATER THAN 1745 PSIG o Pressure - STABLE OR RISING	c. GO TO Step 16.
	___d. Pressurizer level - GREATER THAN 8%	d. PERFORM the following: 1) USE normal pressurizer spray to stabilize RCS pressure. 2) IF normal spray NOT available, THEN: a) ENSURE normal spray valves are closed. b) USE auxiliary spray if available. 3) GO TO Step 16.

Step 15 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 15 continued from previous page.

___e. GO TO 0POP05-EO-ES11, SI TERMINATION, Step 1

___1) Addendum 5 of this procedure complete

1) PERFORM the following:

a) MONITOR Critical Safety Functions.

b) WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.

___2) MONITOR Critical Safety Functions AND IMPLEMENT Functional Restoration Procedures as required

___16 **INITIATE MONITORING of Critical Safety Functions**

___a. Addendum 5 of this procedure complete

a. PERFORM the following:

1) MONITOR Critical Safety Functions.

2) WHEN Addendum 5 of this procedure is complete, THEN Functional Restoration Procedures may be IMPLEMENTED.

3) GO TO Step 17.

___b. MONITOR Critical Safety Functions AND IMPLEMENT Functional Restoration Procedures as required

___17 **RESET SI**

___18 **RESET ESF Load Sequencers**

___19 **RESET Containment Isolation Phase A**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

___20 **RESET Containment Isolation Phase B**

CAUTION

IF a pressurizer spray valve has been determined to be stuck open AND more than one RCP is operating, THEN IA to containment should NOT be established to avoid the initiation of an uncontrolled RCS depressurization.

___21 **ESTABLISH IA To Containment:**

___a. IA pressure - GREATER THAN 95 PSIG

a. DISPATCH an operator to start an IA compressor.

___b. OPEN IA OCIV

b. IF IA OCIV can NOT be opened from the control room, THEN DISPATCH operator to perform the following:

(10 ft MAB PENT space)

1) UNLOCK and CLOSE:

"1(2)-IA-1515"
"RCB INSTRUMENT AIR HEADER"
"FV-8565 MANUAL OVERRIDE"
"VALVE"

2) UNLOCK and OPEN:

"1(2)-IA-1516"
"RCB INSTRUMENT AIR HEADER"
"FV-8565 MANUAL OVERRIDE"
"VALVE"

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___22	**MONITOR SG Levels:**	
	___a. NR levels - GREATER THAN 14%	a. PERFORM the following: 1) MAINTAIN total AFW flow GREATER THAN 576 GPM to restore NR level GREATER THAN 14% in at least one SG. 2) IF any AFW pump fails to start, THEN: a) RESET all SG LO-LO Level AFW actuations. b) CLOSE applicable AFW regulating valve. c) OPEN applicable AFW cross connects. d) CONTROL AFW flow to LESS THAN 675 GPM per AFW pump.
	___b. CONTROL AFW flow to maintain NR levels BETWEEN 22% and 50%	b. IF NR level in any SG continues to rise in an uncontrolled manner, THEN GO TO 0POP05-EO-E030, STEAM GENERATOR TUBE RUPTURE, Step 1. AND MONITOR Critical Safety Functions
	___c. CHECK for a tube rupture - NO UNEXPLAINED SG LEVEL TREND WHERE LEVEL IS CONSTANT OR RISING WITH LOW AFW FLOW	c. GO TO 0POP05-EO-E030, STEAM GENERATOR TUBE RUPTURE, Step 1 AND MONITOR Critical Safety Functions.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___23	**CHECK Secondary Radiation:**	
	___a. PERFORM the following:	
	___1) RESET SG LO-LO level AFW actuations	
	___2) RESET SG blowdown and sample isolations	
	___3) NOTIFY Chemistry to sample all SGs for activity	
	___b. VERIFY SG sample activity - NORMAL	b. IF SG sample activity is verified abnormal, THEN GO TO 0POP05-EO-E030, STEAM GENERATOR TUBE RUPTURE, Step 1 AND MONITOR Critical Safety Functions.
___24	**CHECK MAB Radiation - NORMAL**	IF the cause of the abnormal condition is a loss of RCS inventory outside containment, THEN GO TO 0POP05-EO-EC12, LOCA OUTSIDE CONTAINMENT, Step 1 AND MONITOR Critical Safety Functions.
___25	**CHECK FHB Conditions:** o FHB area radiation monitors - NORMAL o FHB ECCS pump sump levels - NORMAL	IF the cause of the abnormal condition is a loss of RCS inventory outside containment, THEN GO TO 0POP05-EO-EC12, LOCA OUTSIDE CONTAINMENT, Step 1 AND MONITOR Critical Safety Functions.
___26	**CHECK PRT Conditions - NORMAL**	EVALUATE cause of abnormal condition.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___27	**MONITOR If LHSI Pumps Should Be Stopped:**	
	___a. CHECK RCS pressure:	
	___1) Pressure - GREATER THAN 415 PSIG	1) GO TO 0POP05-EO-E010, LOSS OF REACTOR OR SECONDARY COOLANT, Step 1 AND MONITOR Critical Safety Functions.
	___2) Pressure - STABLE OR RISING	2) GO TO Step 28.
	___b. STOP LHSI pumps and PLACE in AUTO	
___28	**ESTABLISH Charging Flow:**	
	___a. CCPs - AT LEAST ONE RUNNING	a. PERFORM the following: 1) CLOSE seal injection isolation valves. o "SEAL INJ ISOL MOV-0033A" o "SEAL INJ ISOL MOV-0033B" o "SEAL INJ ISOL MOV-0033C" o "SEAL INJ ISOL MOV-0033D" 2) CLOSE the CCP discharge valve for the CCP to be started. 3) CLOSE the charging flow control valve. 4) IF charging flow control valve will NOT close, THEN ESTABLISH charging flow to maintain pressurizer level GREATER THAN 8% per ADDENDUM 2, ESTABLISHING ALTERNATE CHARGING FLOW CONTROL AND GO TO Step 29. 5) OPEN the recirculation valve for the CCP to be started. 6) START one CCP.

Step 28 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Step 28 continued from previous page.		
		7) OPEN the CCP discharge valve for the pump that was started.

___b.	Charging flow - ESTABLISHED	b. PERFORM the following: 1) ENSURE Containment Isolation Phase A RESET. 2) ENSURE charging flow control valve CLOSED. 3) IF charging flow control valve will NOT close, THEN ESTABLISH charging flow to maintain pressurizer level GREATER THAN 8% per ADDENDUM 2, ESTABLISHING ALTERNATE CHARGING FLOW CONTROL AND GO TO Step 29. 4) ENSURE CCP discharge valves open. 5) ENSURE normal or alternate charging isolation valve open. 6) ENSURE charging OCIV open. 7) IF charging OCIV will NOT open, THEN DISPATCH operator to open charging OCIV: (29 ft MAB RM 108C) "1(2)-CV-MOV-0025" "CVCS CHARGING" "ORC CONTAINMENT ISOLATION" "MOV OPERATOR"

Step 28 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 28 continued from previous page.

___c. CONTROL charging flow to maintain pressurizer level GREATER THAN 8%

c. IF charging flow control valve will NOT control charging flow, THEN MAINTAIN pressurizer level GREATER THAN 8% per ADDENDUM 2, ESTABLISHING ALTERNATE CHARGING FLOW CONTROL.

___29 **MONITOR If STBY DGs Should Be Stopped:**

___a. VERIFY AC ESF busses - ENERGIZED BY OFFSITE POWER

- o 4.16KV ESF bus
- o 480V ESF LCs
- o 480V ESF MCCs

a. TRY to restore offsite power:

1) REFER TO OPOP04-AE-0001, FIRST RESPONSE TO LOSS OF ANY OR ALL 13.8 OR 4.16 BUS.

2) IF offsite power can NOT be restored, THEN manually LOAD desired equipment on the AC ESF busses, REFER TO ADDENDUM 3, EMERGENCY ELECTRICAL LOADING REQUIREMENTS.

3) WHEN offsite power is restored, THEN PERFORM Steps 29.b, 29.c and 29.d.

___b. RESET any unloaded DG(s) non-emergency trips

___c. RELEASE any unloaded DG(s) from EMERGENCY mode

___d. STOP any unloaded DG(s)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___30	**ENSURE SFPC In Service Within 2.5 HOURS Of Loss Of SFPC:**	
	___a. CHECK CCW pumps - AT LEAST TWO RUNNING	a. PERFORM the following: 1) CONSULT TSC Staff regarding the operation of SFPC with LESS THAN two CCW pumps running. 2) IF SFPC can NOT be placed in service, THEN GO TO Step 31.
	___b. ALIGN CCW flow to SFPC heat exchanger(s)	b. IF CCW flow can NOT be aligned from the main control board, THEN DISPATCH operator to open the following valves: (29 ft MAB RM 106A SW corner) o "1(2)-CC-MOV-0447" "SPENT FUEL POOL HXS" "CCW SUPPLY HEADER" "FIRST ISOLATION MOV OPERATOR" o "1(2)-CC-MOV-0032" "SPENT FUEL POOL HXS" "CCW SUPPLY HEADER" "SECOND ISOLATION MOV OPERATOR"
	___c. CHECK SFPC pump - RUNNING	c. START SFPC pump(s), REFER TO 0POP02-FC-0001, SPENT FUEL POOL COOLING AND CLEANUP SYSTEM.
___31	**RETURN TO Step 8**	

-END-

ADDENDUM 1
PHASE A ISOLATION VERIFICATION

DEVICE	POSITION	CHECK
Fire Water to Containment		
"FIRE WTR OCIV FV-0756"	CLOSED	_____
Instrument Air to Containment		
"IA OCIV FV-8565"	CLOSED	_____
Containment H2 Monitoring		
"VPI FV-4101"	CLOSED	_____
"VPI FV-4127"	CLOSED	_____
"VPI FV-4104"	CLOSED	_____
"VPI FV-4133"	CLOSED	_____
"H2 SAMPLE INL ICIV FV-4135"	CLOSED	_____
"H2 SAMPLE DISCH ICIV FV-4128"	CLOSED	_____
"H2 SAMPLE INL ICIV FV-4136"	CLOSED	_____
"H2 SAMPLE DISCH ICIV FV-4134"	CLOSED	_____
Primary Sampling System		
"RHR SAMPLE ICIV FV-4823"	CLOSED	_____
"RHR SAMPLE OCIV FV-4461"	CLOSED	_____
"SI ACC SAMPLE ICIV FV-4824"	CLOSED	_____
"SI ACC SAMPLE OCIV FV-4466"	CLOSED	_____
"RCS LOOP 1A(2A) Th SAMPLE ICIV" "FV-4454"	CLOSED	_____

ADDENDUM 1
PHASE A ISOLATION VERIFICATION

DEVICE	POSITION	CHECK
Primary Sampling System (con't)		
"RCS LOOP 1C(2C) Th SAMPLE ICIV" "FV-4455"	CLOSED	_____
"RCS SAMPLE OCIV FV-4456"	CLOSED	_____
"PRZR LIQ SAMPLE OCIV FV-4451B"	CLOSED	_____
"PRZR LIQ SAMPLE ICIV FV-4451"	CLOSED	_____
"PRZR VAPOR SAMPLE OCIV FV-4452"	CLOSED	_____
"PRZR VAPOR SAMPLE ICIV FV-4450"	CLOSED	_____
Post Accident Sample System		
"CNTMT SUMP SAMPLE OCIV FV-2453"	CLOSED	_____
"RHR SAMPLE OCIV FV-2454"	CLOSED	_____
"RCS SAMPLE OCIV FV-2455/2455A"	CLOSED	_____
"CNTMT AIR SAMPLE OCIV FV-2456"	CLOSED	_____
"RETURN TO PRT OCIV FV-2458"	CLOSED	_____
"CNTMT AIR RETURN OCIV FV-2457"	CLOSED	_____
SI Accumulators		
"TEST LN ICIV FV-3970"	CLOSED	_____
"TEST LN OCIV FV-3971"	CLOSED	_____
"N2 SPLY OCIV FV-3983"	CLOSED	_____

ADDENDUM 1
PHASE A ISOLATION VERIFICATION

DEVICE	POSITION	CHECK
Pressurizer Relief Tank		
"OCIV FV-3652"	CLOSED	_____
"ICIV FV-3653"	CLOSED	_____
"OCIV FV-3651"	CLOSED	_____
Reactor Coolant Drain Tank		
"OCIV FV-4913"	CLOSED	_____
"ICIV MOV-0312"	CLOSED	_____
"OCIV FV-4919"	CLOSED	_____
"ICIV FV-4920"	CLOSED	_____
Containment Normal Sump		
"DISCH ICIV MOV-0064"	CLOSED	_____
"DISCH OCIV FV-7800"	CLOSED	_____
CVCS Letdown		
"OCIV MOV-0024"	CLOSED	_____
"ICIV MOV-0023"	CLOSED	_____
"LTDN ORIF HDR ISOL FV-0011"	CLOSED	_____
CVCS Seal Return		
"SEAL RTN ICIV MOV-0077"	CLOSED	_____
"SEAL RTN OCIV MOV-0079"	CLOSED	_____

ADDENDUM 1
PHASE A ISOLATION VERIFICATION

DEVICE	POSITION	CHECK
CVCS Charging		
"OCIV MOV-0025"	CLOSED	_____
Personnel Airlock Seal OCIVs		
"INNER SEAL FV-1025"	CLOSED	_____
"INNER SEAL FV-1028"	CLOSED	_____
"OUTER SEAL FV-1026"	CLOSED	_____
"OUTER SEAL FV-1027"	CLOSED	_____

ADDENDUM 2
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF RCP Seal Cooling has been lost and Seal Inlet Temperature has exceeded 230°F, THEN Seal Injection SHALL NOT be established to affected RCPs per this Addendum.

___ 1 DISPATCH operator to perform the following:

___ a. THROTTLE charging flow control manual bypass two turns open

(19 ft MAB RM 79)

"1(2)-CV-0255"
"CVCS CHARGING DISCHARGE"
"FCV-0205 BYPASS VALVE"

___ b. CLOSE charging flow control manual inlet isolation valve

(19 ft MAB RM 79)

"1(2)-CV-0254A"
"CVCS CHARGING DISCHARGE"
"FCV-0205 INLET VALVE"

___ 2 CHECK normal or alternate charging loop isolation valve - OPEN

OPEN normal or alternate charging loop isolation valve.

ADDENDUM 2
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 3	CHECK charging OCIV - OPEN	PERFORM the following: a. OPEN charging OCIV. b. IF charging OCIV will NOT open, THEN DISPATCH operator to open charging OCIV. (29 FT MAB RM 108C) "1(2)-CV-MOV-0025" "CVCS CHARGING ORC" "CONTAINMENT ISOLATION" "MOV OPERATOR"
___ 4	VERIFY RCP seal inlet temperatures have remained - LESS THAN 230°F	CLOSE affected seal injection OCIV's: o "SEAL INJ ISOL MOV-0033A" o "SEAL INJ ISOL MOV-0033B" o "SEAL INJ ISOL MOV-0033C" o "SEAL INJ ISOL MOV-0033D"
___ 5	ESTABLISH charging flow:	
	___ a. CHECK CCP suction aligned to RWST	a. PERFORM the following: 1) OPEN at least one CCP suction valve from the RWST. 2) CLOSE at least one CCP suction valve from the VCT.
	___ b. CHECK CCP(s) - RUNNING	b. PERFORM the following: 1) OPEN the recirculation valve(s) for the CCP(s) to be started. 2) START the CCP(s)
	___ c. ENSURE running CCP(s) discharge valve - OPEN	c. IF running CCP(s) discharge valve can NOT be OPENED, THEN GO TO Step 6 of this Addendum. OBSERVE the CAUTION prior to Step 6.

Step 5 continued next page

ADDENDUM 2
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 5 continued continued from previous page

___ d. DISPATCH operator to adjust charging flow control manual bypass to achieve desired flowrate

(19 ft MAB RM 79)

"1(2)-CV-0255"
"CVCS CHARGING DISCHARGE"
"FCV-0205 BYPASS VALVE"

___ e. CLOSE the running CCP(s) recirculation valve

___ f. CHECK RCP seal injection flow - BETWEEN 6 and 13 GPM

f. IF RCP Seal Inlet temperatures have remained - LESS THAN 230°F. THEN PERFORM the following:

1) ENSURE seal injection OCIV(s) - OPEN.

- o "SEAL INJ ISOL MOV-0033A"
- o "SEAL INJ ISOL MOV-0033B"
- o "SEAL INJ ISOL MOV-0033C"
- o "SEAL INJ ISOL MOV-0033D"

2) ADJUST 1(2)-CV-HCV-0218 to establish between 6 and 13 gpm RCP seal injection flow.

___ g. RETURN TO procedure step in effect

ADDENDUM 2
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF RCP seals have **NOT** been previously isolated, THEN maximum seal injection flow will result when CCP 1B(2B) Alt Discharge to RCP Seal Isolation CV-0236B OR CCP 1A(2A) Bypass Isol MOV-8348 is opened.

___ 6 DISPATCH operator to perform the following:

___ a. OPEN alternate discharge to RCP seals:

(19 ft MAB RM 79)

"1(2)-CV-0236B"
"CENTRIFUGAL CHARGING PUMP 1B(2B)"
"ALT RCP SEAL SUPPLY VALVE"

___ 7 ENSURE CCP 1B(2B) discharge isolation MOV-8377B - CLOSED

___ 8 CHECK CCP 1A(2A) - RUNNING — GO TO Step 9 of this Addendum.

___ a. OPEN CCP 1A(2A) Bypass Isol MOV-8348

___ b. ENSURE CCP 1A(2A) discharge isolation MOV-8377A - CLOSED

ADDENDUM 2
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 9	ESTABLISH desired charging flow:	
	___ a. DISPATCH operator to open: (19 ft MAB RM 79) "1(2)-CV-0255" "CVCS CHARGING DISCHARGE" "FCV-0205 BYPASS VALVE"	
	___ b. THROTTLE HCV-0206 to establish desired charging flow	
	___ c. CLOSE the running CCP(s) recirculation valve	
___ 10	VERIFY RCP seal injection temperature has remained - LESS THAN 230°F	RETURN TO procedure step in effect.
	___ a. ENSURE seal injection OCIV(s) OPEN o "SEAL INJ ISOL MOV-0033A" o "SEAL INJ ISOL MOV-0033B" o "SEAL INJ ISOL MOV-0033C" o "SEAL INJ ISOL MOV-0033D"	
___ 11	DISPATCH operator to THROTTLE Alternate Source to Seal Injection Isolation valve to establish between 6 and 13 gpm RCP seal flow (19 ft MAB RM 79) "1(2)-CV-0246" "CVCS CHARGING PUMPS" "ALT RCP SEAL SUPPLY ISOL VALVE"	
___ 12	RETURN TO procedure step in effect	

ADDENDUM 3
EMERGENCY ELECTRICAL LOADING REQUIREMENTS

Components	Train A (KW)	Train B (KW)	Train C (KW)
Pressurizer Heaters 1A/1B (2A/2B)	431.0	N/A	431.0
Hydrogen Recombiners	N/A	75.0	75.0
RHR Pumps	222.2	222.2	222.2
RMW Pumps	N/A	41.0	41.0
SFPC Pumps	N/A	140.4	140.4
SFP Air Handling Unit	N/A	0.5	0.5
Centrifugal Charging Pumps	450.0	N/A	450.0
BA Transfer Pump Room Fans	0.4	N/A	0.4
BAT Pumps	27.0	N/A	27.0
RMW Pumps Air Handling Unit	N/A	1.9	1.9
480V MCCs 1A5/1B5/1C5 (2A5/2B5/2C5)	171.5	72.5	92.2

ADDENDUM 4
SEQUENCER LOADING VERIFICATION - MODE III

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

- **Equipment should NOT be manually loaded on an ESF Bus until the respective ESF Load Sequencer has completed its automatic sequence OR it has been determined that the respective ESF Load Sequencer has failed to operate.**
- **IF a LOOP or SI occurs, AND a train of Essential Chilled Water fails, THEN the corresponding EAB HVAC fans should be stopped within 30 minutes to prevent heat buildup in the Auxiliary Shutdown/QDPS rooms.**

___ 1 VERIFY the following equipment - LOADED ON ESF BUS

Manually LOAD equipment NOT previously secured by the Emergency Operating Procedures.

COMPONENT	TRAIN "A"	TRAIN "B"	TRAIN "C"
480V LC Feeder Breakers			
ECW Pumps			
HHSI Pumps			
LHSI Pumps			
CNTMT Spray Pumps (If Required,max. of 2)			
RCFCs			
CCW Pumps			
AFW Pumps			
Essential Chill Water Pumps			
EAB Supply and Return HVAC Fans			
CRE Supply, Return, C/U and M/U HVAC Fans			
FHB Main Exhaust HVAC Fans			
Essential Chillers			

ADDENDUM 4
SEQUENCER LOADING VERIFICATION - MODE III

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 2	RESET ESF load sequencers	
___ 3	RESET Pressurizer Backup Heaters 1A(2A) and 1B(2B) ___ a. Place Control Room Handswitches in - OFF ___ b. RETURN Control Room Handswitches to the position required for current plant conditions	
___ 4	STOP any equipment previously secured by any Emergency Operating Procedure	
___ 5	CHECK ALL Essential Chilled Water Trains - IN SERVICE	SECURE the corresponding EAB HVAC for any Essential Chilled Water Train that is NOT operating.
___ 6	RETURN TO procedure step in effect	

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Functional Restoration Procedures (FRPs) SHOULD NOT be IMPLEMENTED until this Addendum is complete. See OPOP01-ZA-0018 "EOP User's Guide" for exceptions.

___ 1 VERIFY FW isolation:

___ a. SGFPTs - TRIPPED — a. Manually TRIP SGFPTs.

___ b. SU SGFP - TRIPPED — b. Manually TRIP SU SGFP.

___ c. VERIFY the following valves - CLOSED — c. Manually CLOSE valves.

- ___ o FWIVs
- ___ o FWIBs
- ___ o FW preheater bypass valves
- ___ o FW regulating valves
- ___ o Low power FW regulating valves
- ___ o SG blowdown isolation valves
- ___ o SG sample isolation valves

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 2	CHECK if main steamline should be isolated:	
___	a. CHECK for any of the following conditions: o Containment pressure - GREATER THAN OR EQUAL TO 3 PSIG OR o SG pressure (without low steamline pressure SI blocked) - LESS THAN OR EQUAL TO 735 PSIG OR o SG pressure (with low steamline pressure SI blocked) - LOWERING AT A RATE GREATER THAN OR EQUAL TO 100 PSI/SEC.BY OBSERVANCE OF THE STEAMLINE PRESSURE RATE BISTABLES	a. GO TO Step 3 of this Addendum.
___	b. VERIFY main steamline isolation: o MSIVs - CLOSED o MSIBs - CLOSED	b. Manually CLOSE valves.

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
	CAUTION **Equipment should NOT be manually loaded on an ESF Bus until the respective ESF Load Sequencer has completed its automatic sequence OR it has been determined that the respective ESF Load Sequencer has failed to operate.**	
___ 3	VERIFY AFW system status:	
	___ a. Motor-driven pump - RUNNING	a. WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN manually START pump(s).
	___ b. Turbine-driven pump - RUNNING	b. Manually OPEN steam supply valves.
___ 4	VERIFY AFW valve alignment - PROPER EMERGENCY ALIGNMENT	Manually ALIGN valves.
___ 5	VERIFY total AFW Flow - GREATER THAN 576 GPM	PERFORM the following: a. Manually START pumps AND ALIGN valves to feed SGs. b. CONTROL AFW flow to maintain NR level BETWEEN 14% [34%] and 50%.

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 6	VERIFY containment isolation phase A:	
	___ a. Phase A - ACTUATED	a. Manually ACTUATE phase A.
	___ b. Phase A valves - CLOSED, REFER TO ADDENDUM 1, PHASE A ISOLATION VERIFICATION	b. Manually CLOSE valves.
___ 7	VERIFY ECW status: o ECW pumps - RUNNING o ECW pump discharge isolation valves - OPEN	WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN PERFORM the following: a. Manually START pump(s). b. Manually OPEN discharge isolation valve(s). c. IF any ECW pump can NOT be started OR its discharge isolation valve can NOT be opened, THEN: 1) TRIP associated STBY DG, AND PLACE in PULL-TO-STOP. 2) TRIP associated Essential Chiller(s).
___ 8	VERIFY CCW pumps - RUNNING	WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN manually START pump(s).

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 9	VERIFY RCFC status:	
	___ a. RCFCs - RUNNING	a. WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN manually START RCFC(s).
	___ b. Cooling water - TRANSFERRED TO CCW	b. PERFORM the following: 1) IF RCFC inlet temperatures are LESS THAN OR EQUAL TO 116°F, THEN Manually TRANSFER cooling to CCW. 2) IF RCFC inlet temperatures are GREATER THAN 116°F, THEN CONTACT the TSC prior to transferring cooling.
___ 10	VERIFY SI pump status: o HHSI pumps - RUNNING o LHSI pumps - RUNNING	WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN manually START pump(s).
___ 11	VERIFY SI valve alignment - PROPER EMERGENCY ALIGNMENT	Manually ALIGN valves.

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 12	VERIFY SI flow:	
	___ a. RCS pressure - LESS THAN 1745 PSIG	a. GO TO Step 13 of this Addendum.
	___ b. HHSI pump flow - INDICATED	b. Manually START pumps AND ALIGN valves.
	___ c. RCS pressure - LESS THAN 415 PSIG	c. GO TO Step 13 of this Addendum.
	___ d. LHSI pump flow - INDICATED	d. Manually START pumps AND ALIGN valves.
___ 13	VERIFY containment ventilation isolation:	
	___ a. Containment atmosphere radiation monitor isolation valves - CLOSED	a. Manually CLOSE valves.
	___ b. Normal purge supply and exhaust fans - STOPPED	b. Manually STOP fans.
	___ c. Supplemental purge supply and exhaust fans - STOPPED	c. Manually STOP fans.
	___ d. Purge Dampers - CLOSED	d. Manually CLOSE dampers.

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 14	VERIFY ventilation actuation:	
	___ a. Control room HVAC - OPERATING IN EMERGENCY RECIRC	a. Manually PLACE control room HVAC in EMERGENCY RECIRC.
	___ b. EAB HVAC - OPERATING IN EMERGENCY RECIRC	b. Manually PLACE EAB HVAC in EMERGENCY RECIRC.
	___ c. FHB HVAC - OPERATING IN EMERGENCY MODE	c. Manually PLACE FHB HVAC in EMERGENCY MODE.
	___ d. FHB Exhaust Fans - ONLY TWO TRAINS OPERATING o Exhaust booster fans o Main exhaust fans	d. PERFORM the following: 1) IF three trains FHB exhaust fans running, THEN PLACE one train FHB exhaust fans in PULL TO LOCK. 2) IF LESS THAN two trains FHB exhaust fans running, THEN manually START train(s). o Exhaust booster fans o Main exhaust fans
	___ e. SECURE one FHB filter train by PERFORMING the following: o PLACE the outlet damper Controller in manual o Manually close the outlet damper o VERIFY proper operation of filter train in service	
	___ f. Essential chilled water pumps - RUNNING	f. PERFORM the following: 1) Manually START essential chilled water pumps. 2) IF an Essential Chilled Water Train fails to start, THEN SECURE the corresponding train of EAB HVAC.

Step 14 continued next page.

ADDENDUM 5
VERIFICATION OF SI EQUIPMENT OPERATION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
Step 14 continued from previous page.		
___	g. Essential chillers - RUNNING	g. PERFORM the following: 1) WHEN the respective ESF Load Sequencer has completed its automatic sequence OR it is determined that the respective ESF Load Sequencer has failed, THEN manually START essential chiller(s). 2) IF an Essential Chiller fails to start, THEN SECURE the corresponding train of EAB HVAC.
___	h. ECCS pump room fan coolers - RUNNING	h. Manually START ECCS pump room fan coolers.
___	i. AFW pump cubicle fans - RUNNING	i. Manually START AFW pump cubicle fans.
___	j. FHB truck bay doors - CLOSED	j. CONTACT designated personnel to close the FHB truck bay doors.
___ 15	NOTIFY Unit Supervisor that Addendum 5 is COMPLETE	
___ 16	IMPLEMENT Functional Restoration Procedures as required	
___ 17	RETURN TO procedure step in effect.	

CONDITIONAL INFORMATION PAGE

RCP TRIP CRITERIA

IF BOTH conditions listed below occur, THEN TRIP ALL RCPs:

a. HHSI pumps - AT LEAST ONE RUNNING
b. RCS pressure - LESS THAN 1430 PSIG

FAULTED SG ISOLATION

IF a faulted SG(s) is NOT required to maintain at least two SGs available for RCS cooldown, THEN the US or SS may direct actions be taken to isolate the faulted SG(s).

MSIV AND MSIB CLOSURE CRITERIA

IF a loss of secondary support systems occurs that impairs the ability of secondary systems to provide a heat sink for the Steam Generators, THEN CLOSE MSIVs and MSIBs. (for example loss of Condenser Availability, C-9)

LHSI PUMP RESTART CRITERIA

IF RCS pressure lowers in an uncontrolled manner to LESS THAN 415 PSIG, THEN START the LHSI pumps to supply water to the RCS.

SEQUENCER LOADING VERIFICATION

IF a LOOP occurs, after the performance of Step 4, THEN PERFORM Addendum 4; Sequencer Loading Verification - Mode III.

AFW FLOW CRITERIA

IF AFW flow must be reduced to limit RCS cooldown, THEN THROTTLE AFW flow as necessary while maintaining total AFW flow GREATER THAN 576 GPM until NR level in at least one SG is GREATER THAN 14% [34%].

AFWST MAKEUP CRITERIA

IF AFWST level lowers to LESS THAN 138,000 GALLONS (26%), THEN INITIATE makeup to the AFWST per 0POP02-AF-0001, AUXILIARY FEEDWATER, to prevent inventory problems during cooldown.

CONTAINMENT SPRAY / PHASE B ACTUATION

IF a Containment Spray / Phase B actuation occurs, THEN STOP all RCPs.

RUPTURED SG ISOLATION (all bulleted substeps below are part of this CIP action)

IF a ruptured SG(s) is NOT required to maintain at least one SG available for RCS cooldown, THEN the US or SS SHALL direct actions be taken to isolate the ruptured SG(s) as follows:

o SG 1D(2D) ISOLATION

WHEN at least one motor driven AFW pump is available, THEN ISOLATE main steam to AFW pump 14(24):

1) RESET SI
2) RESET SG LO-LO level AFW actuations
3) TRIP turbine-driven AFW pump
4) CLOSE turbine-driven AFW pump steam inlet valve (AF-MOV-0143)
5) DISPATCH operator to OPEN breaker for AF-MOV-0143, E1D11(E2D11)/5C
6) ENSURE turbine-driven AFW pump trip/throttle valve closed (AF-MOV-0514)
7) CROSS-CONNECT AFW to 1D(2D) SG until SG NR level is GREATER THAN 14%[34%]

o AFW ISOLATION CRITERIA

WHEN BOTH of the following conditions below are satisfied, THEN ISOLATE AFW flow to the ruptured SG(s):

- After ruptured SG(s) NR level is GREATER THAN 14%[34%]
- Before RCS and ruptured SG(s) pressures have been equalized

o SG PORV ISOLATION CRITERIA

IF the affected SG(s) PORV(s) is open with SG pressure LESS THAN setpoint, THEN manually CLOSE the SG PORV OR dispatch an operator to isolate the SG PORV locally.

o MSIV AND MSIB CLOSURE CRITERIA

IF a loss of secondary support systems occurs that impairs the ability of secondary systems to provide a heat sink for the Steam Generators, THEN CLOSE MSIVs and MSIBs.(for example loss of Condenser Availability, C-9)

RWST CONSERVATION CRITERIA

IF all three CS pumps are injecting, THEN secure one containment spray pump.

Attachment 3
Reactor Trip Response (0POP05-EO-ES01)

Adobe Acrobat 7.0
Document

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The steps relevant to AFW flow are identified below.
Step 1 on p.2 of 22
Step 3 on p. 4 of 22
Step 8 on p. 15 of 22
Addendum 6 Step 11 on p. 3 of 3
Addendum 7 in general
Note that management of SG level is the success criteria for AFW Flow.

10-21-05
DATE EFFECTIVE

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

0POP05-EO-ES01 Rev. 23

REACTOR TRIP RESPONSE

DEPARTMENT PROCEDURE

SAFETY RELATED (Q)

USAGE CONTROL: In Hand Controlling Station

LIST OF ATTACHMENTS:

- Addendum 1, Establishing Normal Letdown
- Addendum 2, Establishing Excess Letdown
- Addendum 3, Emergency Electrical Loading Requirements
- Addendum 4, Saturation Curve
- Addendum 5, Sequencer Loading Verification - Mode II
- Addendum 6 Placing Main Feedwater in Service
- Addendum 7, Placing AFW in Service
- Addendum 8, Failing Air to MSIVs and MSIBs
- Addendum 9, Establishing Alternate Charging Flow Control
- Conditional Information Page

This procedure is applicable in Modes 1, 2, and 3.

PURPOSE

This procedure provides the necessary instructions to stabilize and control the plant following a Reactor Trip without a Safety Injection.

SYMPTOMS OR ENTRY CONDITIONS

This procedure is entered from 0POP05-EO-E000, REACTOR TRIP OR SAFETY INJECTION, Step 4, when SI is neither actuated nor required.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

- Foldout CIP page should be open.
- WHEN RCS temperature is controlled by the SG PORVs in AUTO, THEN RCS temperature will be maintained at approximately 571°F at the SG PORV setpoint.

___ 1 **MONITOR RCS Temperatures**

- WITH ANY RCP RUNNING, RCS TAVG STABLE AT OR TRENDING TO 567°F
- WITHOUT ANY RCP RUNNING, RCS TCOLD STABLE AT OR TRENDING TO 567°F

PERFORM Substep a. OR Substep b. based on RCS temperature:

a. IF temperature LESS THAN 567°F and lowering, THEN:

1) IF the AFW system is in service, THEN THROTTLE AFW flow such that total AFW flow is GREATER THAN 576 GPM until NR level is GREATER THAN 14% in at least one SG.

2) ISOLATE steam loads as follows:
   - ISOLATE steam dump drains.
   - ISOLATE steam chest drains.
   - ISOLATE steam to MSR and steam line drains to MSRs.
   - TRIP all SGFPTs.
   - STOP dumping steam.
   - ISOLATE SGBD.

3) IF cooldown continues, THEN CLOSE MSIVs and MSIBs.
   - IF MSIV(s) and MSIB(s) can NOT be closed, THEN DISPATCH operator to close MSIV(s) and MSIB(s) per ADDENDUM 8, FAILING AIR TO MSIVS AND MSIBS.

Step 1 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 1 continued from previous page.

4) IF temperature LESS THAN 550°F AND lowering, THEN:

a) INITIATE emergency boration

b) WHEN RCS temperature rises to GREATER THAN 550°F OR RCS Cb GREATER THAN 2800 ppm, THEN SECURE emergency boration.

b. IF temperature GREATER THAN 567°F AND rising, THEN:

1) IF condenser available, THEN DUMP steam to condenser.

2) IF condenser NOT available, THEN ENSURE SG PORVs controlling temperature in AUTO.

a) VERIFY SG PORV setpoints at 1225 psig.

b) IF SG PORV(s) are NOT controlling temperature in AUTO, THEN:

1) Place affected SG PORV(s) in MANUAL.

2) ENSURE RCS temperature STABLE AT OR TRENDING TO 571°F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___2	**CHECK FW Status:**	
	___a. CHECK RCS TAVG - LESS THAN 574°F	a. PERFORM the following: 1) WHEN RCS TAVG is LESS THAN 574°F, THEN PERFORM Steps 2.b and 2.c. 2) GO TO Step 3
	___b. VERIFY FW isolation: ___o FWIVs - CLOSED ___o FWIBs - CLOSED ___o FW preheater bypass valves - CLOSED ___o FW regulating valves -CLOSED ___o Low Power FW regulating valves -CLOSED	b. Manually CLOSE valves.
	___c. TRIP all SGFPTs	
___3	**VERIFY Feedwater Flow Established To GREATER THAN OR EQUAL TO three (3) SGs:** o Main Feedwater flow - REFER TO ADDENDUM 6, PLACING MAIN FEEDWATER IN SERVICE OR o AFW flow - REFER TO ADDENDUM 7, PLACING AFW IN SERVICE OR o AFW flow on SG LO-LO level AFW actuation	ESTABLISH feedwater flow to GREATER THAN OR EQUAL TO three (3) SGs using: o Main Feedwater flow - REFER TO ADDENDUM 6, PLACING MAIN FEEDWATER IN SERVICE OR o AFW flow - REFER TO ADDENDUM 7, PLACING AFW IN SERVICE.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___4	**VERIFY Control Rods Fully Inserted** o All rod bottom lights - LIT	PERFORM the following: a. IF two OR more control rod bottom lights NOT lit, THEN: 1) Emergency BORATE 940 GALLONS of boric acid (60 ppm) for each control rod 18 steps OR LESS. _____ X 940 gals = _____ gals # of rods 2) Emergency BORATE 3600 GALLONS of boric acid (228 ppm) for each control rod GREATER THAN 18 steps. ____ X 3600 gals = _____ gals # of rods OR 3) Emergency BORATE until RCS Cb GREATER THAN 2800 ppm. b. IF DRPI has failed, THEN: 1) INITIATE emergency boration. 2) WHEN DRPI has been restored OR RCS Cb GREATER THAN 2800 ppm, THEN SECURE emergency boration.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___5	**CHECK STBY DG Status:**	
	___a. STBY DG - RUNNING	a. GO TO Step 6.
	___b. VERIFY ECW to STBY DG	b. PERFORM the following: 1) Manually START applicable ECW pump. 2) Manually OPEN discharge isolation valve. 3) IF ECW can NOT be established to a running STBY DG, THEN TRIP the affected STBY DG. 4) IF ECW can NOT be established to Essential Chillers, THEN TRIP the associated Essential Chillers.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

The Charging Pump should NOT be manually loaded on an ESF bus until the respective Load Sequencer has completed its automatic sequence OR it has been determined that the respective Load Sequencer has failed to operate.

___6 **CHECK Pressurizer Level Control:**

___a. Pressurizer level - GREATER THAN 17%

a. PERFORM the following:

1) ENSURE normal letdown isolation.

2) ENSURE excess letdown isolation.

3) ENSURE pressurizer heaters off.

4) CONTROL charging to restore pressurizer level GREATER THAN 17%.

5) WHEN pressurizer level is GREATER THAN 17%, THEN:

a) ENSURE ESF load sequencers reset.

b) TURN ON pressurizer heaters as necessary.

c) ESTABLISH normal letdown per ADDENDUM 1, ESTABLISHING NORMAL LETDOWN.

d) IF normal letdown can NOT be established, THEN ESTABLISH excess letdown per ADDENDUM 2, ESTABLISHING EXCESS LETDOWN.

Step 6 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 6 continued from previous page.

___b. VERIFY charging - IN SERVICE

b. ESTABLISH charging flow:

1) IF a charging pump is NOT available, THEN GO TO step 6.c.3 (RNO) of this procedure.

2) IF a charging pump is NOT running, THEN:

a) CLOSE all seal injection isolation valves.

b) CLOSE the charging pump discharge isolation valve for the pump to be started.

c) CLOSE charging flow control valve.

d) IF charging flow control valve will NOT close, THEN ESTABLISH charging flow per ADDENDUM 9, ESTABLISHING ALTERNATE CHARGING FLOW CONTROL and GO TO Step 6) of this RNO.

e) OPEN recirculation valve for the charging pump to be started.

f) RESET the ESF load sequencers.

g) START a charging pump.

3) OPEN charging pump discharge isolation valve.

4) OPEN normal or alternate charging isolation valves.

5) OPEN charging OCIV.

6) CONTROL charging flow as necessary.

Step 6 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 6 continued from previous page.

7) CLOSE the recirculation valve for the running charging pump.

___c. CHECK RCP seal injection flow - NORMAL

c. PERFORM the following:

1) IF seal injection flow is established, THEN ADJUST "FLOW CONT" HCV-0218 to return RCP seal injection flow to BETWEEN 6 AND 13 GPM.

2) IF seal injection flow is NOT established, THEN:

a) PERFORM the following:

1) CHECK seal water inlet and lower seal water bearing temperatures LESS THAN 230°F for each RCP. (Plant computer RC-010)

2) IF seal water inlet OR lower seal water bearing temperatures GREATER THAN OR EQUAL TO 230°F, THEN DO NOT establish seal injection to that RCP. GO TO Step 6.d.

b) CLOSE "FLOW CONT" HCV-0218.

c) ENSURE seal injection isolation valves open for applicable RCPs.

d) MONITOR seal water inlet and lower seal water bearing temperatures. (Plant computer RC-010)

Step 6 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 6 continued from previous page.

e) Slowly OPEN "FLOW CONT" HCV-0218 to establish a 1°F per minute cooldown rate on seal water inlet and lower seal water bearing temperatures.

f) ESTABLISH normal seal injection flow of between 6 and 13 gpm.

3) IF a charging pump is not running, THEN:

a) PERFORM the following:

1) CHECK seal water inlet and lower seal water bearing temperatures LESS THAN 230°F for each RCP. (Plant computer RC-010)

2) IF seal water inlet OR lower seal water bearing temperatures GREATER THAN OR EQUAL TO 230°F, THEN DO NOT establish seal injection to that RCP. GO TO Step 6.d.

b) ENSURE seal injection isolation valves open for applicable RCPs.

c) ENSURE PDP recirculation valve is 100% open.

d) START the PDP.

e) MONITOR seal water inlet and lower seal water bearing temperatures. (Plant computer display RC-010)

Step 6 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 6 continued from previous page.

f) Slowly CLOSE the PDP recirculation valve to establish a 1°F/min. cooldown rate on seal water inlet and lower seal water bearing temperatures.

g) ESTABLISH normal seal injection flow of between 6 and 13 gpm.

___d. VERIFY letdown - IN SERVICE

d. PERFORM the following:

1) ESTABLISH letdown:

a) ESTABLISH normal letdown per ADDENDUM 1, ESTABLISHING NORMAL LETDOWN.

b) IF normal letdown can NOT be established, THEN ESTABLISH excess letdown per ADDENDUM 2, ESTABLISHING EXCESS LETDOWN.

2) IF letdown established, THEN GO TO Step 6.e.

3) IF letdown NOT established AND emergency boration NOT in progress, THEN PERFORM the following:

a) ISOLATE charging.

b) REDUCE seal injection flow to approximately 6 gpm.

c) GO TO Step 7.

Step 6 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 6 continued from previous page:

___e. Pressurizer level trending to 25%

e. CONTROL charging and letdown to maintain level at 25%.

___7 **MONITOR Pressurizer Pressure Control:**

___a. Pressure - GREATER THAN 1857 PSIG

a. PERFORM the following:

1) ENSURE SI actuated.

2) GO TO 0POP05-EO-E000, REACTOR TRIP OR SAFETY INJECTION, Step 1.

___b. Pressure - STABLE AT OR TRENDING TO 2235 PSIG

b. PERFORM the following:

1) IF pressure LESS THAN 2235 PSIG AND lowering, THEN:

a) ENSURE pressurizer PORVs closed.

b) IF any PORV can NOT be closed, THEN manually CLOSE its isolation valve AND REFER TO TECH SPECS 3.4.4.

c) ENSURE pressurizer spray valves closed.

Step 7 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 7 continued from previous page.

d) IF pressurizer spray valve(s) can NOT be closed, THEN PERFORM the following:

1) STOP RCP 1A(2A).

2) STOP RCP 1D(2D).

3) IF RCS pressure continues to lower, THEN stop all but one RCP.

4) IF RCS pressure still continues to lower, THEN PERFORM the following:

- o ISOLATE IA to containment.
- o PLACE Excess Letdown in service per ADDENDUM 2, ESTABLISHING EXCESS LETDOWN.

e) ENSURE ESF load sequencers reset.

f) ENSURE pressurizer heaters on.

Step 7 continued on next page.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 7 continued from previous page.

2) IF pressure GREATER THAN 2235 PSIG AND rising, THEN:

a) ENSURE pressurizer heaters off.

b) CONTROL pressure using normal pressurizer spray.

c) IF normal spray NOT available, THEN:

1) ENSURE normal spray valves are closed.

2) USE auxiliary spray.

d) IF auxiliary spray NOT available, THEN USE one pressurizer PORV.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 8	**MONITOR SG Levels:**	
___	a. NR level - GREATER THAN 14%	a. PERFORM the following: 1) IF NR level in all SGs LESS THAN 14%, THEN MAINTAIN total AFW flow GREATER THAN 576 GPM. 2) WHEN NR level in at least one SG is GREATER THAN 14%, THEN CONTROL AFW flow to maintain NR level BETWEEN 22% and 50%. 3) IF any AFW pump fails to start, THEN: a) RESET all SG LO-LO level AFW actuations. b) CLOSE applicable AFW regulating valve. c) OPEN applicable AFW cross connects. d) CONTROL AFW flow to LESS THAN 675 GPM per AFW pump. 4) GO TO Step 8.c.
___	b. CHECK AFW system - IN SERVICE o AFW pump(s) - RUNNING	b. GO TO Step 9.
___	c. CONTROL AFW flow to maintain NR levels BETWEEN 22% and 50%	c. IF NR level in any SG continues to rise, THEN STOP AFW flow to that SG.
___	d. IF Main Feedwater is available, THEN PLACE Main Feedwater in service per ADDENDUM 6, PLACING MAIN FEEDWATER IN SERVICE	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___9	**VERIFY All 13.8KV And 4.16KV AC Busses - ENERGIZED BY OFFSITE POWER**	PERFORM the following: a. TRY to restore offsite power per 0POP04-AE-0001, FIRST RESPONSE TO LOSS OF ANY OR ALL 13.8KV OR 4.16KV BUS. b. IF offsite power can NOT be restored, THEN manually LOAD desired equipment on the AC ESF busses, REFER TO ADDENDUM 3, EMERGENCY ELECTRICAL LOADING REQUIREMENTS.
___10	**ENSURE All Dilution Paths Are Isolated:**	
	___a. BTRS - BYPASSED	a. BYPASS BTRS.
	___b. Letdown Demineralizer - BYPASSED	b. BYPASS letdown demineralizer.
	___c. RMW pumps - PULL TO LOCK	c. PLACE RMW pumps in PULL TO LOCK.
	___d. RMW nonessential header isolation valves - CLOSED	d. CLOSE at least one RMW nonessential header isolation valve.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Approximately three (3) turns open on each Deaerator High Level Dump Bypass Valve is a good starting point to maintain Deaerator level.

___11 **MAINTAIN** Deaerator Level:

___a. DISPATCH Operator To Throttle Open Deaerator High Level Dump Bypass Valves To Maintain Deaerator Level

(29 ft TGB S of CNDSR #13/23)

- o "1(2)-FW-0486"
  "DEAERATOR STORAGE TANK #2"
  "HIGH LEVEL DUMP BYPASS VALVE"
- o "1(2)-FW-0487"
  "DEAERATOR STORAGE TANK #1"
  "HIGH LEVEL DUMP BYPASS VALVE"

___b. VERIFY Deaerator Level Control Valve - MAINTAINING LEVEL

b. Manually CONTROL Deaerator Level Control Valve to maintain Deaerator Level.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___12	**CHECK MSIV Status:**	
	___a. Condenser - AVAILABLE	a. PERFORM the following: 1) ENSURE MSIVs and MSIBs - CLOSED. o IF MSIV(s) and MSIB(s) can NOT be closed, THEN DISPATCH operator to close MSIV(s) and MSIB(s) per ADDENDUM 8, FAILING AIR TO MSIVS AND MSIBS. 2) USE SG PORV(s) to maintain RCS temperature: o WITHOUT ANY RCP running, RCS TCOLD - STABLE. o WITH ANY RCP running, RCS TAVG - STABLE. 3) GO TO Step 14, OBSERVE note prior to Step 14.
	___b. MSIVs - OPEN	b. IF RCS TAVG is controlled OR rising, THEN: 1) ENSURE MSIV and MSIB handswitches in CLOSED position. 2) ENSURE Main Steam Isolation reset. 3) Slowly OPEN MSIBs to pressurize the main steam header. 4) WHEN the differential pressure across the MSIVs is LESS THAN 50 PSIG, THEN OPEN the MSIVs. 5) IF RCS TAVG lowers in an uncontrolled manner, THEN CLOSE the MSIVs and MSIBs.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The steam dump pressure controller setting to maintain 1185 psig is approximately 8.46 turns.

___13 **TRANSFER Condenser Steam Dump To Pressure Control Mode:**

___a. PLACE the steam dump controller in MANUAL and at minimum demand

___b. TRANSFER steam dump to pressure control mode

___c. ENSURE Steam dump pressure controller - SET TO MAINTAIN 1185 PSIG

c. ADJUST steam dump controller.

___d. PLACE the steam dump controller in AUTO

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The RCP preferred running order to provide normal pressurizer spray is as follows:

- o First - LOOP D
- o Second - LOOP A
- o Third - LOOPs B OR C

___14 **CHECK RCP Status - AT LEAST ONE RUNNING**

PERFORM the following:

a. START one RCP per 0POP02-RC-0004, OPERATION OF REACTOR COOLANT PUMP.

b. IF an RCP can NOT be started, THEN VERIFY natural circulation.

- o RCS subcooling based on core exit T/Cs - GREATER THAN 35°F
- o SG pressures - STABLE OR LOWERING.
- o RCS hot leg temperatures - STABLE OR LOWERING.
- o Core exit T/Cs - STABLE OR LOWERING.
- o RCS cold leg temperatures - AT SATURATION TEMPERATURE FOR SG PRESSURE. REFER TO ADDENDUM 4, SATURATION CURVE.

c. IF natural circulation can NOT be verified, THEN RAISE steam dumping rate.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___15	**CHECK If SR Detectors Should Be Energized:**	
	___a. CHECK IR flux - LESS THAN 10^{-10} AMPS	a. PERFORM the following: 1) WHEN IR flux LESS THAN 10^{-10} AMPS, THEN PERFORM Steps 15.b and 15.c. 2) GO TO Step 16.
	___b. VERIFY SR detectors - ENERGIZED	b. Manually ENERGIZE SR detectors.
	___c. TRANSFER NR-45: o Highest SR channel o Highest IR channel	
___16	**SECURE Unnecessary Plant Equipment, REFER TO OPOP04-ZO-0003, SECONDARY PLANT STABILIZATION**	
___17	**PERFORM OPSP10-ZG-0003, SHUTDOWN MARGIN VERIFICATION MODES 3, 4, AND 5**	
___18	**MAINTAIN Stable Plant Conditions:** o Pressurizer pressure - BETWEEN 2220 PSIG AND 2250 PSIG o Pressurizer level - BETWEEN 23% AND 33% o SG NR levels BETWEEN 22% and 50% o RCS Temperature - o WITH ANY RCP RUNNING, RCS TAVG BETWEEN 565°F AND 569°F OR o WITHOUT ANY RCP RUNNING, RCS TCOLD BETWEEN 565°F AND 569°F	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___19	**DETERMINE If Natural Circulation Cooldown Is Required:**	
	___a. CHECK RCPs - ALL OFF	a. GO TO Step 20.
	___b. Letdown - AVAILABLE	b. GO TO 0POP05-EO-ES05, NATURAL CIRCULATION COOLDOWN WITHOUT LETDOWN, Step 1.
	___c. GO TO 0POP05-EO-ES02, NATURAL CIRCULATION COOLDOWN, Step 1	
___20	**PERFORM 0POP01-ZQ-0022, PLANT OPERATIONS SHIFT ROUTINES, SAFETY FUNCTION CHECKLIST, For The Applicable Mode**	
___21	**VERIFY Compliance With Technical Specifications Limiting Conditions For Operation**	PERFORM The following: a. CONTINUE monitoring of Critical Safety Function Status Trees. b. CONTINUE monitoring the Conditional Information Page. c. ATTEMPT to restore plant conditions to comply with Technical Specifications. d. CONSULT Plant Management. e. DO NOT exit this procedure until directed by Plant Management OR compliance with Technical Specification Limiting Conditions For Operation are achieved.
___22	**GO TO Appropriate Plant Procedure, As Determined By Unit Or Shift Supervisor**	

-END-

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 1	VERIFY charging - IN SERVICE	RETURN TO procedure step in effect.
___ 2	VERIFY at least one train of CCW - ALIGNED TO THE LETDOWN HEAT EXCHANGER	PERFORM the following: a. START CCW pump(s) and ALIGN valves to establish CCW flow to letdown heat exchanger. b. IF CCW flow can NOT be established to letdown heat exchanger, THEN RETURN TO procedure step in effect.
___ 3	CLOSE RCS letdown orifice isolation valves	RETURN TO procedure step in effect.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 4	VERIFY letdown pressure - WITHIN 100 psi OF RCS PRESSURE (35 ft EAB Relay Room North Wall, Panel ZLC505) "1(2)-CV-PI-0469" "EXCESS/NORMAL LETDN PRESSURE"	PERFORM the following: a. ENSURE CCW is in service and aligned to supply cooling to the excess letdown heat exchanger. b. OPEN excess letdown loop isolation valves. c. OPEN regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" d. VERIFY pressure on "CV-PI-0469 EXCESS/NORMAL LETDN PRESSURE" WITHIN 100 PSI of RCS pressure. e. IF letdown pressure is NOT WITHIN 100 psi of RCS pressure, THEN PERFORM the following: 1) CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505 "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" 2) CLOSE excess letdown loop isolation valves. 3) RETURN TO procedure step in effect.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 5	PLACE letdown pressure controller in MANUAL	
___ 6	THROTTLE letdown pressure control valve 1(2)-PCV-0135 to 50%	
___ 7	OPEN letdown line containment isolation valves o OCIV MOV-0024 o ICIV MOV-0023	PERFORM the following: a. CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" b. RETURN TO procedure step in effect.
___ 8	OPEN letdown line loop isolation valves o LETDN ISOL LCV-0465 o LETDN ISOL LCV-0468	PERFORM the following: a. CLOSE letdown line containment isolation valves. b. CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" c. RETURN TO procedure step in effect.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 9	OPEN letdown orifice header isolation valve o LTDN ORIF HDR ISOL FV-0011	PERFORM the following: a. CLOSE letdown line loop isolation valves. b. CLOSE letdown line containment isolation valves. c. CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" d. RETURN TO procedure step in effect.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

Failure to perform Steps 10 and 11 in rapid sequence may cause excessive letdown line fluid flashing or lifting of letdown relief to PRT.

___ 10 OPEN desired letdown line orifice isolation valve:

o FV-0012

OR

o FV-0013

OR

o MOV-0014

PERFORM the following:

a. CLOSE letdown orifice header isolation valve.

b. CLOSE letdown line loop isolation valves.

c. CLOSE letdown line containment isolation valves.

d. CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve.

(35 ft EAB Relay Room North Wall, panel ZLC505)

"1(2)-CV-HS-0469 EXCESS/NORMAL"
"LETDN CROSS CONNECTION"

e. RETURN TO procedure step in effect.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 11	THROTTLE letdown pressure controller to maintain 375 to 385 psig	PERFORM the following: a. CLOSE applicable letdown line orifice isolation valve(s): o FV-0012 o FV-0013 o MOV-0014 b. CLOSE letdown orifice header isolation valve. c. CLOSE letdown line loop isolation valves. d. CLOSE letdown line containment isolation valves. e. CLOSE regenerative heat exchanger excess letdown heat exchanger crosstie valve. (35 ft EAB Relay Room North Wall, panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION" f. RETURN TO procedure step in effect.
___ 12	OPEN additional letdown orifice isolation valves as desired	
___ 13	PLACE letdown pressure controller to AUTO	CONTROL letdown pressure in MANUAL.

ADDENDUM 1
ESTABLISHING NORMAL LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 14	IF regenerative heat exchanger excess letdown heat exchanger crosstie valve 1(2)-CV-HV-0469 was opened, THEN CLOSE: (35 ft EAB Relay Room North Wall, Panel ZLC505) "1(2)-CV-HS-0469 EXCESS/NORMAL" "LETDN CROSS CONNECTION"	
___ 15	VERIFY excess letdown loop isolation valves - CLOSED	Manually CLOSE excess letdown loop isolation valves.
___ 16	RETURN TO procedure step in effect	

ADDENDUM 2
ESTABLISHING EXCESS LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 1	OPEN CCW isolation valves for excess letdown heat exchanger	RETURN TO procedure step in effect.
___ 2	CHECK seal return containment isolation valves - OPEN	PERFORM the following: a. OPEN seal return containment isolation valves. b. IF seal return containment isolation valves can NOT be opened, THEN: 1) PLACE excess letdown divert valve to RCDT position. 2) START RCDT pump. 3) ENSURE LV-4911 RCDT level control valve in AUTO. 4) OPEN RCDT discharge containment isolation valves. 5) DISPATCH operator to open RCDT HX discharge flow orifice bypass. (Valve located 29 ft MAB Rm 108C. operated via reach rod 41 ft MAB, Penetration Area) "1(2)-WL-0019" "RCDT HEAT EXCHANGER" "FE-4914 BYPASS VALVE" 6) ENSURE adequate capacity in the RHT to receive the discharged coolant. 7) OPEN excess letdown loop isolation valves. 8) GO TO Step 5 of this Addendum and OBSERVE caution prior to Step 5 of this Addendum.

ADDENDUM 2
ESTABLISHING EXCESS LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 3	OPEN excess letdown loop isolation valves	RETURN TO procedure step in effect. --- ESTABLISH excess letdown flow to RCDT a. PLACE excess letdown divert valve to RCDT position. b. START RCDT pump. c. ENSURE LV-4911 RCDT level control valve in AUTO. d. OPEN RCDT discharge containment isolation valves. e. DISPATCH operator to open RCDT HX discharge flow orifice bypass. (Valve located 29 ft MAB Rm 108C, operated via reach rod 41 ft MAB, Penetration Area) "1(2)-WL-0019" "RCDT HEAT EXCHANGER" "FE-4914 BYPASS VALVE" f. ENSURE adequate capacity in the RHT to receive the discharged coolant.
___ 4	PLACE excess letdown divert valve to VCT position	

ADDENDUM 2
ESTABLISHING EXCESS LETDOWN

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF excess letdown heat exchanger outlet temperature rises to GREATER THAN 175° OR pressure rises to GREATER THAN 150 PSIG, THEN damage to excess letdown piping and components may occur.

___ 5 INITIATE excess letdown flow by throttling excess letdown temperature control valve

PERFORM the following:

a. CLOSE excess letdown loop isolation valves.

b. IF 1(2)-WL-0019 was operated, THEN DISPATCH operator to CLOSE RCDT HX discharge flow orifice bypass valve.

(Valve located 29 ft MAB Rm 108C, operated via reach rod 41 ft MAB, Penetration Area)

"1(2)-WL-0019"
"RCDT HEAT EXCHANGER"
"FE-4914 BYPASS VALVE"

c. RETURN TO procedure step in effect.

___ 6 RETURN TO procedure step in effect

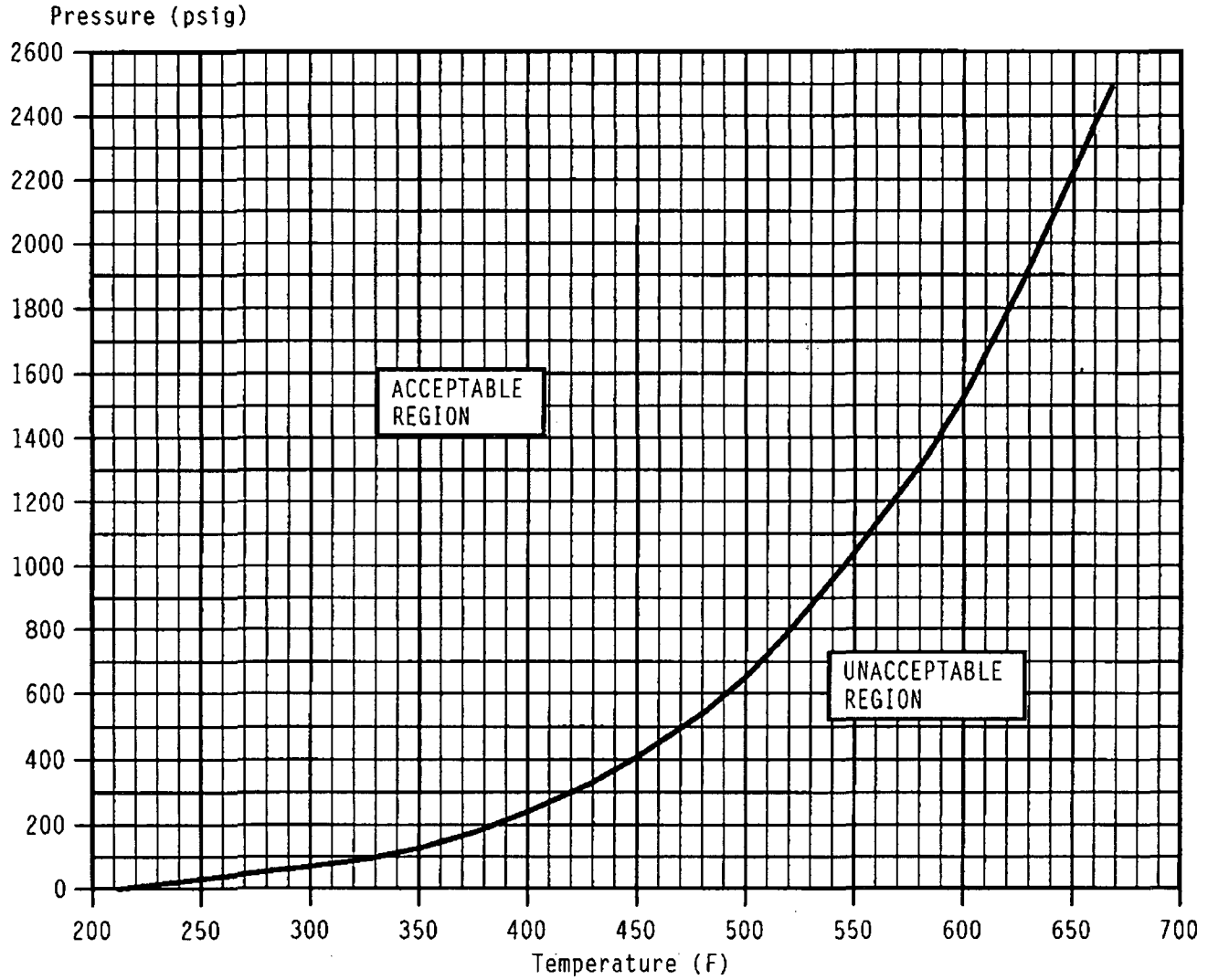
ADDENDUM 3
EMERGENCY ELECTRICAL LOADING REQUIREMENTS

Components	Train A (KW)	Train B (KW)	Train C (KW)
Pressurizer Heaters 1A/1B (2A/2B)	431.0	N/A	431.0
Hydrogen Recombiners	N/A	75.0	75.0
RHR Pumps	222.2	222.2	222.2
RMW Pumps	N/A	41.0	41.0
SFPC Pumps	N/A	140.4	140.4
SFP Air Handling Unit	N/A	0.5	0.5
Centrifugal Charging Pumps	450.0	N/A	450.0
BA Transfer Pump Room Fans	0.4	N/A	0.4
BAT Pumps	27.0	N/A	27.0
RMW Pumps Air Handling Unit	N/A	1.9	1.9
480V MCCs 1A5/1B5/1C5 (2A5/2B5/2C5)	171.5	72.5	92.2

ADDENDUM 4
SATURATION CURVE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Saturation Curve



ADDENDUM 5
SEQUENCER LOADING VERIFICATION - MODE II

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

o Equipment should NOT be manually loaded on an ESF Bus until the respective ESF Load Sequencer has completed its automatic sequence OR it has been determined that the respective ESF Load Sequencer has failed to operate.

o IF a LOOP or SI occurs, AND a train of Essential Chilled Water fails, THEN the corresponding EAB HVAC fans should be stopped within 30 minutes to prevent heat buildup in the Auxiliary Shutdown/QDPS rooms.

___ 1 VERIFY the following equipment - LOADED ON ESF BUS

Manually LOAD equipment NOT previously secured by the Emergency Operating Procedures.

COMPONENT	TRAIN "A"	TRAIN "B"	TRAIN "C"
480V LC Feeder Breakers			
ECW Pumps			
RCFCs			
CCW Pumps			
AFW Pumps			
Essential Chill Water Pumps			
EAB Supply and Return HVAC Fans			
CRE Supply, Return and C/U HVAC Fans			
FHB Main Exhaust HVAC Fans			
Essential Chillers			

ADDENDUM 5
SEQUENCER LOADING VERIFICATION - MODE II

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 2	RESET ESF load sequencers	
___ 3	RESET Pressurizer Backup Heaters 1A(2A) and 1B(2B)	
	___ a. Place Control Room Handswitches in - OFF	
	___ b. RETURN Control Room Handswitches to the position required for current plant conditions	
___ 4	STOP any equipment previously secured by any Emergency Operating Procedure	
___ 5	CHECK ALL Essential Chilled Water Trains - IN SERVICE	SECURE the corresponding EAB HVAC for any Essential Chilled Water Train that is NOT operating.
___ 6	RETURN TO procedure step in effect	

ADDENDUM 6
PLACING MAIN FEEDWATER IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 1	VERIFY S/U SGFP - RUNNING	PERFORM the following: a. CLOSE S/U SGFP discharge valve. b. Manually START S/U SGFP. c. OPEN the S/U SGFP discharge valve. d. IF S/U SGFP can NOT be started THEN ENSURE AFW in service per ADDENDUM 7, PLACING AFW IN SERVICE.
___ 2	VERIFY S/U SGFP discharge valve - OPEN	Manually OPEN S/U SGFP discharge valve.
___ 3	PLACE FW regulating and low power FW regulating valves in manual and minimum demand	
___ 4	PLACE the handswitches for the following valves in the CLOSED position: o FWIVs o FWIBs o Preheater Bypass Valves o SGBD Isolation Valves	
___ 5	RESET "LOW TAVG" FW isolation	

ADDENDUM 6
PLACING MAIN FEEDWATER IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The status lights located on the feedwater isolation panel for the "FW CONT/BYP VALVES" may remain lit after the feedwater isolation has been reset.

___ 6 RESET "FW CONT/BYP VALVES" feedwater isolation

NOTE

To reset a Feedwater Isolation signal following an actual SG HI-HI (P-14) condtion, the SI/SG HI-HI pushbuttons must be depressed with the reactor trip breakers closed and the SG HI-HI condition clear.

___ 7 RESET SI/SG HI-HI level feedwater isolation

___ 8 RESET all feedwater isolation safety-grade solenoids by momentarily placing handswitches for each train in the OPEN postion

CAUTION

IF any SG levels begin to rise in an uncontrolled manner when the respective preheater bypass valve is opened, THEN it may be necessary to manually isolate the main feedwater regulating valve for that SG(s).

___ 9 OPEN the preheater bypass valves

___ 10 ESTABLISH SG main feedwater flow with the low power FW regulating valves

IF SG main FW flow can NOT be established to ALL SGs, THEN USE AFW to maintain level in affected SGs per ADDENDUM 7, PLACING AFW IN SERVICE.

ADDENDUM 6
PLACING MAIN FEEDWATER IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 11	VERIFY SG NR level in at least one SG - GREATER THAN 14%	PERFORM the following: a. MAINTAIN total AFW flow GREATER THAN 576 GPM. b. WHEN SG NR level in at least one SG is GREATER THAN 14%, THEN PERFORM Step 12 of this addendum. c. RETURN TO procedure step in affect. --- GO TO Step 14 of this addendum. ---
___ 12	CHECK AFW - IN SERVICE TO ANY SG	
___ 13	SECURE AFW to SG(s) being supplied by main FW	
	___ a. RESET all SG LO-LO level AFW actuations	
	___ b. CLOSE applicable AFW OCIV(s)	
	___ c. SECURE applicable AFW pump(s): o Motor-driven AFW pumps - STOP PUMP AND PLACE IN AUTO o Steam-driven AFW pump - TRIP TURBINE AND CLOSE TRIP/THROTTLE VALVE	
	___ d. OPEN applicable AFW flow control valves	
___ 14	CONTROL feedwater flow to maintain SG NR levels BETWEEN 22% and 50%	
___ 15	RETURN TO procedure step in effect	

ADDENDUM 7
PLACING AFW IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

Components are located on CP006 unless otherwise noted.

___ 1 VERIFY AFW to SG isolation valves - CLOSED

- o AFW to SG 1A(2A) "OCIV MOV-0048"
- o AFW to SG 1B(2B) "OCIV MOV-0065"
- o AFW to SG 1C(2C) "OCIV MOV-0085"
- o AFW to SG 1D(2D) "OCIV MOV-0019"

CLOSE valves.

___ 2 CLOSE AFW to SG regulating valves(s)

- o AFW to SG 1A(2A) "AFW REG FV-7525"
- o AFW to SG 1B(2B) "AFW REG FV-7524"
- o AFW to SG 1C(2C) "AFW REG FV-7523"
- o AFW to SG 1D(2D) "AFW REG FV-7526"

DISPATCH an operator to close valve(s). (25 ft IVC)

___ 3 IF cross train flow is desired, THEN OPEN the desired AFW Pump cross connect valve(s)

- o AFW Pump 11(21) "XCONN FV-7517"
- o AFW Pump 12(22) "XCONN FV-7516"
- o AFW Pump 13(23) "XCONN FV-7515"
- o AFW Pump 14(24) "XCONN FV-7518"

DISPATCH an operator to open the desired valve(s). (25 ft IVC)

ADDENDUM 7
PLACING AFW IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

AFW Pump flowrate SHALL NOT exceed 675 GPM per pump.

___ 4 START the selected motor-driven AFW pump(s)

- o "AFW Pump 11(21)"
- o "AFW Pump 12(22)"
- o "AFW Pump 13(23)"

IF a motor-driven AFW pump can NOT be started, THEN START the turbine-driven AFW pump as follows:

a. ENSURE "MN STM ISOL MOV-0143 - OPEN.

b. ENSURE "T & T UNIT TRIP" annunciator (06M4 B-7) - EXTINGUISHED.

c. ENSURE "T & T MECH OVERSP TRIP" annunciator (06M4 C-8) - EXTINGUISHED.

d. OPEN "TURB TRIP/THROT MOV-0514

___ 5 OPEN AFW to SG isolation valves

- o AFW to SG 1A(2A) "OCIV MOV-0048"
- o AFW to SG 1B(2B) "OCIV MOV-0065"
- o AFW to SG 1C(2C) "OCIV MOV-0085"
- o AFW to SG 1D(2D) "OCIV MOV-0019"

DISPATCH an operator to open the valve(s). (25 ft IVC)

ADDENDUM 7
PLACING AFW IN SERVICE

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 6	THROTTLE the AFW to SG regulating valves to maintain SG NR levels - BETWEEN 22% and 50% o AFW to SG 1A(2A) "AFW REG FV-7525" o AFW to SG 1B(2B) "AFW REG FV-7524" o AFW to SG 1C(2C) "AFW REG FV-7523" o AFW to SG 1D(2D) "AFW REG FV-7526"	DISPATCH an operator to throttle valve(s). (25 ft IVC)
___ 7	RETURN TO procedure step in effect	

ADDENDUM 8
FAILING AIR TO MSIVS AND MSIBS

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE

The following steps will vent air to both the MSIV and MSIB.

___ 1 CLOSE IA isolation to MSIV and MSIB:

(58 ft IVC, on wall by MSIV)

A - "1(2)-IA-0555"
"INSTRUMENT AIR SUBHEADER ISOLATION VALVE"

B - "1(2)-IA-0551"
"INSTRUMENT AIR SUBHEADER ISOLATION VALVE"

C - "1(2)-IA-0547"
"INSTRUMENT AIR SUBHEADER ISOLATION VALVE"

D - "1(2)-IA-0559"
"INSTRUMENT AIR SUBHEADER ISOLATION VALVE"

___ 2 VENT IA line to atmosphere by opening petcock on air regulator to MSIB:(58 ft IVC on wall by MSIB)

A - "1(2)-IA-PCV-7037" or "1(2)-IA-PCV-7038" for
"1(2)-MS-FV-7412"
"STEAM GENERATOR 1A(2A) MAIN STEAM"
"FSV-7414 BYPASS VALVE (ORC)"

B - "1(2)-IA-PCV-7050" or "1(2)-IA-PCV-7051" for
"1(2)-MS-FV-7422"
"STEAM GENERATOR 1B(2B) MAIN STEAM"
"FSV-7424 BYPASS VALVE (ORC)"

C - "1(2)-IA-PCV-7063" or "1(2)-IA-PCV-7064" for
"1(2)-MS-FV-7432"
"STEAM GENERATOR 1C(2C) MAIN STEAM"
"FSV-7434 BYPASS VALVE (ORC)"

D - "1(2)-IA-PCV-7025" or "1(2)-IA-PCV-7023" for
"1(2)-MS-FV-7442"
"STEAM GENERATOR 1D(2D) MAIN STEAM"
"FSV-7444 BYPASS VALVE (ORC)"

___ 3 RETURN TO procedure step in effect

ADDENDUM 9
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF RCP Seal Cooling has been lost and Seal Inlet Temperature has exceeded 230°F, THEN Seal Injection SHALL NOT be established to affected RCPs per this Addendum.

___ 1 DISPATCH operator to perform the following:

___ a. THROTTLE charging flow control manual bypass two turns open

(19 ft MAB RM 79)

"1(2)-CV-0255"
"CVCS CHARGING DISCHARGE"
"FCV-0205 BYPASS VALVE"

___ b. CLOSE charging flow control manual inlet isolation valve

(19 ft MAB RM 79)

"1(2)-CV-0254A"
"CVCS CHARGING DISCHARGE"
"FCV-0205 INLET VALVE"

___ 2 CHECK normal or alternate charging loop isolation valve - OPEN

OPEN normal or alternate charging loop isolation valve.

ADDENDUM 9
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 3	CHECK charging OCIV - OPEN	PERFORM the following: a. OPEN charging OCIV. b. IF charging OCIV will NOT open, THEN DISPATCH operator to open charging OCIV. (29 FT MAB RM 108C) "1(2)-CV-MOV-0025" "CVCS CHARGING ORC" "CONTAINMENT ISOLATION" "MOV OPERATOR"
___ 4	VERIFY RCP seal inlet temperatures have remained - LESS THAN 230°F	CLOSE affected seal injection OCIV's: o "SEAL INJ ISOL MOV-0033A" o "SEAL INJ ISOL MOV-0033B" o "SEAL INJ ISOL MOV-0033C" o "SEAL INJ ISOL MOV-0033D"
___ 5	ESTABLISH charging flow:	
	___ a. CHECK CCP suction aligned to RWST	a. PERFORM the following: 1) OPEN at least one CCP suction valve from the RWST. 2) CLOSE at least one CCP suction valve from the VCT.
	___ b. CHECK CCP(s) - RUNNING	b. OPEN the recirculation valve(s) for the CCP(s) to be started.
	___ c. ENSURE a CCP running	
	___ d. ENSURE running CCP(s) discharged. valve - OPEN	d. IF running CCP(s) discharge valve can NOT be OPENED, THEN GO TO Step 6 of this Addendum. OBSERVE the CAUTION prior to Step 6.

Step 5 continued next page

ADDENDUM 9
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

Step 5 continued continued from previous page

___ e. DISPATCH operator to adjust charging flow control manual bypass to achieve desired flowrate

(19 ft MAB RM 79)

"1(2)-CV-0255"
"CVCS CHARGING DISCHARGE"
"FCV-0205 BYPASS VALVE"

___ f. CLOSE the running CCP(s) recirculation valve

___ g. CHECK RCP seal injection flow - BETWEEN 6 and 13 GPM

g. IF RCP Seal Inlet temperatures have remained - LESS THAN 230°F, THEN PERFORM the following:

1) ENSURE seal injection OCIV(s) - OPEN.

- o "SEAL INJ ISOL MOV-0033A"
- o "SEAL INJ ISOL MOV-0033B"
- o "SEAL INJ ISOL MOV-0033C"
- o "SEAL INJ ISOL MOV-0033D"

2) ADJUST 1(2)-CV-HCV-0218 to establish between 6 and 13 gpm RCP seal injection flow.

___ h. RETURN TO procedure step in effect

ADDENDUM 9
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION

IF RCP seals have NOT been previously isolated, THEN maximum seal injection flow will result when CCP 1B(2B) Alt Discharge to RCP Seal Isolation CV-0236B OR CCP 1A(2A) Bypass Isol MOV-8348 is opened.

___ 6 DISPATCH operator to perform the following:

___ a. OPEN alternate discharge to RCP seals:

(19 ft MAB RM 79)

"1(2)-CV-0236B"
"CENTRIFUGAL CHARGING PUMP 1B(2B)"
"ALT RCP SEAL SUPPLY VALVE"

___ 7 ENSURE CCP 1B(2B) discharge isolation MOV-8377B - CLOSED

___ 8 CHECK CCP 1A(2A) - RUNNING — GO TO Step 9 of this Addendum.

___ a. OPEN CCP 1A(2A) Bypass Isol MOV-8348

___ b. ENSURE CCP 1A(2A) discharge isolation MOV-8377A - CLOSED

ADDENDUM 9
ESTABLISHING ALTERNATE CHARGING FLOW CONTROL

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
___ 9	ESTABLISH desired charging flow:	
	___ a. DISPATCH operator to open: (19 ft MAB RM 79) "1(2)-CV-0255" "CVCS CHARGING DISCHARGE" "FCV-0205 BYPASS VALVE"	
	___ b. THROTTLE HCV-0206 to establish desired charging flow	
	___ c. CLOSE the running CCP(s) recirculation valve	
___ 10	VERIFY RCP seal injection temperature has remained - LESS THAN 230°F	RETURN TO procedure step in effect.
	___ a. ENSURE seal injection OCIV(s) OPEN o "SEAL INJ ISOL MOV-0033A" o "SEAL INJ ISOL MOV-0033B" o "SEAL INJ ISOL MOV-0033C" o "SEAL INJ ISOL MOV-0033D"	

___ 11	DISPATCH operator to THROTTLE Alternate Source to Seal Injection Isolation valve to establish between 6 and 13 gpm RCP seal flow (19 ft MAB RM 79) "1(2)-CV-0246" "CVCS CHARGING PUMPS" "ALT RCP SEAL SUPPLY ISOL VALVE"	
___ 12	RETURN TO procedure step in effect	

CONDITIONAL INFORMATION PAGE

SI ACTUATION CRITERIA

IF EITHER condition listed below occurs, THEN ACTUATE SI and GO TO 0POP05-EO-E000, REACTOR TRIP OR SAFETY INJECTION, Step 1.

- o RCS subcooling based on core exit T/Cs - LESS THAN 35°F.
- o Pressurizer level - LESS THAN 8%.

AFWST MAKEUP CRITERIA

IF AFWST level lowers to LESS THAN 138,000 GALLONS (26%), THEN INITIATE makeup to the AFWST per 0POP02-AF-0001, AUXILIARY FEEDWATER, to prevent inventory problems during cooldown.

E000 TRANSITION CRITERIA

IF an SI actuation occurs during this procedure, THEN GO TO 0POP05-EO-E000, REACTOR TRIP OR SAFETY INJECTION, Step 1.

RCFC COOLING CRITERIA

RESTORE CCW to RCFCs within 30 minutes after a LOOP signal.

SEQUENCER LOADING VERIFICATION

IF a LOOP has occurred, THEN PERFORM Addendum 5, Sequencer Loading Verification - Mode II.

MSIV AND MSIB CLOSURE CRITERIA

IF a loss of secondary support systems occurs that impairs the ability of secondary systems to provide a heat sink for the Steam Generators, THEN CLOSE MSIVs and MSIBs. (For example: loss of Condenser Availability, C-9.)