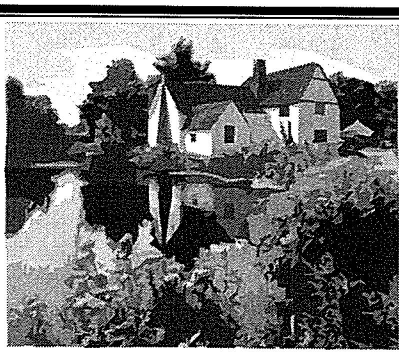
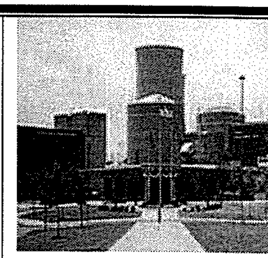
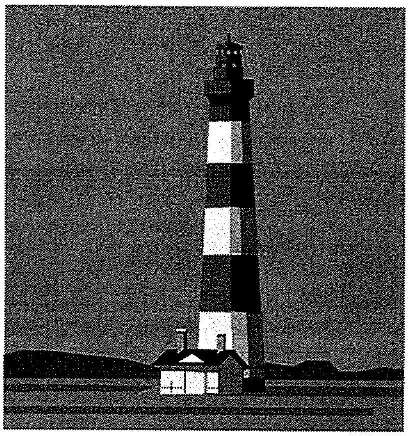


FINAL

Sequoyah Nuclear Plant



SEPT 2010 NRC INITIAL LICENSE RO/SRO Simulator/Inplant JPM EXAM



Simulator JPMs (A- H)
Inplant JPMs (I-K)

FINAL

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Simulator A-1
Withdraw Shutdown Banks
Alternate Path

RO/SRO

JOB PERFORMANCE MEASURE

Task: Withdraw Shutdown Banks

Task #: **RO** 0010180101

Task Standard: Withdraw Shutdown Control Rods to the fully withdrawn position. Stop Rod Withdrawal when SD 'A' Group 1 control rods drop into core from a partially withdrawn position and place the reactor in a tripped, shutdown condition.

Time Critical Task: **YES:** ______ **NO:** __X__

K/A Reference/Ratings: 001A2.11 (4.4/4.7)
001A2.17 (3.3/3.8)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** __X__

Evaluation Method:

Simulator __X__ **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **20 mins** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

SIMULATOR OPERATOR INSTRUCTIONS:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize in IC #112.
4. If IC #112 is not available, initialize in IC #7 and perform the following setup;
   - Position HS-85-5110 to Manual;
   - Select STARTUP Mode on NR45;
   - Ensure Audio Count rate is audible
   - Clear HI Flux at Shutdown alarm.

   Insert the dropped rod malfunctions below for SD Grp 1 together on a key; activate as specified in JPM body:
   - E-5 – RD07E5
   - E-11 – RD07E11
   - L-5 – RD07L5
   - L-11 – RD07L11
   - Monitor Rod Withdrawal; @ ~100 steps on SD 'A', initiate Key 1
5. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

0-SO-85-1, section 6.3
TI-28 Attachment 6

References:

	Reference	Title	Rev No.
1.	0-SO-85-1	Control Rod Drive System	34
2.	TI-28	Curve Book	243
3.	TRM	Technical Requirements Manual	45

==

DIRECTIONS TO TRAINEE on next page

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 Tripped after a 4 month run following startup from the Spring 2009 refueling outage. Trip report is finalized and the unit is ready for restart
2. Reactor Engineering specifies shutdown and control banks' fully withdrawn position is 228 steps.
3. Unit 1 is in MODE 3 with Tavg at 547°F and RCS pressure at 2235 psig.
4. 0-SI-NUC-000-038.0, Shutdown Margin Section 6.2.3, Shutdown Margin Calculation for Modes 3, 4, and 5 (Including Cases Where Shutdown Banks are to be Withdrawn or are Already Withdrawn) is complete for withdrawing shutdown rods.
5. Both M-G sets are in service.
6. Precautions, Limitation and 0-SO-85-1 Section 4 are current, complete and signed off.

INITIATING CUES:

1. The Unit Supervisor directs you to withdraw the Shutdown Banks in accordance with 0-SO-85-1, Control Rod Drive System Section 6.3 starting at step 11.
2. Inform the US when the all shutdown banks are at the fully withdrawn position.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
EVALUATOR NOTE: 0-SO-85-1, Control Rod Drive System 6.3, 'Manual Operation of Rod Control System Below 15 Percent Power' contains the procedural steps for performing the following actions starting at step 11.	
EVALUATOR NOTE: SQN Unit 1 ICS Rod Position Indication display access: Top Level → PRIMARY MIMICS → ROD POSITION INDICATORS	
STEP 1.: **Operator determines and locates correct procedure and section to be used or Evaluator provides selected procedures and/or section(s) as necessary**. STANDARD: Operator locates and obtains a copy of 1-SO-63-1 section 8.1 or is provided with appropriate procedure and section COMMENTS:	_______ SAT _______ UNSAT _______ **Start Time**
STEP 2.: **[11] MONITOR** Control Rod position **USING** Rod Position Indicators ICS screen 30 minute trend during SD & Control Banks withdrawal to aid in detecting rod misalignment. STANDARD: Applicant acknowledges continuous action (**'MONITOR'**) step and locates/displays ICS ROD POSITION INDICATORS screen using the mouse to position the cursor on the specified action field and click the left mouse button. COMMENTS:	_______ SAT _______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 3.: **[12] IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of SD Banks, **THEN** **[a] STOP** rod withdrawal **[b] ENSURE** subcriticality **[c] CONTACT** MIG **AND** **INITIATE** troubleshooting **[d] IF** troubleshooting does not resolve the problem, **OR** subcriticality can NOT be verified, **THEN** **INITIATE** Reactor **TRIP**. STANDARD: Applicant acknowledges conditional action step and continues. COMMENTS:	_______ SAT _______ UNSAT
Step 4.: **[13] IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of Control Banks, **THEN GO TO** AOP-C.01 section 2.5 Rod Position Indicator (RPI) Malfunction - Modes 1 or 2. STANDARD: Applicant acknowledges conditional action step. COMMENTS:	_______ SAT _______ UNSAT

CAUTION:
Under normal conditions control rod banks must be withdrawn and inserted in the prescribed sequence. For withdrawal, the sequence is Shutdown Bank A, Shutdown Bank B, Shutdown Bank C, Shutdown Bank D, Control Bank A, Control Bank B, Control Bank C, Control Bank D. The insertion sequence is the reverse of the withdrawal sequence.

NOTE 1:
Startup rate, Source range, Intermediate range, Nuclear Instrumentation recorders, Group Step Counters and the Rod Position Indicators should be monitored during each bank withdrawal.

NOTE 2:
The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6)

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 5.: **[14] PLACE [HS-85-5110]**, Rod Control Mode Selector to the **SBA** position. STANDARD: Applicant locates/places **1-HS-85-5110** to the 'SBA' position **Shaded portion is critical because correct shutdown rod bank selection for withdrawal is assured.** COMMENTS:	________ SAT ________ UNSAT **Critical Step** **(shaded portion)**
STEP 6.: **[15] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute. STANDARD: Applicant locates Rod Speed Indicator SI-412 (on the central upright portion of M-4) and verifies 64 Steps/minute indicated. COMMENTS:	________ SAT ________ UNSAT

NOTE:
Monitor Group Step Counters, Rod Position Indicator and the "IN-OUT" status lights to ensure anticipated motion as each bank is being withdrawn. Rod speed indicator should be reading 64 steps per minute.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 7.: **[16] ENSURE** Shutdown Bank A demand position counters operational by performing the following: **[C.2]** **[a] BUMP [HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank A one-half step at a time, for one full step. **[b] CHECK** group demand position counters advance properly. **[c] BUMP [HS-85-5111]** to withdraw Shutdown Bank A one-half step at a time, for the second full step. **[d] VERIFY** group demand position counters advance properly. STANDARD: Applicant places 1-HS-85-5111 to the "OUT" position to move rods one step in half step increments **AND** checks that both step counters count up one step. Applicant places 1-HS-85-5111 to the "OUT" position to move rods one step in half step increments a second time **AND** checks that both step counters count up one additional step. COMMENTS:	_______ SAT _______ UNSAT
STEP 8.: **[16] [e] IF** group demand position counters do **NOT** advance properly, **THEN:** A. **STOP** rod withdrawal. B. **INITIATE** WO to have counter repaired. C. **WHEN** counter is repaired, **THEN:** 1. **ENSURE** Shutdown Bank A fully **INSERTED.** 2. **RETURN** to beginning of this step. STANDARD: Operator observes/verifies that both counters are responding correctly and **N/As** this step. COMMENTS:	_______ SAT _______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
NOTE: The fully withdrawn position for shutdown and control rods is defined by TI-28, Att. 6.	
Simulator Operator: As directed by the Examiner, or at ~100 steps, insert SD Group 1 dropped rod malfunctions when SD Bank 'A' reaches ~100 steps.	
ALTERNATE Path: STEP 9.: **[17] WITHDRAW** Shutdown Bank A to the **FULLY WITHDRAWN** position using **[HS-85-5111]**. STANDARD: Operator continues withdrawing SB 'A' control rods using handswitch 1-HS-85-5111 At ~100 steps, the Applicant identifies SB 'A' Group 1 Control Rods have dropped by using: – Using IRPIs (M-4 central upright portion to the left of Rod Speed indicator) AND – Associated Rod bottom lights (below each IRPI). **THEN** – the Applicant manually inserts a reactor trip signal by turning 1-RT-1 on 1-M-4 (1-RT-2 on 1-M-6 will accomplish the same thing) to the 'TRIP' position AND – identifies all SB 'A' Control Rods are fully inserted. **Shaded portion is critical to ensure compliance with the control rod alignment and insertion limits to maintain shutdown margin. This action can be implemented as a prudent operator action (defined in EPM-4) or according to AOP-C.01, Rod Control System Malfunctions.** COMMENTS: ***CUE:* This completes this JPM.**	______ SAT ______ UNSAT **Critical Step (shaded portion)** ______ **Stop Time**

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 Tripped after a 4 month run following startup from the Spring 2009 refueling outage. Trip report is finalized and the unit is ready for restart
2. Reactor Engineering specifies shutdown and control banks' fully withdrawn position is 228 steps.
3. Unit 1 is in MODE 3 with Tavg at 547°F and RCS pressure at 2235 psig.
4. 0-SI-NUC-000-038.0, Shutdown Margin Section 6.2.3, Shutdown Margin Calculation for Modes 3, 4, and 5 (Including Cases Where Shutdown Banks are to be Withdrawn or are Already Withdrawn) is complete for withdrawing shutdown rods.
5. Both M-G sets are in service.
6. Precautions, Limitation and 0-SO-85-1 Section 4 are current, complete and signed off.

INITIATING CUES:

1. The Unit Supervisor directs you to withdraw the Shutdown Banks in accordance with 0-SO-85-1, Control Rod Drive System, Section 6.3 starting at step 11.
2. Inform the US when the all shutdown banks are at the fully withdrawn position.

3.5 Prudent Operator Actions

A. The following should be considered when deciding if a prudent action is appropriate:

1. Plant safety status should be maintained or enhanced. Prudent actions should not degrade plant status or challenge the plant more than the initiating event. It should not cause a RED or ORANGE path condition. For example, closing MSIVs to isolate the steam dumps at 100% power would challenge the plant more than the original problem by causing a load rejection event and lifting pzr and S/G safeties. However, in Mode 3, closing MSIVs to stop an uncontrolled cooldown would have minimal impact on plant status, while enhancing reactor safety. Nuclear safety and personnel safety must be the first priorities. Prudent actions for economic reasons (for example, shutting down secondary equipment) cannot be allowed to interfere with mitigating actions.

2. Prudent operator actions should be consistent with procedural guidance for similar situations. For example, if a steamline break occurs in Mode 3 and S/G pressure is approaching 600 psig, a manual MSIV Isolation would anticipate the designed automatic response and is consistent with procedural guidance.

3. In the EOP network, prudent operator actions shall NOT be performed prior to completing the immediate actions for E-0, FR-S.1, or ECA-0.0.

4. The basis for the prudent action (i.e. why it is necessary and appropriate) should be clearly understood prior to taking the action.

5. Prudent operator actions should normally be performed with the concurrence of an active licensed SRO. The following items are exceptions in which a Unit Operator may take prudent action without waiting for SRO concurrence:

   - When there is NOT an active SRO in the horseshoe

     OR

   - When prompt action is needed to manually trip the reactor

     OR

   - When prompt action is needed to manually control components to prevent an avoidable automatic trip or transient.

     OR

   - When prompt action is needed to actuate ESF equipment which failed to operate.

   When a Unit Operator takes prudent action without prior SRO concurrence, it is the responsibility of that Unit Operator to ensure the action is appropriate and that the action is promptly reported to the Shift Manager or Unit Supervisor.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

0-SO-85-1

CONTROL ROD DRIVE SYSTEM

Revision 34

QUALITY RELATED

PREPARED BY: CECIL DYER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 09/23/09

LEVEL OF USE: **CONTINUOUS USE**

VFU Today

REVISION DESCRIPTION:

Split Section 5.1 standby readiness for both MG sets into Section 5.1 for MG set A and 5.2 for MG set B this will remove error traps. (PCR 09000712)
Section 6.3 Step 38 deleted note referencing LEFM available and changed step from 113 to 110 steps for rod control banks limit low-low. (PCR 09000168)
Section 6.3 Step 39 deleted note referencing LEFM available and change step from 123 to 120 steps for rod control banks limit low. (PCR 09000168)
Section 6.3 added Caution prior to step 1 for TRM 3.1.3.3 requirements and referenced AOP-C.01 as required. (PCR 08001279)
Added precaution and limitation M that rod movement without the CRDM fans aligned to the reactor vessel shroud is allowed, provided that the RCS temperatures are less than 350 degrees F. Section 6.3 Note prior to step [1] and precaution and limitation M added when RCS temperatures are greater than 350 degrees F, continuous rod motion shall comply with the restrictions. Section 6.3 Step 3 added to ensure CRDM fans in service in accordance with 0-SO-30-6, if RCS temperature is greater than 350 degrees F.(PCR 07001668, PER 172096 & EWR 09-BOP-30-018)

PERFORMANCE OF THIS PROCEDURE COULD IMPACT REACTIVITY

3.0 PRECAUTIONS AND LIMITATIONS

A. Rod thermal lock-up is **NOT** a concern when the reactor trip breakers are OPEN. If reactor trip breakers are CLOSED and an RCS cooldown of greater than 50°F is planned, the shutdown and control banks should be withdrawn at least 5 steps each. This will limit the possibility of "thermal lock-up" of the rods. This does not apply if performing sections 8.5 or 8.6.

B. If both MG sets are to be shutdown, the control rods and shutdown rods shall be inserted in the core and the reactor trip breakers OPEN prior to shutting down the MG sets.

C. Reactor Trip Breakers shall **NOT** be closed while in Mode 3 unless in compliance with LCO 3.4.1.2.

D. Failure to perform 1,2-PI-IFT-099-0P4.0, Verification of P4 Contacts could result in the prevention of AUTO SI if required.

E. Under normal conditions, the control rod banks must be withdrawn and inserted in the prescribed sequence. For withdrawal the sequence is Shutdown Bank A, Shutdown Bank B, Shutdown Bank C, Shutdown Bank D, Control Bank A, Control Bank B, Control Bank C, and Control Bank D. The insertion sequence is the reverse of the withdrawal sequence.

F. For manual bank sequencing, the prescribed withdrawal and insertion sequence should be followed. Rod motion of the correct bank should be monitored by observing the group step counters and the rod position indicators.

G. During Control Rod withdrawal, the Control Banks should be monitored for bank overlap.

H. The control banks must be maintained above their respective insertion limits (Low-Low Alarm to ensure adequate shutdown in the event of a reactor trip, to ensure that maximum possible ejected rod reactivity limits are maintained and to ensure acceptable core power distributions.

I. Before withdrawing any rod bank from the fully inserted position, the group step counters and the rod position indicators for that bank must be at zero steps.

3.0 PRECAUTIONS AND LIMITATIONS (Continued)

J. Deleted

K. RPIs and step counters shall be maintained within limits per TS 3.1.3.1 and 3.1.3.2.

L. The Control Rods shall **NOT** be stepped or tripped unless the RCS pressure is at least 100 psig.

M. Rod movement without the CRDM fans aligned to the Reactor Vessel shroud is allowed, provided that the RCS temperatures are less than 350°F.

N. When RCS temperatures are greater than 350°F, continuous rod motion shall comply with these restrictions:

CRDM OUTLET TEMPERATURE	ROD MOTION LIMITS	
≤ 190°F	10 minutes ON	20 minutes OFF
≤ 200°F	6 minutes ON	24 minutes OFF

Time limitations are due to a lower air flow rate of 48,000 cfm across the shroud combined with a higher temperature (Reference TSIR-97-BOP-30-636 and Westinghouse Letters RIM's #B38931005806, B38930920800, and B38931005803).

N. The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) failure of both 100v DC power supplies (PS3 and PS6) simultaneously.

O. Defeating or restoring Tavg/Delta T or NIS channel may cause step change in input to rod control. A delay of at least 3 minutes prior to returning rod control to automatic will allow lead/lag signal to decay off.

3.0 PRECAUTIONS AND LIMITATIONS (Continued)

P. Directional Overcurrent Relay Targets are reset by depressing the Relay Target Reset Pushbutton on the panel to break the target coil seal in circuit and then lifting the mechanical reset at the bottom of the relay cover.

Q. US / SRO Oversight for control rod manipulation shall include:

1. Prior to Rod Movement
   a. Ensure RPI's within T.S. range (+ or - 12 steps)
   b. Ensure delta flux will not be adversely affected
   c. Ensure Tavg and Rx Thermal power will not be adversely affected
   d. Verify on target with Rx Eng reactivity balance sheet
   e. Verify power change will not exceed hourly rate
   f. Ensure no simultaneous reactivity manipulations in progress (i.e.: borations, dilutions or turbine load changes)
2. During Rod Movement
   a. Ensure RO has peer check
   b. Ensure RO is following procedure
   c. Ensure RO understands how many steps they are moving rods
   d. Ensure RO has checked all the above mentioned items
   e. Watch performance of rod manipulation while listening to audible indication of rod step
   f. Ensure peer check is doing their job
   g. Re-verify steps a - d of initial evaluation
   h. Ensure procedure is followed placing rods back to auto (Tavg - Tref mismatch)
   i. Monitor plant for expected response

Unit 1 Date Today

4.0 PREREQUISITE ACTIONS

NOTE Throughout this instruction where an **IF/THEN** statement occurs, the step may be **N/A** if the condition does **NOT** exist.

[1] **ENSURE** the instruction to be used is a copy of the effective version. JD

[2] **ENSURE** Precautions and Limitations, Section 3.0 has been reviewed. JD

[3] **ENSURE** each performer documents their name and initials:

Print Name	Initials
John Doe	JD

[4] **INDICATE** below which performance section of this instruction will be used and the reason for this performance:

- ☐ 5.0 STARTUP/STANDBY READINESS
- ☑ 6.0 NORMAL OPERATION
- ☐ 7.0 SHUTDOWN
- ☐ 8.0 INFREQUENT OPERATION

Reason: withdraw Rods

Unit 1 Date Today

6.3 Manual Operation of Rod Control System Below 15 Percent Power

CAUTION 1 TR 3.1.3.3 requires group demand position indicator capable of determining within ±2 steps, the demand position for each rod not fully inserted. In Modes 3, 4, or 5 and greater than ±2 steps deviation refer to AOP-C.01.

CAUTION 2 If reactor trip breakers are CLOSED and an RCS cooldown of greater than 50°F is planned, the shutdown and control banks should be withdrawn at least 5 steps each. This will limit the possibility of "thermal lock-up" of the rods. Thermal lock-up is NOT a concern during unit heatup.

NOTE When RCS temperatures are greater than 350°F, continuous rod motion shall comply with these restrictions:

CRDM OUTLET TEMPERATURE	ROD MOTION LIMITS	
≤190°F	10 minutes ON	20 minutes OFF
≤200°F	6 minutes ON	24 minutes OFF

[1] **ENSURE** Section 5.5, Reset/Close Reactor Trip Breakers has been completed. ☐

[2] **IF** the shutdown and control rods were withdrawn 5 steps to prevent thermal lockup during an RCS cooldown,
THEN
ENSURE rods are fully inserted prior to withdrawal. N/A /____ (1st / CV)

[3] **IF** RCS temperatures are greater than 350°F,
THEN
ENSURE CRDM cooling fans are aligned and in service in accordance with 0-SO-30-6. ☐

Unit 1 Date Today

6.3 Manual Operation of Rod Control System Below 15 Percent Power

CAUTION **ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) should never be held in STARTUP position for any extended period of time. Holding this switch in STARTUP position may cause damage to the counters.**

NOTE ROD CONTROL STARTUP STEP COUNTER RESET (SUS on M-4) Resets:

A. All GROUP STEP COUNTERS on the Control Board.

B. The master cycler reversible counter.

C. All slave cycler counters.

D. The bank overlap counter.

E. All internal memory and alarm circuits.

F. All pulse-to-analog converters in the Rod Position Indication System.

[4] **MOMENTARILY PLACE** **[SUS]**, Rod Control Startup Step Counter Reset to the **STARTUP** position to reset Control Rod Drive System. ☑

CAUTION **Before withdrawing any rod from the fully inserted position, all Group Step Counters and all Rod Position indicators must be at zero steps.**

[5] **ENSURE** all Full Length Rod step counters reset to zero. JD

Unit 1 Date Today

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[6] **VERIFY** rod control IN-OUT direction lights are **NOT** LIT. JD

[7] **DEPRESS [RCAS]**, Rod Urgent Failure Alarm Reset. ☑

[8] **RESET** Window 6 (A-6), ROD CONTROL SYSTEM URGENT FAILURE alarm on panel **[XA-55-4B]** using **[XS-55-4A]**, Annunciator RESET/ACK/TEST Switch. JD

[9] **VERIFY** the following rod control system alarms on panel **[XA-55-4B]** are **NOT** LIT:

WINDOW NUMBER	NOT LIT (√)
5 (A5)	☑
6 (A6)	☑
11 (B4)	☑
12 (B5)	☑
13(B6)	☑
18 (C4)	☑
19(C5)	☑
27 (D6)	☑
34 (E6)	☑

JD

Unit 1 Date Today

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[10] **ENSURE** Plant computer points for rod bank position are **ZERO** using the following computer points:

COMPUTER PT	ROD BANK	√
U0049	Control A	☑
U0050	Control B	☑
U0051	Control C	☑
U0052	Control D	☑
U0053	Shutdown A	☑
U0054	Shutdown B	☑
U0055	Shutdown C	☑
U0056	Shutdown D	☑

JD

[11] **MONITOR** Control Rod position **USING** Rod Position Indicators ICS screen 30 minute trend during SD & Control Banks withdrawal to aid in detecting rod misalignment. ☐

[12] **IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of SD Banks, **THEN**

[a] **STOP** rod withdrawal. ☐

[b] **ENSURE** subcriticality. ☐

[c] **CONTACT** MIG
AND
INITIATE troubleshooting. ☐

[d] **IF** troubleshooting does not resolve the problem,
OR
subcriticality can NOT be verified,
THEN
INITIATE Reactor **TRIP**. ☐

Unit_______________ Date_________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[13] **IF** Individual Rod Position Indication does not indicate proper rod position during withdrawal of Control Banks, **THEN** **GO TO** AOP-C.01 section 2.5 Rod Position Indicator (RPI) Malfunction - Modes 1 or 2. ☐

CAUTION **Under normal conditions control rod banks must be withdrawn and inserted in the prescribed sequence. For withdrawal, the sequence is Shutdown Bank A, Shutdown Bank B, Shutdown Bank C, Shutdown Bank D, Control Bank A, Control Bank B, Control Bank C, Control Bank D. The insertion sequence is the reverse of the withdrawal sequence.**

NOTE 1 Startup rate, Source range, Intermediate range, Nuclear Instrumentation recorders, Group Step Counters and the Rod Position Indicators should be monitored during each bank withdrawal.

NOTE 2 The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6)

[14] **PLACE** **[HS-85-5110]**, Rod Control Mode Selector to the **SBA** position. _____ / _____ (1st / CV)

[15] **VERIFY** Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute. _____ / _____ (1st / CV)

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

NOTE Monitor Group Step Counters, Rod Position Indicator and the "IN-OUT" status lights to ensure anticipated motion as each bank is being withdrawn. Rod speed indicator should be reading 64 steps per minute.

[16] **ENSURE** Shutdown Bank A demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Shutdown Bank A one-half step at a time, for one full step.

_____ / _____
1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Shutdown Bank A one-half step at a time, for the second full step.

_____ / _____
1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank A fully **INSERTED.** ☐

2. **RETURN** to beginning of this step. ☐

NOTE The fully withdrawn position for shutdown and control rods is defined by TI-28, Att. 6.

[17] **WITHDRAW** Shutdown Bank A to the **FULLY WITHDRAWN** position using [HS-85-5111].

_____ / _____
1st CV

Unit______________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[18] **PLACE** [HS-85-5110], Rod Control Mode Selector to the **SBB** position.

_____ / _____
1st CV

[19] **VERIFY** Rod Speed Indicator [SI-412], indicates 64 Steps/minute.

_____ / _____
1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[20] **ENSURE** Shutdown Bank B demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Shutdown Bank B one-half step at a time, for one full step.

_____ / _____
1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Shutdown Bank B one-half step at a time, for the second full step.

_____ / _____
1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank B fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[21] **WITHDRAW** Shutdown Bank B to the **FULLY WITHDRAWN** position using [HS-85-5111].

_____ / _____
1st CV

Unit________________ Date__________

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[22] **PLACE** [HS-85-5110], Rod Control Mode Selector to the **SBC** position. _____ / _____ 1st CV

[23] **VERIFY** Rod Speed Indicator [SI-412], indicates 0 Steps/minute. _____ / _____ 1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[24] **ENSURE** Shutdown Bank C demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Shutdown Bank C one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counter advances properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Shutdown Bank C a second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counter advanced properly. ☐

[e] **IF** group demand position counters do <u>**NOT**</u> advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank C fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[25] **WITHDRAW** Shutdown Bank C to the **FULLY WITHDRAWN** position using [HS-85-5111]. _____ / _____ 1st CV

Unit________________ Date__________

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[26] **PLACE** [HS-85-5110], Rod Control Mode Selector to the **SBD** position. _____ / _____ 1st CV

[27] **VERIFY** Rod Speed Indicator [SI-412], indicates 0 Steps/minute. _____ / _____ 1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[28] **ENSURE** Shutdown Bank D demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Shutdown Bank D one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counter advances properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Shutdown Bank D a second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counter advanced properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Shutdown Bank D fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[29] **WITHDRAW** Shutdown Bank D to the **FULLY WITHDRAWN** position using [HS-85-5111]. _____ / _____ 1st CV

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

NOTE Remainder of this section performed in conjunction with 0-GO-2 or 0-RT-NUC-000-003.0.

[30] **PLACE** [HS-85-5110], Rod Control Mode Selector to the **MANUAL** position. _____ / _____ 1st CV

[31] **VERIFY** Rod Speed Indicator [SI-412], indicates 48 Steps/minute. _____ / _____ 1st CV

NOTE The following failures will render the rod control system incapable of automatic and / or manual motion without any annunciation or indication: 1) Hand switch failure; 2) relay failure, and 3) simultaneous failure of both 100v DC power supplies (PS3 and PS6).

[32] **ENSURE** Control Bank A demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Control Bank A one-half step at a time, for one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Control Bank A one-half step at a time, for the second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank A fully **INSERTED** and ☐
2. **RETURN** to beginning of this step. ☐

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[33] **CONTINUE** withdrawal of Control Bank A using [HS-85-5111], Rod Control Switch to 128 steps or next doubling. __________

NOTE When Control Bank A is above 20 steps, alarm FULL LENGTH RODS AT BOTTOM light on [XA-55-4B] should clear. When Control Bank A gets above 20 steps and rods are driven back in, the alarm will come back in. When Control Banks B, C, and D get above 35 steps, then drop below 20 steps, the alarm will come back in.

[34] **WHEN** Control Bank A is above 20 steps, **THEN**

ENSURE Window 28 (D-7), FULL LENGTH RODS RODS AT BOTTOM alarm on panel [XA-55-4B] **CLEARS**. __________

Unit_______________ Date__________

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

CAUTION **When Control Bank A is reaches 128 steps, Control Bank B should begin to move. Each successive bank should begin to move when the previous bank reaches 128 steps.**

[35] **WHEN** Control Bank A is withdrawn to 128 steps, **THEN**

ENSURE Control Bank B demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Control Bank B one-half step at a time, for one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Control Bank B one-half step at a time, for the second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do <u>**NOT**</u> advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank B fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[36] **CONTINUE** withdrawal of Control Bank B using [HS-85-5111] to 128 steps or next doubling. _________

Unit________________ Date__________

6.3 Manual Operation of Rod Control System Below 15 Percent Power (Continued)

[37] **WHEN** Control Bank B is withdrawn to 128 steps, **THEN**

ENSURE Control Bank C demand position counters operational by performing the following: **[C.2]**

[a] **BUMP** [HS-85-5111], Rod Control Switch to withdraw Control Bank C one-half step at a time, for one full step. _____ / _____ 1st CV

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP** [HS-85-5111] to withdraw Control Bank C one-half step at a time, for the second full step. _____ / _____ 1st CV

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank C fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[38] **CONTINUE** withdrawal of Control Bank C using [HS-85-5111] to 128 steps or next doubling. _______

[39] **WHEN** Control Bank C is ≈ 110 Steps, **THEN** **ENSURE** Window 14 (B-7), ROD CONTROL BANKS LIMIT LOW-LOW alarm on panel [XA-55-4B] **CLEARS**. _______

Unit________________ Date__________

6.3 **Manual Operation of Rod Control System Below 15 Percent Power** (Continued)

[40] **WHEN** Control Bank C is ≈ 120 steps, **THEN**

ENSURE Window 7 (A-7), ROD CONTROL BANKS LIMIT LOW alarm on panel **[XA-55-4B] CLEARS**. ________

[41] **WHEN** Control Bank C is withdrawn to 128 steps, **THEN**

ENSURE Control Bank D demand position counters operational by performing the following: **[C.2]**

[a] **BUMP [HS-85-5111]**, Rod Control Switch to withdraw Control Bank D one-half step at a time, for one full step. ____ / ____ (1st / CV)

[b] **CHECK** group demand position counters advance properly. ☐

[c] **BUMP [HS-85-5111]** to withdraw Control Bank D one-half step at a time, for the second full step. ____ / ____ (1st / CV)

[d] **VERIFY** group demand position counters advance properly. ☐

[e] **IF** group demand position counters do **NOT** advance properly, **THEN**

A. **STOP** rod withdrawal. ☐

B. **INITIATE** WO to have counter repaired. ☐

C. **WHEN** counter is repaired, **THEN**

1. **ENSURE** Control Bank D fully **INSERTED** and ☐

2. **RETURN** to beginning of this step. ☐

[42] **CONTINUE** withdrawal of Control Bank D using **[HS-85-5111]** to next doubling or criticality. ________

End of Section 6.3

TVA

Sequoyah Nuclear Plant

Technical Instruction

TI-28

CURVE BOOK

Revision 0244

Quality Related

Level of Use: Reference Use

Effective Date: 06-09-2010

Responsible Organization: SNE, System Eng - NSSS

Prepared By: Marion Rankin

Approved By: Scott Hunnewell

This Attachment contains the axial repositioning schemes for the Unit 1 and Unit 2 RCCA fully withdrawn positions and the bank overlap switch settings for the various fully withdrawn positions.

Fully withdrawn position for control rod banks shall be in a range of 225-231 steps in accordance with the COLR.

NOTE

The ARO step withdrawn position is set before startup of each cycle and every 92 days thereafter in conjunction with the performance of 0-SI-OPS-085-011.0 Reactivity Control Systems Moveable Control Assemblies.

Unit 1			
	ARO Steps Withdrawn		
	Cycle 17	Cycle 18	Cycle 19
Startup Date	Spring 2009	Fall 2010	Spring 2012
1st Period	230	225	230
2nd Period	228	226	228
3rd Period	226	228	226
4th Period	225	230	225
5th Period	228	228	228
6th Period	230	225	230

Unit 2			
	ARO Steps Withdrawn		
	Cycle 17	Cycle 18	Cycle 19
Startup Date	Fall 2009	Spring 2011	Winter 2012
1st Period	230	228	226
2nd Period	228	227	228
3rd Period	227	226	230
4th Period	226	225	227
5th Period	225	228	226
6th Period	226	230	225

NOTES

1) Switch setting changes must be made to the Solid State Rod Control System, Logic Cabinet, bank overlap switches.
2) S1 through S6 must be changed when changing to a new full-out position.

FULL OUT POSITION	SWITCH SETTING FOR 128 STEP TIP-TO-TIP					
	S1	S2	S3	S4	S5	S6
222	128	222	256	350	384	478
223	128	223	256	351	384	479
224	128	224	256	352	384	480
225	128	225	256	353	384	481
226	128	226	256	354	384	482
227	128	227	256	355	384	483
228	128	228	256	356	384	484
229	128	229	256	357	384	485
230	128	230	256	358	384	486
231	128	231	256	359	384	487

S1 = Tip-to-Tip; S2 = desired full out position; S3 = (2 x S1)
S4 = (S1 + S2); S5 = (3 x S1); S6 = (S1 + S4)

The effect of the switch setting changes will be to maintain a 128 step Tip-to-Tip distance between control banks. For example, during withdrawal, the next bank will start moving in overlap when the bank being withdrawn reaches 128 steps. On control bank insertion, the reverse would be true with the next bank starting to move in overlap when the bank being moved is inserted 128 steps from the fully withdrawn position.

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Simulator B-1
Refill the #3 CLA to Within
Normal Operating Range

RO/SRO
JOB PERFORMANCE MEASURE

Task: Refill the #3 CLA to Within Normal Operating Range

Task #: (**RO**) 0060050101

Task Standard: Cold Leg Accumulator #3 level has been returned to within normal operating range of >7615 gal but <7955 gal

Time Critical Task: **YES:** ______ **NO:** __X__

K/A Reference/Ratings: 006K6.02 (3.4/3.9) 006A1.07 (3.3/3.6) 006A1.13 (3.5/3.7)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** __X__

Evaluation Method:

Simulator __X__ **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: 20 mins **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize in IC #189.
4. If IC #189 is not available, initialize in IC #16 and perform the following setup steps:
   - PTL 1A-A SI Pump and place HO tag.
   - Insert malfunction SI04C @100% to drain level in the #3 CLA to until the low level alarm comes in;
   - then DELETE the MF. [Will take 5-8 min]
   - Both 1-XA-55-6D C-1 and C-2 annunicators should be lit
5. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

1-SO-63-1, section 8.1

References:

	Reference	Title	Rev No.
1.	1-SO-63-1	Cold Leg Injection Accumulators	47

==

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is at 100% RTP.
2. #3 CLA sample valve did not properly close at the completion of sampling resulting in #3 CLA inventory draining to the current value.
3. The sample line has been isolated.
4. All power and valve checklists are complete with NO deviations.
5. The SI pumps are aligned in the normal standby configuration.
6. RWST boron concentration is 2575 ppm per the latest RC Lab analysis.
7. The initial level in #3 CLA per SI-OPS-000.002.0 was 7855 gallons and pressure ~645 psig.

INITIATING CUES:

1. The US directs you to restore the #3 CLA to within required limits per the appropriate procedure.
2. Inform the SM when #3 CLA has been restored.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
EVALUATOR NOTE: 0-SO-63-1, Cold Leg Injection Accumulators Section 8.1, Adding Makeup Water to Cold Leg Accumulators contains the procedural steps for performing the following actions starting at step 1.	
STEP 1.: **Operator determines and locates correct procedure and section to be used or Evaluator provides selected procedures and/or section(s) as necessary**. STANDARD: Operator obtains a copy of 1-SO-63-1 section 8.1 and reviews the following CAUTIONS and NOTES prior to Step 1 COMMENTS:	_____ SAT _____ UNSAT
CAUTION 1: Operability limits for CLA level and pressure are 7615-7955 gal and 624-668 psig.	
CAUTION 2: Radiochemical Laboratory obtaining sample of Accumulators for boron concentration analysis while draining or filling in progress may result in invalid calculation.	
NOTE 1: Steps [12] through [15] may be performed in any order to allow making up to accumulators in the desired order. However, substeps associated with making up to each accumulator shall be performed in the order listed.	
NOTE 2: Limiting the fill level to 7916 gallons, during an initial fill following an outage, will alleviate the need for MIG to perform a purge of the level instrument upper leg due to borated water intrusion.	
NOTE 3: Limiting the fill level to 7956 gallons, during normal operation, will alleviate the need for MIG to perform a purge of the level instrument upper leg due to borated water intrusion.	
STEP 2.: Section 8.1 Steps 1 – 5 previously verified according to Initial Conditions STANDARD: Operator ensures power and valve checklists, SI pumps' configuration and RWST boron concentration from initial conditions COMMENTS:	_____ SAT _____ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 3.: **[6] IF** required due to RHR discharge header pressurization, **THEN VENT** RHR discharge piping fully using 1-SO-63-5. ***CUE:*** IF necessary, as US, venting is not required at this time. STANDARD: Operator checks RHR Discharge Header pressure on 1-PI-74-13 & 26 on 1-M-6, verifies pressure is low and N/As this step. COMMENTS:	______ SAT ______ UNSAT
STEP 4.: **[7] ENSURE [1-FCV-63-84]** SIS Test Line to HUT is **CLOSED** STANDARD: Operator ensures 1-FCV-63-84 is closed via green light ON. COMMENTS:	______ SAT ______ UNSAT
STEP 5.: **[8] IF** in Mode 4, 5, or 6 (with the vessel head on), **THEN ENSURE** the following valves are **CLOSED** with power removed and tagged under a hold order to comply with LCO 3.4.12: STANDARD: Operator will verify unit is mode 1 and N/A this step. COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 6.: **[9] ENSURE** the following valves are **OPEN:** (located on 1-M-6) 1-FCV-63-71, SIS Test Line to HUT 1-FCV-63-23 CL Accum Makeup From SI Pumps STANDARD: Operator opens 1-FCV-63-71 and 23 via 1-HS-63-71A and 1-HS-63-23A and verifies the valves come open by red light LIT. **CRITICAL Step:** to establish fill flowpath to the CLA common fill line COMMENTS:	______ SAT ______ UNSAT **Critical Step**
Operator reviews CAUTIONS prior to Step 10: **CAUTION 1:** To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started. **CAUTION 2** In Modes 1-3, closure of 1-FCV-63-152 requires entering LCO 3.5.2.	
STEP 7.: **[10] IF** 1A-A SI pump is to be used to add makeup water to Accumulators, **THEN PERFORM** the following: STANDARD: Operator identifies 1A-A SI Pump tagged and marks step N/A; AND Proceeds to CAUTIONS prior to step 11 COMMENTS:	______ SAT ______ UNSAT
CAUTION 1: SI pump 1B-B CANNOT be used to fill CLA in Mode 3 with RCS pressure <1700 psig due to having to close 1-FCV-63-22 (LCO 3.0.3). **CAUTION 2:** To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started.	

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
STEP 8.: **[11] IF** 1B-B SI pump is to be used to add makeup water to Accumulators, **THEN PERFORM** the following: **[a] IF** Unit 1 is in Mode 3, **THEN…** **[b] IF** in Mode 4, 5, or 6 (with the vessel head on), **THEN** STANDARD: Operator will verify unit is mode 1 and N/A subsequent substeps through 11.b.2; proceeds to step 11.c COMMENTS:	______ SAT ______ UNSAT
STEP 9.: **[11.c] ENSURE** the following valves are **OPEN**: 1-FCV-63-3 SI Pump Recirc to RWST – Common 1-FCV-63-175 SI Pump 1B Recirc to RWST 1-FCV-63-152 SI Pump 1A CL Injection Isolation 1-FCV-63-153 SI Pump 1B CL Injection Isolation 1-FCV-63-48 SI Pump 1B Suction Isolation STANDARD: Operator verifies normally open valves are open via 1-M-6 handswitches 1-HS-63-3, 175, 152, 153, and 48 indicated by RED light LIT. COMMENTS:	______ SAT ______ UNSAT
STEP 10.: **[d] START** 1B-B SI pump using **[1-HS-63-15A]**. STANDARD: Operator starts the 1B-B SI pump by placing 1-HS-63-15A to the START and verifying RED light ON, amps indicated on 1-EI-63-16A, and pressure 1-PI-63-19 stable **CRITICAL Step:** this will provide the motive force for CLA fill. COMMENTS:	______ SAT ______ UNSAT **Critical Step**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 11.: **[e] WHEN** SI pump has run for at least 5 minutes **THEN** proceed with this procedure. ***CUE:*** Five minutes has elapsed STANDARD: Operator ensures pump has run 5 minutes prior to continuing adhering to **CAUTION** prior to step 11 COMMENTS:	______ SAT ______ UNSAT
STEP 12.: **[12] & [13] Filling #s 1 & 2 CLAs;** STANDARD: Operator acknowledges and marks N/A; proceeds to CAUTIONS & NOTE prior to step 14 COMMENTS:	______ SAT ______ UNSAT
Operator reviews CAUTIONS & NOTE prior to Step 14: **CAUTION 1:** Do not cross connect the Cold Leg Accumulators **CAUTION 2** Reducing level in the RWST to <370,000 gallons while in mode 1-4 will result in RWST being inoperable. **NOTE:** Operability band for CLA level is 7615-7955 gal.	
STEP 13.: **[14]** **IF** adding makeup water to Accumulator 3, **THEN PERFORM** the following: **[a] ENSURE** the following valves are **CLOSED**: 1-FCV-63-115 No. 1 CL Accum Water Makeup 1-FCV-63-95 No. 2 CL Accum Water Makeup 1-FCV-63-70 No. 4 CL Accum Water Makeup STANDARD: Operator verifies 1-M-6 handswitches 1-HS-63-115A, 63-95A and 63-70A in the CLOSE position with GREEN light LIT and RED light out. COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 14. **[14.b] OPEN [1-FCV-63-77]** No. 3 CL Accum Water Makeup to begin filling No. 3 Accumulator. STANDARD: Operator positions 1-M-6 handswitch 1-HS-63-77A to OPEN position and verifies valve opens indicated by RED light LIT. **CRITICAL Step:** to establish fill flowpath to #3 CLA COMMENTS:	______ SAT ______ UNSAT **Critical Step**
Operator reviews CAUTION & NOTE prior to proceeding: **CAUTION:** Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit. **NOTE:** 1-HIC-63-65 may be adjusted as desired to control the rate of pressure decrease. Approximately 5-10% open is recommended for pressure adjustments within the normal band.	
Evaluator Note: Applicant should monitor CLA gas pressure but should focus on restoring level; gas pressure adjustment is not expected.	
STEP 15. **[c] IF** desired to vent accumulator to maintain pressure within limits, **THEN...** STANDARD: Operator acknowledges step and continues while continuing to monitor Accumulator gas pressure during fill. COMMENTS:	______ SAT ______ UNSAT
Operator reviews CAUTION prior to proceeding: **CAUTION:** IF CLA Fill valve [1-FCV-63-77] fails to completely close, the CLA may over-fill and over-pressurize. Step [16] may be performed out of sequence if necessary to isolate fill line.	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 16.: **[14.d]** **WHEN** No. 3 Accumulator increases to desired level, **THEN ENSURE** the following valves CLOSED: **[1] [1-FCV-63-77]**. **[2] [1-FCV-63-87]** **[3] [1-FCV-63-65]** **[4] INDEPENDENTLY VERIFY** the following: 1. **[1-FCV-63-77]** CLOSED 2. **[1-FCV-63-87]** CLOSED 3. **[1-FCV-63-65]** CLOSED ***CUE:*** Another operator will perform independent verification, prompt operator to continue, if necessary. STANDARD: Operator positions 1-M-6 handswitches 1-HS-63-77A, 87 and 65 to CLOSE position and verifies valves close as indicated by GREEN light LIT. **CRITICAL Step:** to stop #3 CLA fill COMMENTS:	_____ SAT _____ UNSAT **Critical Step**
Operator reviews NOTE prior to proceeding: **NOTE:** Filling the upper instrument line with borated water requires that the line be purged with DI water to achieve proper level instrument accuracy.	
STEP 17.: **[e] IF** accumulator was filled to greater than 7956 gallons (7916 gallons post calibration fill), **THEN NOTIFY** MIG to purge the upper instrument line with DI water. STANDARD: Operator should mark step N/A. COMMENTS:	_____ SAT _____ UNSAT
Operator reviews CAUTION prior to proceeding: **CAUTION:** Do not fill any other accumulators until No. 3 accumulator pressure and level are within the operability limits of 624-668 psig and 7615-7955 gallons.	

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
STEP 18.: **[14.f] VERIFY** No. 3 accumulator pressure and level are within Tech Spec limits. STANDARD: Operator verifies level and pressure within limits by observing readings: – 1-PIS-63-88 & 86 (>624 psig but<668 psig); – 1-LIS-63-89 & 81 (>7615 gal but<7955 gal). **CRITICAL Step:** verifies Tech Spec compliance COMMENTS:	______ SAT ______ UNSAT **Critical Step**
STEP 19.: **[g] VERIFY** ACCUMULATOR 3 PRESSURE HI-LOW and ACCUMULATOR 3 LEVEL HI-LOW alarms are **CLEAR**. (1-XA-55-6D windows C-1 and C-2) STANDARD: Operator verifies alarm windows are DARK (or will reset). COMMENTS:	______ SAT ______ UNSAT
STEP 20.: **[15] Filling # 4 CLA…** STANDARD: Operator acknowledges and marks N/A; proceeds to CAUTIONS & NOTE prior to step 16 COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
STEP 21.: **[16] CLOSE** the following valves: 1-FCV-63-71 SIS Test Line to HUT 1-FCV-63-23 CL Accum Makeup From SI Pumps STANDARD: Operator positions 1-M-6 1-HS-63-71A and 1-HS-63-23A to CLOSE and verifies 1-FCV-63-71 and 23 go closed by GREEN light only LIT. COMMENTS:	_____ SAT _____ UNSAT
STEP 22.: **[17] IF** depressurizing RHR is required before SIP minimum run time is complete, **THEN DEPRESSURIZE** RHR fully using 1-SO-63-5 in parallel with steps **[18]** through **[22].** ***Cue:*** CRO will perform SI Pump discharge piping depressurization. STANDARD: Operator checks RHR Discharge Header pressure on LT-74-13 & 26 and verifies pressure is low and N/As this step. COMMENTS:	_____ SAT _____ UNSAT
STEP 23.: **[18] ENSURE** SI pump has run for a minimum of 20 minutes. ***Cue:*** Pump has been running 20 minutes. STANDARD: Operator ensures SI pump 1B-B has run 20 minutes prior to stopping pump. (to prevent premature bearing wear) COMMENTS:	_____ SAT _____ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 24.: **[19] STOP** 1B-B SI pump with 1-HS-63-15A. STANDARD: Operator places 1-HS-63-15A to the stop position, verifies Green light on, amps and pressure decrease to zero (or to original pressure prior to pump start). COMMENTS:	______ SAT ______ UNSAT
STEP 25.: **[20] IF** Unit 1 is in Modes 1-3, **THEN ENSURE** SI Pump in A-AUTO 1B-B SI pump 1-HS-63-15A. STANDARD: Operator places 1-HS-63-15A to the A-AUTO, (center pull-out) position. **CRITICAL Step:** step ensures pump is placed in normal standby state and ensures shutdown and termination of the fill process. ***Cue:*** **This completes the JPM.** STANDARD: End of JPM	______ SAT ______ UNSAT **Critical Step**

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is at 100% RTP.
2. #3 CLA sample valve did not properly close at completion of sampling resulting in #3 CLA inventory draining to the current value.
3. The sample line has been isolated.
4. All power and valve checklists are complete with NO deviations.
5. The SI pumps are aligned in the normal standby configuration.
6. RWST boron concentration is 2575 ppm per the latest RC Lab analysis.
7. The initial level in #3 CLA per SI-OPS-000.002.0 was 7855 gallons and pressure ~645 psig.

INITIATING CUES:

1. The US directs you to restore the #3 CLA to within required limits per the appropriate procedure.
2. Inform the US when #3 CLA has been restored.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

1-SO-63-1

COLD LEG INJECTION ACCUMULATORS

Revision 47

QUALITY RELATED

PREPARED/PROOFREAD BY: LOYD HODGES

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: J. K. WILKES

EFFECTIVE DATE: 03/09/2009

LEVEL OF USE: **CONTINUOUS USE**

VFU Today JD

REVISION DESCRIPTION:

Added step 5.1[1] to notify System Engineer that CLAs are about to be filled and VT-2 test may be required (PCR07001781). Added notes and steps to check nitrogen pressure locally in sections 8.3.1, 8.3.2, 8.3.3, and 8.3.4 (PCR08000053). Added caution to Appendix A, B, C, and D prior to step 7 about limiting MOV starts (PCR08001141). Added P&L note M to require Void Volume Evaluation any time a segment of the ECCS system is drained (PCR08001174). Added note and step to all sections of 5.1, 5.2, and 5.3 about system operability and evaluation of void volume (PCR08001174). Added Caution Section 8.1 preceding steps [12][d][1], [13][d][1], [14][d][1], and [15][d][1] cautioning about CLA over-fill and over-pressurization (PCR09000112).Corrected steps referenced in Section 8.1 Note 1 from 13-thru-16 to 12-thru-15 (PCR09000112).

3.0 PRECAUTIONS AND LIMITATIONS

A. Venting large volumes of nitrogen from the cold leg accumulators could displace oxygen and create a hazardous atmosphere in the No. 4 Accumulator Room. Prior to venting a significant volume of nitrogen from the cold leg accumulators, the No. 4 Accumulator Room shall be evacuated or continuous oxygen monitoring shall be established. If evacuated, a safe atmosphere should be verified prior to restoring access.

B. Cold Leg Accumulator (CLA) room temperatures must be maintained equal to or greater than 60°F whenever the CLAs are pressurized (not open to atmosphere).

C. Tech Spec operability limit (including instrument uncertainty) for CLA borated water volume is between 7615 gallons and 7960, but Unit 1 CLA level indicators will indicate a maximum of 7956 gallons. Therefore, the CLA operability limit has been reduced to between 7615 gallons and 7955 gallons.

D. Tech Spec operability limit (including instrument uncertainty) for CLA nitrogen pressure is between 624 psig and 668 psig.

E. Do not change relief valve setpoints to allow more rapid pressurization. If Pressurization rate is inadequate, the SM should be contacted immediately for resolution.

F. Cross connection of the nitrogen or water supplies of any Cold Leg Accumulators will make the cross-tied accumulators inoperable. Do NOT cross-tie accumulators in Modes 1-3. **[C.2]**

G. Do not adjust pressure control valves 0-PCV-77-253 or 0-PCV-77-254. Maintenance should be contacted for assistance if valves require adjustment.

H. To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started.

I. To prevent brittle fracture when adding nitrogen to a CLA with accumulator pressure less than 600 psig, then the piping temperature between the nitrogen supply regulator (0-PCV-77-253 or -254) and the containment isolation valve (1-FCV-63-64) should be monitored and maintained greater than 40°F. If temperature approaches 40°F, nitrogen fill should be stopped or the flow rate reduced to maintain piping temperature greater than 40°F.

J. Anytime accumulators are filled above 7956 gallons, the upper instrument level tap will need to be purged by Instrument Maintenance Group.

K. Limiting accumulator fill to 7916 gallons during the initial fill following an outage, prevents flooding of the upper instrument level leg. After calibration the lower instrument leg is unborated water and level instrument inaccuracies result.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

L. In Modes 4, 5, and 6 (with vessel head on), CLA valves are required to be closed with motor breakers locked in OFF position unless CLA pressure is less than the maximum RCS pressure allowed by PTLR for current cold leg temperature. (LCO 3.4.12)

M. Engineering evaluation for air removal is required any time a segment of the ECCS system is drained. Ultrasonic testing may be required in order to validate air removal or to quantify any void volume that remains. This evaluation should consider whether or not the existing vent valves can completely remove all air pockets from the piping, and if not, the effect on the system of the remaining void in concert with other existing voids. During outages, the fill and vent can be verified by the subsequent performance of full flow testing. Evaluation of procedure sections can be performed in advance of actual use.

END OF SECITON 3.0

Date Today

4.0 PREREQUISITE ACTIONS

NOTE Throughout this instruction where an **IF/THEN** statement exists, the step should be **N/A** if condition does not exist.

[1] **ENSURE** the Instruction to be used is a copy of the effective version. JD

[2] **ENSURE** Precautions and Limitations, Section 3.0, has been reviewed. JD

[3] **ENSURE** RWST water volume between 370,000 and 375,000 gallons in modes 1-4. (Reference TS 3.5.5) JD

[4] **IF** segment(s) of ECCS system will be refilled following draining, **THEN**
NOTIFY System Engineering to initiate system void volume evaluation. N/A

[5] **IF** performing Section 5.1, **THEN**

ENSURE Unit 1 RWST is NOT on recirculation. N/A

[6] **ENSURE** each performer documents their name and initials:

Print Name	Initials
John Doe	JD

[7] **INDICATE** below which performance section of this Instruction will be used and the reason for this performance:

☐ 5.0 STARTUP/STANDBY READINESS

☑ 8.0 INFREQUENT OPERATION

REASON: Restore CLA

END OF SECTION 4.0

Date __________

8.0 INFREQUENT OPERATION

8.1 Adding Makeup Water to the Cold Leg Accumulators

CAUTION 1 **Operability limits for CLA level and pressure are 7615-7955 gal and 624-668 psig.**

CAUTION 2 **Radiochemical Laboratory obtaining sample of Accumulators for boron concentration analysis while draining or filling in progress may result in invalid calculation. [C.1]**

NOTE 1 Steps [12] through [15] may be performed in any order to allow making up to accumulators in the desired order. However, substeps associated with making up to each accumulator shall be performed in the order listed.

NOTE 2 Limiting the fill level to 7916 gallons, during an initial fill following an outage, will alleviate the need for MIG to perform a purge of the level instrument upper leg due to borated water intrusion.

NOTE 3 Limiting the fill level to 7956 gallons, during normal operation, will alleviate the need for MIG to perform a purge of the level instrument upper leg due to borated water intrusion.

[1] **ENSURE** Power Checklist 1-63-1.01 complete. __________

[2] **ENSURE** Valve Checklist 1-63-1.06 complete. __________

[3] **ENSURE** Valve Checklist 1-63-1.07 complete. __________

[4] **ENSURE** at least one SI Pump operable or available. __________

[5] **ENSURE** RWST boron concentration between 2500 and 2700 ppm per Radiochemical Laboratory results. __________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[6] **IF** required due to RHR discharge header pressurization,
THEN
VENT RHR discharge piping fully using 1-SO-63-5. ___________

[7] **ENSURE** [1-FCV-63-84] SIS Test Line to HUT is **CLOSED**. ___________

[8] **IF** in Mode 4, 5, or 6 (with the vessel head on),
THEN

ENSURE the following valves are **CLOSED** with power removed and tagged under a hold order to comply with LCO 3.4.12:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-69	Check valve test isolation	________
1-FCV-63-79	Check valve test isolation	________
1-FCV-63-97	Check valve test isolation	________
1-FCV-63-117	Check valve test isolation	________
1-FCV-63-163	Check valve test isolation	________
1-FCV-63-164	Check valve test isolation	________
1-FCV-63-165	Check valve test isolation	________
1-FCV-63-166	Check valve test isolation	________
1-FCV-63-174	CCP to CL Accumulator Fill	________
1-FCV-63-68	Check valve test isolation	________
1-FCV-63-116	Check valve test isolation	________
1-FCV-63-96	Check valve test isolation	________
1-FCV-63-78	Check valve test isolation	________
1-FCV-63-167	Check valve test isolation	________
1-FCV-63-24	Check valve test isolation	________
1-FCV-63-121	Check valve test isolation	________
1-FCV-63-21	Check valve test isolation	________
1-FCV-63-111	Check valve test isolation	________
1-FCV-63-112	Check valve test isolation	________
1-FCV-63-158	Check valve test isolation	________

Date ___________

8.1 **Adding Makeup Water to the Cold Leg Accumulators** (Continued)

[9] **ENSURE** the following valves are **OPEN**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-71	SIS Test Line to HUT	________
1-FCV-63-23	CL Accum Makeup From SI Pumps	________

CAUTION 1 **To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started.**

CAUTION 2 **In Modes 1-3, closure of 1-FCV-63-152 requires entering LCO 3.5.2.**

[10] **IF** 1A-A SI pump is to be used to add makeup water to Accumulators, **THEN** **PERFORM** the following:

[a] **IF** RCS pressure <1700 psig, **THEN**

ENSURE the following valves are **CLOSED**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-156	SI Pump 1A HL Injection Isolation	________
1-FCV-63-152	SI Pump 1A CL Injection Isolation	________

[b] **IF** in Mode 4, 5, or 6 (with the vessel head on), **THEN**

1. **ENSURE** the following valves are **CLOSED** with power removed and tagged under a hold order to comply with LCO 3.4.12:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-22	SI Pumps CL Injection	________
1-FCV-63-156	SI Pump 1A HL Injection Isolation	________
1-FCV-63-157	SI Pump 1B HL Injection Isolation	________

2. **ENSURE** **[1-VLV-63-645]** leakoff isolation **LOCKED CLOSED** and tagged. ___________

Date ____________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[c] **ENSURE** the following valves are **OPEN**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-3	SI Pump Recirc to RWST	________
1-FCV-63-4	SI Pump 1A Recirc to RWST	________
1-FCV-63-47	SI Pump 1A Suction Isolation	________

[d] **START** 1A-A SI pump using [**1-HS-63-10A**]. ________

[e] **WHEN** SI pump has run for at least 5 minutes
THEN proceed with this procedure. ________

CAUTION 1 **SI pump 1B-B CANNOT be used to fill CLA in Mode 3 with RCS pressure <1700 psig due to having to close 1-FCV-63-22 (LCO 3.0.3).**

CAUTION 2 **To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started.**

[11] **IF** 1B-B SI pump is to be used to add makeup water to Accumulators, **THEN**

PERFORM the following:

[a] **IF** Unit 1 is in Mode 3, **THEN**

VERIFY RCS pressure is >1700 psig. ________

[b] **IF** in Mode 4, 5, or 6 (with the vessel head on), **THEN**

1. **ENSURE** the following valves are **CLOSED** with power removed and tagged under a hold order to comply with LCO 3.4.12:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-22	SI Pumps CL Injection	________
1-FCV-63-156	SI Pump 1A HL Injection Isolation	________
1-FCV-63-157	SI Pump 1B HL Injection Isolation	________

2. **ENSURE** [**1-VLV-63-645**] leakoff isolation **LOCKED CLOSED** and tagged. ________

Date ____________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[c] **ENSURE** the following valves are **OPEN**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-3	SI Pump Recirc to RWST - Common	________
1-FCV-63-175	SI Pump 1B Recirc to RWST	________
1-FCV-63-152	SI Pump 1A CL Injection Isolation	________
1-FCV-63-153	SI Pump 1B CL Injection Isolation	________
1-FCV-63-48	SI Pump 1B Suction Isolation	________

[d] **START** 1B-B SI pump using [1-HS-63-15A]. ____________

[e] **WHEN** SI pump has run for at least 5 minutes **THEN** proceed with this procedure. ____________

CAUTION 1 **Do not cross connect the Cold Leg Accumulators. [C.2]**

CAUTION 2 **Reducing level in the RWST to < 370,000 gallons while in mode 1-4 will result in RWST being inoperable.**

NOTE Operability band for CLA level is 7615-7955 gal.

[12] **IF** adding makeup water to Accumulator 1, **THEN**

PERFORM the following:

[a] **ENSURE** the following valves are **CLOSED**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-95	No. 2 CL Accum Water Makeup	________
1-FCV-63-77	No. 3 CL Accum Water Makeup	________
1-FCV-63-70	No. 4 CL Accum Water Makeup	________

[b] **OPEN** [1-FCV-63-115] No. 1 CL Accum Water Makeup to begin filling No. 1 Accumulator. ____________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

CAUTION **Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit.**

NOTE 1-HIC-63-65 may be adjusted as desired to control the rate of pressure decrease. Approximately 5-10% open is recommended for pressure adjustments within the normal band.

[c] **IF** desired to vent accumulator to maintain pressure within limits, **THEN**

[1] **THROTTLE** **[1-FCV-63-65]** CL Accum N2 Header Vent Flow Control. ___________

[2] **OPEN** **[1-FCV-63-127]** to vent nitrogen from Accumulator 1. ___________

[3] **ADJUST** **[1-FCV-63-65]** as needed to control CLA pressure between 630 and 662 psig. ___________

CAUTION **IF CLA Fill valve [1-FCV-63-115] fails to completely close, the CLA may over-fill and over-pressurize. Step [16] may be performed out of sequence if necessary to isolate fill line.**

[d] **WHEN** No. 1 Accumulator increases to desired level, **THEN**

ENSURE the following valves are CLOSED:

[1] **[1-FCV-63-115]**. ___________

[2] **[1-FCV-63-127]** ___________

[3] **[1-FCV-63-65]** ___________

[4] **INDEPENDENTLY VERIFY** the following:

1. **[1-FCV-63-115]** CLOSED ___________
2. **[1-FCV-63-127]** CLOSED ___________
3. **[1-FCV-63-65]** CLOSED ___________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

NOTE Filling the upper instrument line with borated water requires that the line be purged with DI water to achieve proper level instrument accuracy.

[e] **IF** accumulator was filled to greater than 7956 gallons (7916 gallons post calibration fill), **THEN**

NOTIFY MIG to purge the upper instrument line with DI water. ___________

CAUTION **Do not fill any other accumulators until No. 1 accumulator pressure and level are within the operability limits of 624-668 psig and 7615-7955 gallons.**

[f] **VERIFY** No. 1 accumulator pressure and level are within Tech Spec limits. ___________

[g] **VERIFY** ACCUMULATOR 1 PRESSURE HI-LOW and ACCUMULATOR 1 LEVEL HI-LOW alarms are **CLEAR**. (1-XA-55-6D windows A-1 and A-2) ___________

CAUTION 1 **Do not cross connect the Cold Leg Accumulators. [C.2]**

CAUTION 2 **Reducing level in the RWST to < 370,000 gallons while in mode 1-4 will result in RWST being inoperable.**

NOTE Operability band for CLA level is 7615-7955 gal.

[13] **IF** adding makeup water to Accumulator 2, **THEN**

PERFORM the following:

[a] **ENSURE** the following valves are **CLOSED**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-115	No. 1 CL Accum Water Makeup	________
1-FCV-63-77	No. 3 CL Accum Water Makeup	________
1-FCV-63-70	No. 4 CL Accum Water Makeup	________

Date ___________

8.1 **Adding Makeup Water to the Cold Leg Accumulators** (Continued)

[b] **OPEN** [1-FCV-63-95] No. 2 CL Accum Water Makeup to begin filling No. 2 Accumulator. ________

CAUTION **Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit.**

NOTE 1-HIC-63-65 may be adjusted as desired to control the rate of pressure decrease. Approximately 5-10% open is recommended for pressure adjustments within the normal band.

[c] **IF** desired to vent accumulator to maintain pressure within limits, **THEN**

[1] **THROTTLE** [1-FCV-63-65] CL Accum N2 Header Vent Flow Control. ________

[2] **OPEN** [1-FCV-63-107] to vent nitrogen from Accumulator 2. ________

[3] **ADJUST** [1-FCV-63-65] as needed to control CLA pressure between 630 and 662 psig. ________

CAUTION **IF CLA Fill valve [1-FCV-63-95] fails to completely close, the CLA may over-fill and over-pressurize. Step [16] may be performed out of sequence if necessary to isolate fill line.**

[d] **WHEN** No. 2 Accumulator increases to desired level, **THEN**

ENSURE the following valves CLOSED

[1] [1-FCV-63-95]. ________

[2] [1-FCV-63-107] ________

[3] [1-FCV-63-65] ________

[4] **INDEPENDENTLY VERIFY** the following:

1. [1-FCV-63-95]. CLOSED ________
2. [1-FCV-63-107] CLOSED ________
3. [1-FCV-63-65] CLOSED ________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

NOTE Filling the upper instrument line with borated water requires that the line be purged with DI water to achieve proper level instrument accuracy.

[e] **IF** accumulator was filled to greater than 7956 gallons (7916 gallons post calibration fill), **THEN**

NOTIFY MIG to purge the upper instrument line with DI water. ___________

CAUTION **Do not fill any other accumulators until No. 2 accumulator pressure and level are within the operability limits of 624-668 psig and 7615-7955 gallons.**

[f] **VERIFY** No. 2 accumulator pressure and level are within Tech Spec limits. ___________

[g] **VERIFY** ACCUMULATOR 2 PRESSURE HI-LOW and ACCUMULATOR 2 LEVEL HI-LOW alarms are **CLEAR**. (1-XA-55-6D windows B-1 and B-2) ___________

CAUTION 1 **Do not cross connect the Cold Leg Accumulators. [C.2]**

CAUTION 2 **Reducing level in the RWST to < 370,000 gallons while in mode 1-4 will result in RWST being inoperable.**

NOTE Operability band for CLA level is 7615-7955 gal.

[14] **IF** adding makeup water to Accumulator 3, **THEN**

PERFORM the following:

[a] **ENSURE** the following valves are **CLOSED**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-115	No. 1 CL Accum Water Makeup	________
1-FCV-63-95	No. 2 CL Accum Water Makeup	________
1-FCV-63-70	No. 4 CL Accum Water Makeup	________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[b] **OPEN** [1-FCV-63-77] No. 3 CL Accum Water Makeup to begin filling No. 3 Accumulator. __________

CAUTION **Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit.**

NOTE 1-HIC-63-65 may be adjusted as desired to control the rate of pressure decrease. Approximately 5-10% open is recommended for pressure adjustments within the normal band.

[c] **IF** desired to vent accumulator to maintain pressure within limits, **THEN**

[1] **THROTTLE** [1-FCV-63-65] CL Accum N2 Header Vent Flow Control. __________

[2] **OPEN** [1-FCV-63-87] to vent nitrogen from Accumulator 3. __________

[3] **ADJUST** [1-FCV-63-65] as needed to control CLA pressure between 630 and 662 psig. __________

CAUTION **IF CLA Fill valve [1-FCV-63-77] fails to completely close, the CLA may over-fill and over-pressurize. Step [16] may be performed out of sequence if necessary to isolate fill line.**

[d] **WHEN** No. 3 Accumulator increases to desired level, **THEN**

ENSURE the following valves CLOSED

[1] [1-FCV-63-77]. __________

[2] [1-FCV-63-87] __________

[3] [1-FCV-63-65] __________

[4] **INDEPENDENTLY VERIFY** the following:

1. [1-FCV-63-77] CLOSED __________
2. [1-FCV-63-87] CLOSED __________
3. [1-FCV-63-65] CLOSED __________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

NOTE Filling the upper instrument line with borated water requires that the line be purged with DI water to achieve proper level instrument accuracy.

[e] **IF** accumulator was filled to greater than 7956 gallons (7916 gallons post calibration fill), **THEN**

NOTIFY MIG to purge the upper instrument line with DI water. ___________

CAUTION **Do not fill any other accumulators until No. 3 accumulator pressure and level are within the operability limits of 624-668 psig and 7615-7955 gallons.**

[f] **VERIFY** No. 3 accumulator pressure and level are within Tech Spec limits. ___________

[g] **VERIFY** ACCUMULATOR 3 PRESSURE HI-LOW and ACCUMULATOR 3 LEVEL HI-LOW alarms are **CLEAR**. (1-XA-55-6D windows C-1 and C-2) ___________

CAUTION 1 **Do not cross connect the Cold Leg Accumulators. [C.2]**

CAUTION 2 **Reducing level in the RWST to < 370,000 gallons while in mode 1-4 will result in RWST being inoperable.**

NOTE Operability band for CLA level is 7615-7955 gal

[15] **IF** adding makeup water to Accumulator 4, **THEN** **PERFORM** the following:

[a] **ENSURE** the following valves are **CLOSED**:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-115	No. 1 CL Accum Water Makeup	________
1-FCV-63-95	No. 2 CL Accum Water Makeup	________
1-FCV-63-77	No. 3 CL Accum Water Makeup	________

Date ____________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[b] **OPEN** [1-FCV-63-70] No. 4 CL Accum Water Makeup to begin filling No. 4 Accumulator. ____________

CAUTION **Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit.**

NOTE 1-HIC-63-65 may be adjusted as desired to control the rate of pressure decrease. Approximately 5-10% open is recommended for pressure adjustments within the normal band.

[c] **IF** desired to vent accumulator to maintain pressure within limits, **THEN**

[1] **THROTTLE** [1-FCV-63-65] CL Accum N2 Header Vent Flow Control. ____________

[2] **OPEN** [1-FCV-63-63] to vent nitrogen from Accumulator 4. ____________

[3] **ADJUST** [1-FCV-63-65] as needed to control CLA pressure between 630 and 662 psig. ____________

CAUTION **IF CLA Fill valve [1-FCV-63-70] fails to completely close, the CLA may over-fill and over-pressurize. Step [16] may be performed out of sequence if necessary to isolate fill line.**

[d] **WHEN** No. 4 Accumulator increases to desired level, **THEN**

ENSURE the following valves CLOSED

[1] [1-FCV-63-70]. ____________

[2] [1-FCV-63-63] ____________

[3] [1-FCV-63-65] ____________

[4] **INDEPENDENTLY VERIFY** the following:

1. [1-FCV-63-70]. CLOSED ____________
2. [1-FCV-63-63] CLOSED ____________
3. [1-FCV-63-65] CLOSED ____________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

NOTE Filling the upper instrument line with borated water requires that the line be purged with DI water to achieve proper level instrument accuracy.

[e] **IF** accumulator was filled to greater than 7956 gallons (7916 gallons post calibration fill), **THEN**

NOTIFY MIG to purge the upper instrument line with DI water. ___________

CAUTION **Do not fill any other accumulators until No. 4 accumulator pressure and level are within the operability limits of 624-668 psig and 7615-7955 gallons.**

[f] **VERIFY** No. 4 accumulator pressure and level are within Tech Spec limits. ___________

[g] **VERIFY** ACCUMULATOR 4 PRESSURE HI-LOW and ACCUMULATOR 4 LEVEL HI-LOW alarms are **CLEAR**. (1-XA-55-6D windows D-1 and D-2) ___________

[16] **CLOSE** the following valves:

VALVE NO.	FUNCTION	INITIALS
1-FCV-63-71	SIS Test Line to HUT	______/______ 1st IV
1-FCV-63-23	CL Accum Makeup From SI Pumps	______/______ 1st IV

[17] **IF** depressurizing RHR is required before SIP minimum run time is complete,
THEN
DEPRESSURIZE RHR fully using 1-SO-63-5 in parallel with steps **[18]** through **[22].** ___________

[18] **ENSURE** SI pump has run for a minimum of 20 minutes. ___________

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[19] **STOP** running SI pump.

SWITCH NO.	FUNCTION	INITIALS
1-HS-63-10A	1A-A SI Pump	
1-HS-63-15A	1B-B SI Pump	

[20] **IF** Unit 1 is in Modes 1-3, **THEN**

ENSURE SI Pump in **A-AUTO** (N/A pump not started):

SWITCH NO.	FUNCTION	INITIALS
1-HS-63-10A	1A-A SI Pump	____ 1st ____ IV
1-HS-63-15A	1B-B SI Pump	____ 1st ____ IV

[21] **IF** Unit 1 is in Mode 4, 5, or 6, **THEN**

ENSURE SI Pumps are in **PULL-TO-LOCK**.

SWITCH NO.	FUNCTION	INITIALS
1-HS-63-10A	1A-A SI Pump	____ 1st ____ IV
1-HS-63-15A	1B-B SI Pump	____ 1st ____ IV

[22] **IF** 1-FCV-63-152 was **CLOSED** in step **[10]**, **THEN**

PERFORM the following:

[a] **DEPRESSURIZE** SI pump discharge piping using 1-SO-63-5. ___________

[b] **OPEN** [1-FCV-63-152] SI Pump 1A CL Injection Isolation.

________ ________
1st IV

Date ___________

8.1 Adding Makeup Water to the Cold Leg Accumulators (Continued)

[23] **IF** SI Pump discharge piping depressurization NOT previously performed, **THEN**

DEPRESSURIZE piping using 1-SO-63-5. ___________

[24] **IF** in Mode 4, 5, or 6 (with vessel head on) **AND** all CLA filling activities are completed, **THEN**

1. **ENSURE** **[1-FCV-63-23]** CLOSED and tagged with power removed to comply with LCO 3.4.12. ___________
2. **REMOVE** clearance from valves tagged in step **[8]**. ___________

END OF TEXT SECTION 8.1

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

SIM C (RO/SRO)

RETURN PRESSURIZER RELIEF TANK TO NORMAL

RO/SRO
JOB PERFORMANCE MEASURE

Task: Pzr Vapor Space Accident (Return PRT to Normal)

Task #: 0070040101 0070050101 0680990101 (**RO**) 0070010102 (**SRO**)

Task Standard: Pressurizer Relief Tank (PRT) parameters have been returned to within normal ranges; temperature ($\leq$ 155°F), pressure (1.5 - 6.5 psi), and level (~70%).

Time Critical Task: **YES:** ______ **NO:** X

K/A Reference/Ratings: 007A1.01 (2.9/3.1)
007A1.02 (2.7/2.9)
007A1.03 (2.6/2.7)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **17 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments.
3. Acknowledge any associated alarms.
4. Initialize in IC #115.
5. If #115 is not available, initialize in IC #16 and perform the following setup:
   - ACTIVATE MFRC05 at 5% to cause PCV-68-334 to leak through.
   - Allow PORV Tailpipe temperature to increase and bring in the alarm, then close FCV-68-333.

   ACTIVATE the following REMOTE FUNCTIONS:
   - **RF RCR04** to remove power from valve
   - **RF WDR02A** Pump in PTL
   - **RF WDR02B** Pump in Run

   ACTIVATE the following OVERRIDES:
   - **ZAOPI68301 f:10** (PRT pressure at 10 psi)
   - **ZAOTI68309 f:130** (PRT pressure at 10psi)
   - **AN_OVRD[357] ON** (1-XX-55-5A D-1)
   - **AN_OVRD[2109] ON** (1-XX-55-5A C-1)

   Ensure FCV-81-12 is OPEN.
6. Due to time restraints, CUEs for PRT level and temperature will be given at appropriate times.

Tools/Equipment/Procedures Needed:

0-SO-68-5, section 8.2 & 8.4

References:

	Reference	Title	Rev No.
1.	0-SO-68-5	Reactor Coolant System	18

==

DIRECTIONS TO TRAINEE on next page

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Unit 1 is at 100% power, steady state.
Pressurizer pressure controls in automatic.
Pressurizer sprays in automatic.
PORV PCV-68-334 is partially opened but the block valve has been closed and de-energized.
With the block valve closed, leakage has been isolated through PCV-68-334.
1A Rx Coolant Drain Tank pump is inoperable.

INITIATING CUES:

1. You are directed to reduce PRT temperature IAW 1-SO-68-5 “Pressurizer Relief Tank.
2. Notify the US when the PRT parameters have been returned to the normal conditions.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
EVALUATOR NOTE: 1-SO-68-5, Pressurizer Relief Tank, has 2 sections that the candidate will use to perform this task; – Section 8.2, Reducing PRT Level Using B RCDT Pump – Section 8.4, Reducing the Temperature of the PRT. Sections may be performed in any order. The JPM starts with Sect 8.4, however if the candidate chooses to perform sect 8.2 first then start at JPM step 5.	
STEP 1.: **[8.4.1] ENSURE** [1-FCV-81-12] **OPEN**. STANDARD: Operator verifies that FCV-81-12, Primary Water to PRT & Standpipes is open by observing 1-HS-81-12A Red light on, Green light Off. COMMENTS:	______ SAT ______ UNSAT
Simulator Operator Note: When FCV-68-303 is opened, THEN delete ZAOTI68309 and AN:OVRD[2109] 0verrides	
STEP 2.: **[8.4.2] OPEN** 1-FCV-68-303 by placing 1-HS-68-303A to **OPEN** position. STANDARD: Operator takes 1-M-5 handswitch 1-HS-68-303A, Primary Water To PRT to OPEN. Handswitch indicates valve is open by red light "ON". This step is critical to align primary water to the PRT tank sparging line to lower temperature. COMMENTS:	______ SAT ______ UNSAT **Critical Step (shaded portion)**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 3.: **[8.4.3] IF** PRT level increases to $\geq$ 88% OR PRT temperature decreases to $\leq$ 120°F THEN close FCV-68-303 ***Cue:*** ***PRT level is 91%. PRT temperature is as indicated.*** STANDARD: Operator monitors PRT level on LI-68-300 and temperature on TI-68-309; Then, based on PRT level Cue @ 91%, places FCV-68-303 in the closed position and verifies green light ON. This step is critical to prevent overfill of the PRT COMMENTS:	______ SAT ______ UNSAT **Critical Step**
STEP 4.: **[8.4.4] IF** PRT level is ≥ 88%, THEN GO TO section 8.2 or 8.3. STANDARD: Operator goes to section 8.2 "Reducing PRT Level Using "B" RCDT Pump" (1A RCDT pump is inop) COMMENTS:	______ SAT ______ UNSAT
Evaluator Note: This starts Sect 8.2, Reducing PRT Level Using B RCDT Pump	
Caution 1: Pump damage could occur if suction is lost while pumping water >175°F	
Caution 2: RCDT pump 1B will NOT automatically stop on low level in PRT or closure of FCV-68-310.	
Note: RCDT pump B will Auto start when 1-FCV-68-310, PRT drain to RCDT opens.	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 5.: **[8.2.1] VERIFY** RCDT pumps aligned for service in accordance with valve checklist 1-77-1.02. ***Cue:*** ***NO deviations*** STANDARD: Operator explains how to check status log to ensure no deviations exist. COMMENTS:	______ SAT ______ UNSAT
NOTE: An AUO at panel 0-L-2 in communication with a MCR UO is needed to perform this instruction	
STEP 6.: **[8.2.2]** Station AUO at panel 0-L-2. ***Cue:*** ***Respond as the Rad Waste AUO, state that you are at 0-L-2 panel standing by and awaiting instructions.*** STANDARD Operator ensures an AUO is stationed at 0-L-2 panel. COMMENTS:	______ SAT ______ UNSAT
STEP 7.: **[8.2.3]** If RCDT level >20%, THEN PUMP down RCDT level. ***Cue:*** ***Role play as the Rad Waste AUO. State that you are at 0-L-2 panel and the level in Unit 1 RCDT is 18%.*** STANDARD: Operator checks with an AUO at 0-L-2 panel and ensures level is <20% COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 8.: **[8.2.4] ENSURE** [1-FCV-77-9] and [1-FCV-77-10] are OPEN. STANDARD: Operator verifies FCV-77-9 and FCV-77-10 open on panel M-15 (red lights on hand-switches illuminated) COMMENTS:	______ SAT ______ UNSAT
STEP 9.: **[8.2.5] ENSURE** [1-HS-77-6A] for RCDT pump B is in the PULL-P-AUTO position. ***Cue:*** ***Rad waste Operator informs UO that RCDT Pump "B" is in P-AUTO and that the level in the Unit 1 RCDT is still 18%.*** STANDARD: Operator contacts Rad Waste Operator and verifies HS-77-6A for RCDT Pump B is in P-AUTO. COMMENTS:	______ SAT ______ UNSAT
STEP 10.: **[8.2.6] OPEN** [1-FCV-68-305] Nitrogen supply to PRT. STANDARD: Operator opens FCV-68-305 by placing 1-HS-68-305A to OPEN on panel 1 M-5 and verifies Red lights ON This step is critical to ensure normal pressure maintained in the PRT during the level decrease. COMMENTS:	______ SAT ______ UNSAT **Critical Step** **(shaded portion)**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 11.: **[8.2.7] PLACE** 1-HS-68-310A in the OPEN position, and VERIFY 1-FCV-68-310 OPENS ***Cue:*** ***When operator opens FCV-68-310 and the operator contacts the Rad Waste operator, then state to the operator the B RCDT pump has started.*** STANDARD: Operator places 1-HS-68-310A to OPEN on panel 1-M-5 and verifies Red lights ON This step is critical to provide a suction flowpath to the RCDT pump and to make up the pump starting logic. COMMENTS:	______ SAT ______ UNSAT **Critical Step (shaded portion)**
STEP 12.: **[8.2.8]** ENSURE RCDT Pump B starts. ***Cue:*** ***RCDT pump B is running.*** STANDARD: Operator checks with Rad Waste AUO to ensure RCDT pump B starts. COMMENTS:	______ SAT ______ UNSAT
Simulator Operator Note: 30 seconds after FCV-68-310 is open, DELETE ZAOPI68301 & AN:OVRD[357]	
STEP 13.: **[8.2.9]** IF PRT pressure drops < 1.5 psig, THEN... ***Cue:*** ***PRT pressure is constant ~ 6.5 psig..*** STANDARD: Operator monitors PRT pressure with PI-68-301 on 1-M-5. COMMENTS:	______ SAT ______ UNSAT
Caution: The RCDT level is to be maintained <50% while 1-FCV-68-310 is open to prevent inadvertent opening of 1-LCV-77-415 which could cause overfilling of RCDT from the PRT.	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 14.: **[8.2.10] IF** at any time while pumping down the PRT the RCDT level approaches 50%, THEN... ***Cue:*** ***When AUO contacted, state: "I will monitor RCDT level, Stop RCDT pump and notify you to close FCV-68-310 if RCDT approaches 50%."*** STANDARD: Operator notifies AUO of this step. COMMENTS:	_____ SAT _____ UNSAT
STEP 15.: **[8.2.11] IF** returning from Appendix C, Then... STANDARD: Operator N/As this step. COMMENTS:	_____ SAT _____ UNSAT
STEP 16.: **[8.2.12] WHEN** PRT level reaches desired level, THEN STOP "B" RCDT Pump (at 0-L-2 panel) ***Cue:*** ***When the operator begins to monitor level on LI-68-300, Tell the operator that "PRT level has decreased to 70%".*** ***Cue:*** ***When operator requests AUO to stop RCDT pump 1B, Tell him "RCDT pump 1B is stopped and HS is in Pull-P-Auto".*** STANDARD: Operator verifies level, and has the Rad Waste Operator STOP RCDT Pump 1B and place HS in Pull-P-Auto COMMENTS:	_____ SAT _____ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 17.: **[8.2.13] CLOSE** FCV-68-310 ***Cue:*** ***If operator asks, PRT Level is 70%, Temp is 110°F, and Press is 6.5 psig.*** STANDARD: Operator closes FCV-68-310 with HS-68-310A (on panel 1-M-5) and verifies green light ON. This step is critical to drop out the stop logic to the RCDT pump and to isolate the PRT from the RCDT. COMMENTS:	______ SAT ______ UNSAT **Critical Step** **(shaded portion)**
STEP 18.: **[8.2.14] PLACE** [1-HS-77-6A] RCDT pump B in Pull-P-Auto position at 0-L-2 panel. ***Cue:*** ***When operator requests AUO to place the HS for RCDT pump 1B, Tell him "RCDT pump 1B HS is in Pull-P-Auto."*** STANDARD: Operator has the Rad Waste Operator place HS in Pull-P-Auto. COMMENTS:	______ SAT ______ UNSAT
STEP 19.: **[8.2.15] CLOSE** [1-FCV-68-305] Nitrogen Supply to PRT. STANDARD: Operator closes 1-FCV-68-305 with 1-HS-68-305A (on panel 1-M-5) and verifies Green light ON. COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 20.: Inform the US/SRO that the PRT parameters have been returned to within normal operating conditions/ranges. ***Cue:* This completes the JPM.** STANDARD: Operator informs the US/SRO that the PRT parameters have been returned to within normal operating conditions/ranges. COMMENTS:	______ SAT ______ UNSAT Stop Time____

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is at 100% power, steady state.
2. Pressurizer pressure controls in automatic.
3. Pressurizer sprays in automatic.
4. PORV PCV-68-334 is partially opened but the block valve has been closed and de-energized.
5. With the block valve closed, leakage has been isolated through PCV-68-334.
6. 1A Rx Coolant Drain Tank pump is inoperable.

INITIATING CUES:

1. You are directed to reduce PRT temperature IAW 1-SO-68-5 “Pressurizer Relief Tank.
2. Notify the US when the PRT parameters have been returned to the normal conditions.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

1-SO-68-5

PRESSURIZER RELIEF TANK

Revision **18**

QUALITY RELATED

PREPARED/PROOFREAD BY: PAT BARBREE/MARIE HANKINS

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 10/28/07

LEVEL OF USE: **CONTINUOUS USE**

VFU Today JD

REVISION DESCRIPTION: Added UNIDs on handswitches for operating RCDT Pumps to sections 8.2, 8.3, 8.7 and Appendixes A & B. Added "Block Valves Open" and draining PRT to less than 5% to step 4 of section 8.7. All changes IAW (07000493). Added steps to Appendix B to allow operation of the RCDT pump from switchgear.

2.2 Developmental References

A. SOI-68.1, *Reactor Coolant System*

B. 0-MI-MXX-068-006.0, *Venting of Pressurizer, Pressurizer Relief Tank, and Reactor Head*

C. SPP-10.3, *Verification Program*

D. TVA Drawing
   1. 47W813-1
   2. 47W819-1
   3. 47W830-1
   4. 47W830-6

E. FSAR
   1. Section 5.5

3.0 PRECAUTIONS AND LIMITATIONS

A. During normal operation, PRT water temperature should not exceed 120°F.

B. Maintaining 3 to 6 psig N_2 gas blanket on the PRT will prevent the formation of explosive hydrogen-oxygen mixtures.

C. The PRT concentration of oxygen shall be limited to less than or equal to 2% by volume whenever the hydrogen concentration exceeds 4% by volume.

D. Over filling the PRT to solid water condition during oxygen reduction per Section 8.8 may result in failure of the PRT rupture disc.

E. The PRT pressure should be maintained < 7.5 psig during normal operation. (Except during the performance of section 8.9).

F. The PRT rupture discs are rated at 85 psig.

G. The level in the PRT should be maintained at 70%. If the level increases to 88%, then decreasing level to 70% is necessary. If the level decreases to 55%, then increasing level to 70% is needed when the PRT is required to be operable.

H. Completely draining the PRT may result in gas binding the RCDT pumps.

I. Water intrusion into the waste gas vent header is possible during PRT venting operations with PRT level high. This could affect RCP seal leakoff flows and the vent capability of tanks which vent to waste gas vent header.

J. PRT level indications or alarms are not available in the Aux Control Room, thus PRT level manipulations and feed & bleed processes are unavailable.

Date Today

4.0 PREREQUISITE ACTIONS

NOTE Throughout this Instruction, where an **IF/THEN** statement exists, the step should be **N/A** if condition does not exist.

[1] **ENSURE** Instruction to be used is a copy of the effective version. JD

[2] **ENSURE** Precautions and Limitations, Section 3.0 have been reviewed. JD

[3] **ENSURE** Attachment 1, Power Checklist 1-68-5.01 is complete. JD

[4] **ENSURE** Attachment 2, Valve Checklist 1-68-5.02 is complete. JD

[5] **VERIFY** primary water is available to fill and cool the PRT (N/A if primary water will not be used). JD

[6] **VERIFY** Waste Disposal System is available to receive liquid from PRT. JD

[7] **VERIFY** vent header in service to receive gases from the PRT (N/A if PRT will not be vented to vent header). JD

[8] **VERIFY** low pressure N_2 system is in service (N/A if nitrogen will not be used). JD

[9] **ENSURE** each performer documents their name and initials:

Print Name	Initials
John Doe	JD

[10] **INDICATE** below which performance section of this Instruction will be used and the reason for this performance:

☐ 5.0 STARTUP/STANDBY READINESS

☑ 8.0 INFREQUENT OPERATION

REASON: Restore PRT conditions normal

Date__________

8.2 Reducing PRT Level Using B RCDT Pump

CAUTION 1 **Pump damage could occur if suction is lost while pumping water > 175°F.**

CAUTION 2 **RCDT pump 1B will NOT automatically stop on low level in PRT OR closure of FCV-68-310.**

NOTE RCDT pump B will Auto start when 1-FCV-68-310, PRT drain to RCDT opens.

[1] **VERIFY** RCDT pumps aligned for service in accordance with Valve Checklist 1-77-1.02. __________

NOTE An AUO at panel 0-L-2 in communication with a MCR UO is needed to perform this Instruction.

[2] **STATION** an AUO at panel 0-L-2. __________

[3] **IF** RCDT level > 20%, **THEN**

PUMP down RCDT level in accordance with Appendix C of this Instruction. __________

[4] **ENSURE** [1-FCV-77-9] and [1-FCV-77-10] RCDT pump outlet isolation valves are **OPEN**. __________

[5] **ENSURE** [1-HS-77-6A] for RCDT pump B is in the **PULL-P-AUTO** position. __________

[6] **OPEN** [1-FCV-68-305] Nitrogen Supply to PRT. __________

[7] **PLACE** [1-HS-68-310A] in the **OPEN** position, **AND**

VERIFY [1-FCV-68-310] **OPENS**. __________

[8] **ENSURE** RCDT pump B **STARTS**. __________

Date__________

8.2 Reducing PRT Level Using B RCDT Pump (Continued)

[9] **IF** PRT pressure drops < 1.5 psig, **THEN**

COMPLETE the following:

[a] **STOP** 'B' RCDT pump using [1-HS-77-6A] at 0-L-2, ______

AND

CLOSE [1-FCV-68-310]. ______

[b] **PLACE** [1-HS-77-6A] RCDT pump B in **PULL-P-AUTO**. ______

[c] **WHEN** PRT pressure returns to normal, **THEN**

OPEN [1-FCV-68-310]. ______

[d] **ENSURE** RCDT pump B **STARTS**. ______

CAUTION **The RCDT level is to be maintained < 50% while 1-FCV-68-310 is open to prevent inadvertent opening of 1-LCV-77-415 which could cause overfilling of RCDT from the PRT.**

[10] **IF** at any time while pumping down the PRT the RCDT level approaches 50%, **THEN**

PERFORM the following before continuing the PRT level reduction:

[a] **PLACE** [1-HS-77-6A] RCDT pump B in the **PULL-TO-LOCK** position. ______

[b] **CLOSE** [1-FCV-68-310]. ______

[c] **GO TO** Appendix C of this Instruction for RCDT level reduction and return to Step **[11]** of Section 8.2. ______

Date__________

8.2 Reducing PRT Level Using B RCDT Pump (Continued)

[11] **IF** returning from Appendix C, **THEN**

PERFORM the following:

[a] **PLACE** **[1-HS-77-6A]** RCDT pump B in **PULL-P-AUTO** position. ______

[b] **OPEN** **[1-FCV-68-310]**. ______

[c] **ENSURE** "B" RCDT pump STARTS. ______

[12] **WHEN** PRT reaches desired level, **THEN** **STOP** 'B' RCDT pump using **[1-HS-77-6A]**. ______

[13] **CLOSE** **[1-FCV-68-310]**. ______ 1st ______ IV

[14] **PLACE** **[1-HS-77-6A]** RCDT pump 'B' in **PULL-P-AUTO** position at 0-L-2 panel. ______ 1st ______ IV

[15] **CLOSE** **[1-FCV-68-305]** Nitrogen Supply to PRT. ______ 1st ______ IV

END OF TEXT

Date__________

NOTE May need an extra copy of this Instruction.

8.4 Reducing the Temperature of the PRT

[1] **ENSURE [1-FCV-81-12] OPEN.** __________

[2] **OPEN [1-FCV-68-303]** by placing **[1-HS-68-303A]** to **OPEN** position. __________

[3] **IF** PRT level increases to ≥ 88% or PRT temperature decreases ≤ 120°F, **THEN**

CLOSE [1-FCV-68-303] . ________ ________
1st IV

[4] **IF** PRT level is ≥ 88%, **THEN**

GO TO section 8.2 or 8.3 of this Instruction, **AND**

RETURN to step **[1]** of this section if further temperature reduction is needed. __________

END OF TEXT

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Sim D-1 (RO/SRO)

Respond to Loss of Flow to RCP Oil Cooler

RO/SRO
JOB PERFORMANCE MEASURE

Task: Respond to Loss of Flow to RCP Oil Cooler per AOP-R.04

Task #: (**RO**) 0000820501

Task Standard: Identify Loop 2 RCP oil cooling degradation requiring pump shutdown and supporting plant manipulations.

Time Critical Task: **YES:** ______ **NO:** X

K/A Reference/Ratings: 003 A1.02 (2.9/2.9) 003 A4.06 (2.9/2.9)
003 A2.02 (3.7/3.9)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / **Signature** DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **10 mins** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize in IC # 16; 100% power
4. Insert Malf "**set yp_rc12b=-1**" (expert command)
5. Ensure Applicant performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

AOP-R.04

References:

	Reference	Title	Rev No.
1.	0-AR-M27-B-A	Annunciator Response 0-AR-M27-B-A	11
2.	AOP-R.04	Reactor Coolant Pump Malfunctions	24

==

DIRECTIONS TO TRAINEE on next page

1. Time Critical Task **YES:** ________ **NO:** __**X**__

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is operating at 100% reactor power, equipment is normal.

INITIATING CUES:

1. You are the OATC and are to monitor the control board and respond per licensed duties to operating conditions as a reader/doer.
2. Your US and the CRO are currently outside the MCR.
3. You will be required to respond to any abnormalities.
4. When any required actions/procedures have been completed notify the SM.

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
STEP 1.: Respond to indications of loss of cooling water flow to RCP # 2 oil cooler per 0-AR-M27-B-A window D-3 STANDARD: Operator responds to annunciator panel 0- XA-55-4B; identifies window D-3 illuminated and enters alarm response procedure (ARP) 0-AR-M27-B-A, D-3 COMMENTS:	______ SAT ______ UNSAT Start Time____
Evaluator Note: ARP 0-AR-M27-B-A, D-3 follows starting at Corrective Actions Step 1	
STEP 2.: **[1] CHECK** RCP No. 2 upper and lower oil cooler outlet flow by observing 1-FI-70-106 and 1-FI-70-108 on 0-M27-B. STANDARD: Operator observes oil cooler flow instruments 1-FI-70-108 (lower) and 1-FI-70-106 (upper) for RCP # 2 on panel 0-M27-B and determines loss of CCS flow to the upper oil cooler as the cause of the alarm. COMMENTS:	______ SAT ______ UNSAT
STEP 3.: **[2] MONITOR** RCP temperatures and CCS flow through upper and lower oil coolers. STANDARD: Operator monitors RCP # 2 operating parameters utilizing ICS screen “RCP DATA” and/or individual ICS points and concludes upper radial bearing temperature is increasing. COMMENTS:	______ SAT ______ UNSAT
STEP 4.: **[3] IF** upper or lower motor bearing temperature approaches 200°F, **THEN GO TO** AOP-R.04, *Reactor Coolant Pump Malfunctions.* STANDARD: Operator determines that temperature is approaching the upper limit for the upper radial bearing and implements AOP-R.04. COMMENTS:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
Evaluator Note: Operator transitions from the ARP to AOP-R.04, Reactor Coolant Pump Malfunctions and reviews Section 2.0 Operator Actions **CAUTIONS** and **NOTE** prior to step 1	
CAUTION 1: RCP should NOT be tripped when reactor power is greater than 5% (FR-S.1) or when RCP operation is required by FR-C.1 (Inadequate Core Cooling) or FR-C.2 (Degraded Core Cooling).	
CAUTION 2: Exceeding any of the following limits requires tripping the affected RCP, except as described in Caution 1: • RCP # 1 Seal ΔP less than 220 psid • RCP # 1 Seal Temperature greater than 225°F • RCP Lower Bearing Temperature greater than 225°F • RCP Upper Motor Bearing Temperature greater than 200°F • RCP Lower Motor Bearing Temperature greater than 200°F • RCP Motor Amps greater than 608 amps • RCP Vibration greater than 20 mils on any axis (x and/or y) • RCP Upper Motor Bearing Temperature greater than 200°F	______ SAT ______ UNSAT
NOTE: RCP trip criteria is also located in Appendix B.	

STEP 5.: 1. **DIAGNOSE** the failure:

______ SAT

______ UNSAT

STANDARD: Operator concludes trip criteria exists when motor bearing temperature exceeds 200°F;

Operator selects Section 2.1, ANY RCP tripped or RCP Shutdown Required

IF...	GO TO SECTION	PAGE
ANY RCP tripped or RCP shutdown required	2.1	4
NOTE — During plant startup following seal maintenance, the seal package should seat and operate normally following 24 hours of run time.		
#1 Seal Leakoff high flow (high flow Alarm) on ANY RCP	2.2	7
#1 Seal Leakoff low flow (low flow Alarm) on ANY RCP	2.3	13
#2 Seal Leakoff high flow (high RCP standpipe level) on ANY RCP	2.4	18
#3 Seal Leakoff high flow (low RCP standpipe level) on ANY RCP	2.5	21
Motor Stator Temperature High on ANY RCP	2.6	24

COMMENTS:

CAUTION: A rapid drop in level and steam flow on the affected loop S/G may occur when RCP is stopped.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 6.: 2.1.1. **CHECK** unit in Mode 1 or 2. STANDARD: Operator determines MODE 1 conditions **AND** Determines reactor should be tripped before stopping the RCP. COMMENTS:	_____ SAT _____ UNSAT
CAUTION: If #1 seal leak-off flow is HIGH on any RCP, Step 3 requires closing seal return valve within 5 minutes after stopping affected RCP(s). Step 3 should be continued after E-0 immediate actions.	
STEP 7.: 2.1.2. **PERFORM** the following: a. **TRIP** the reactor. STANDARD: Operator performs reactor trip by operating reactor trip handswitch 1-RT-1 (M-4) or 1-RT-2 (M-6.) COMMENTS:	_____ SAT _____ UNSAT **Critical Step** **(shaded portion)**
STEP 8.: b. **WHEN** reactor is tripped, **THEN STOP** affected RCP(s). Time: ____________ STANDARD: Operator observes reactor trip breakers open, reactor trip indications THEN stops RCP # 2, and records the current time. COMMENTS:	_____ SAT _____ UNSAT **Critical Step**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 9.: c. **GO TO** E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure. ***CUE:*** When step 2 action is initiated, ***CUE*** operator that another operator will perform E-0 while he continues in AOP-R.04. STANDARD: Operator ensures that someone is performing remaining E-0 immediate actions. COMMENTS:	_____ SAT _____ UNSAT
CAUTION: If RCP seal leakoff is HIGH, seal return valve must be closed within 5 minutes after stopping the affected RCP(s).	
STEP 10.: 3. **MONITOR** #1 seal leakoff on affected RCP: 1. Check for any of the following: • RCP Seal Leak-off greater than 8 gpm OR • RCP Seal Leak-off greater than 6 gpm and Lower bearing or seal temperature rising uncontrolled. STANDARD: Operator determines that seal leakoff is not outside of normal values and continues to step 4. COMMENTS:	_____ SAT _____ UNSAT
STEP 11.: 4. **PULL TO DEFEAT** affected loop ΔT and T-avg: • XS-68-2D (ΔT) • XS-68-2M (T-avg) STANDARD: Operator uses Panel 1-M-5 selector switches 1-XS-68-2D and 1-XS-68-2M, Operator removes the idle loop's temperature inputs from control by pulling to defeat XS-68-2D and XS-68-2M Critical to remove the affected loop temperature inputs from delta T and Tavg circuits because temperatures are not valid. COMMENTS:	_____ SAT _____ UNSAT **Critical Step** **(shaded portion)**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 12.: 5. **CHECK** RCPs 1 and 2 RUNNING STANDARD: Operator identifies #2 RCP as effected pump **AND** Proceeds to **RNO** column COMMENTS:	______ SAT ______ UNSAT
STEP 13.: Step 5 RNO: **CLOSE** affected loop's pressurizer spray valve. STANDARD: Operator closes #2 RCP Pressurizer Spray Valve by placing controller 1-PIC-68-340B to MANUAL and CLOSE **AND** Observes valve demand indicates full close condition of the valve **AND** Verifies RED light out on indicator 1-XI-68-340B Critical to close spray valve on affected loop to prevent inadvertent operation of valve. COMMENTS:	______ SAT ______ UNSAT **Critical Step** **(shaded portion)**
STEP 14.: 6. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix 7. **EVALUATE** the following Tech Specs for applicability: ***Cue:* This completes the JPM.** STANDARD: Operator notifies the Shift Manager that the actions of AOP-R.04 are complete; SM/STA evaluate EPIP-1 and Tech Specs the actions of AOP-R.04 are complete.	______ SAT ______ UNSAT Stop Time____

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Unit 1 is operating at 100% reactor power, equipment is normal.

INITIATING CUES:

1. You are the OATC and are to monitor the control board and respond per licensed duties to operating conditions as a reader/doer.
2. Your US and the CRO are currently outside the MCR.
3. You will be required to respond to any abnormalities.
4. When any required actions/procedures have been completed notify the SM.

RC PUMP 2 OIL COOLERS OUTLET FLOW LOW

Source	**Setpoint**
SER 1137 (Unit 1 annunciator system) 1-FS-70-106 (upper)	100 gpm decreasing
SER 1138 (Unit 1 annunciator system) 1-FS-70-108 (lower)	4 gpm decreasing

Retransmitted to U-2
SER 2132 & 2133 (Unit 2 annunciator system)

Probable Causes

1. Loss of component cooling water to the reactor coolant pump.
2. Low component cooling water pressure.
3. Valve misalignment.
4. Phase B Containment isolation.

Corrective Actions

[1] **CHECK** RCP No. 2 upper and lower oil cooler outlet flow by observing **[1-FI-70-106]** and **[1-FI-70-108]** on 0-M-27B.

[2] **MONITOR** RCP temperatures and CCS flow through upper and lower oil coolers.

[3] **IF** upper or lower motor bearing temperature approaches 200°F, **THEN**

GO TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[4] **VERIFY** proper valve alignment in accordance with 1-SO-70-1, *Component Cooling Water System Train A.*

[5] **REFER** to AOP-M.03, *Loss of Component Cooling Water.*

References

45B655-27BA-0, 47B601-70-28, 47W610-70-3, 47W611-70-3, 47W859-2

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-R.04

REACTOR COOLANT PUMP MALFUNCTIONS

Revision **24**

QUALITY RELATED

PREPARED/PROOFREAD BY: CECIL DYER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: D. A. PORTER

EFFECTIVE DATE: 3/5/2009

REVISION DESCRIPTION: Changed wording of section titles to avoid confusion. (PCR# 07000278) Changed appendix A to allow use of computer point to determine #2 seal leakage. (PCR# 07000229) Changed section 2.3 step 8 to a continuous action step to monitor RCDT to determine seal leakage. (PCR# 08000914) Added FR-S.1, to the notes/cautions pertaining to leaving RCPs running during events requiring RCP operation. (PCR# 08000836) Updated procedural guidance to conform to most recent Westinghouse recommendations on RCP shutdown with No.1 seal leakage outside the operating limits. Clarified guidance pertaining to stopping RCPs after reactor trip (PER 148792)

1.0 PURPOSE

This procedure provides the actions necessary to mitigate the effects of a Reactor Coolant Pump (RCP) trip below P-8 (35% power), excessive RCP seal leakage, and various RCP malfunctions.

If RCP seal injection flow is lost, AOP-M.09 (Loss of Charging) takes precedence over this AOP.

2.0 OPERATOR ACTIONS

CAUTION 1 **RCP should NOT be tripped when reactor power is greater than 5% (FR-S.1) or when RCP operation is required by FR-C.1 (Inadequate Core Cooling) or FR-C.2 (Degraded Core Cooling).**

CAUTION 2 **Exceeding any of the following limits requires tripping the affected RCP, except as described in Caution 1:**

- **RCP #1 Seal ΔP less than 220 psid**
- **RCP #1 Seal Temperature greater than 225°F**
- **RCP Lower Bearing Temperature greater than 225°F**
- **RCP Upper Motor Bearing Temperature greater than 200°F**
- **RCP Lower Motor Bearing Temperature greater than 200°F**
- **RCP Motor Voltage less than 5940V or greater than 7260V**
- **RCP Motor Amps greater than 608 amps**
- **RCP Vibration greater than 20 mils on any axis (x and/or y) [C.3]**

NOTE: RCP trip criteria is also located in Appendix B.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
ANY RCP tripped or RCP shutdown required	2.1	4
NOTE During plant startup following seal maintenance, the seal package should seat and operate normally following 24 hours of run time.		
#1 Seal Leakoff high flow (high flow Alarm) on ANY RCP	2.2	7
#1 Seal Leakoff low flow (low flow Alarm) on ANY RCP	2.3	13
#2 Seal Leakoff high flow (high RCP standpipe level) on ANY RCP	2.4	18
#3 Seal Leakoff high flow (low RCP standpipe level) on ANY RCP	2.5	21
Motor Stator Temperature High on ANY RCP	2.6	24

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ANY RCP Tripped or RCP Shutdown Required

CAUTION: A rapid drop in level and steam flow on the affected loop S/G may occur when RCP is stopped.

1.	**CHECK** unit in Mode 1 or 2.	**STOP** affected RCP(s). Time: ____________ **GO TO** Caution prior to Step 3.

CAUTION: If #1 seal leakoff flow is HIGH on any RCP, Step 3 requires closing seal return valve <u>within 5 minutes</u> after stopping affected RCP(s). Step 3 should be continued after E-0 immediate actions. [C.2]

2. **PERFORM** the following:

   a. **TRIP** the reactor.

   b. **WHEN** reactor is tripped,
   THEN
   STOP affected RCP(s).

   Time: ____________

   c. **GO TO** E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure.

2.1 ANY RCP Tripped or RCP Shutdown Required (cont'd)

CAUTION: If RCP seal leakoff is HIGH, seal return valve must be closed <u>within 5 minutes</u> after stopping the affected RCP(s). [C.2]

3. **MONITOR** #1 seal leakoff on affected RCP:

   a. **CHECK** for any of the following:

   - RCP Seal Leakoff greater than 8 gpm

     OR

   - RCP Seal leakoff greater than 6 gpm AND Lower bearing or seal temperature rising uncontrolled.

   RNO: a. **GO TO** Step 4.

   b. **WHEN** between 3 and 5 minutes have elapsed since RCP stop,
   THEN
   CLOSE affected RCP seal return FCV:

   - FCV-62-9 [RCP 1]
   - FCV-62-22 [RCP 2]
   - FCV-62-35 [RCP 3]
   - FCV-62-48 [RCP 4]

4. **PULL TO DEFEAT** affected loop ΔT and T-avg:

   - XS-68-2D (ΔT)
   - XS-68-2M (T-avg)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.1	**ANY RCP Tripped or RCP Shutdown Required (cont'd)**	
5.	**CHECK** RCPs 1 and 2 RUNNING.	**CLOSE** affected loop's pressurizer spray valve.
6.	**EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.	
7.	**EVALUATE** the following Tech Specs for applicability: • 3.2.5, DNB Parameters • 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation • 3.4.1.2, Reactor Coolant System - Hot Standby • 3.4.1.3, Reactor Coolant System - Shutdown • 3.4.6.2, RCS Operational Leakage	
8.	**GO TO** appropriate plant procedure.	

END OF SECTION

SEQUOYAH NUCLEAR PLANT

September 2010 NRC Exam

SIM E (RO\SRO)

Respond to High Containment Pressure, Place RHR Spray in Service

RO/SRO
JOB PERFORMANCE MEASURE

Task: Respond to High Containment Pressure, Place RHR Spray in Service

Task #: 3110160601 **(RO)**

Task Standard: Attempt to establish one train of RHR spray in service per FR-Z.1.

Time Critical Task: **YES:** ____ **NO:** X

K/A Reference/Ratings: W/E14 EA1.1 (3.7/3.7) 026000 GA13 (3.6 - 3.6) 026000 GA9 (3.6 - 3.6)
022000 A3.01 (4.1 - 4.4) 022000 A4.04 (3.1 -3.20)

Method of Testing:

Simulated Performance: ________ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ________ **Classroom** ________

Main Control Room ________ **Mock-up** ________

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ________
Name / Signature DATE

Performance Rating: **SAT:** ________ **UNSAT:** ________

Validation Time: 8 minutes **Total Time:** ________

Performance Time: **Start Time:** ________ **Finish Time:** ________

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical Steps are identified in step SAT/UNSAT column by bold print "Critical Step."
2. Any UNSAT requires comments
3. Initialize simulator in **IC#62**. If IC#62 is not available the reset to **IC #24** and complete substeps below.
   a. Activate MF # **TH01A at 35%**.
   b. Activate MFs # **CH01 A thru D at 70%** (~10.2 psid)
   c. Complete the actions of ES-1.3, Sump Swapover. Stop RCPs.
   d. Activate Override **ZDIHS6393A OPEN**, to prevent FCV-63-93 from closing.
   e. Activate Override **ZDIHS7241A CLOSE**, to prevent FCV-72-41 from opening.
   f. Activate **ZAOPDI30133 f:5**
   g. Activate **ZAOPDIR30133 f:0.5**
4. Activate the following, as necessary, to prevent nuisance alarms:
   1. **AN:OVRN[96]** to ON, prevents Turbine Zero Speed alarm
   2. **AN:OVRN[304]** to ON, prevents Saturation Monitor alarm
5. Insert Remote Function **RHR14 ON**, places power on FCV-63-1.
6. FREEZE the simulator until the operator is ready to commence task.
7. Console operator will need to acknowledge alarms not associated with JPM.
8. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

FR-Z.1, step 14

References:

	Reference	Title	Rev No.
1.	FR-Z.1	High Containment Pressure	19

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READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 has experienced a reactor trip and Safety Injection in conjunction with a large break LOCA.
2. The crew has been monitoring step 13 of FR-Z.1 since FR-Z.1 was implemented.
3. 1 hour has elapsed since the accident.

INITIATING CUES:

1. You are the Unit 1 OATC and the SRO directs you to initiate one train of RHR spray per FR-Z.1 starting at step 13.
2. Inform the SRO when a train of RHR spray has been established.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
Evaluator Note: FR-Z.1, High Containment Pressure, step 13 contains the steps for this JPM.	
STEP 1.: Obtain copy of appropriate procedure. ***Cue:*** ***After operator locates FR-Z.1 procedure, provide a copy of FR-Z.1 marked up as appropriate.*** STANDARD: Operator obtains a copy of FR-Z.1 (begin at Step 13). COMMENTS:	___ SAT ___ UNSAT ______ Start Time
STEP 2.: [FR-Z.1, Step 13] MONITOR if RHR Spray should be placed in service: a. CHECK the following: • Containment press greater than 9.5 psid. STANDARD: Operator checks 1-PDI-30-45 and 44 and determines that pressure is greater than 9.5. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: [FR-Z.1, Step 13] MONITOR if RHR Spray should be placed in service: a. CHECK the following: • at least 1 hour has elapsed since beginning of accident. ***Cue:*** ***IF asked, 1 hour has elapsed since beginning of accident.*** STANDARD: Operator determines from initiating cues (or asks US) that 1 hour has elapsed. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 4.: [FR-Z.1, Step 13] MONITOR if RHR Spray should be placed in service: a. CHECK the following: • RHR suction ALIGNED to containment sump. ***Cue:*** ***IF asked, ES-1.3 has been completed.*** STANDARD: Operator checks FCV-63-72 and 73 OPEN and FCV-74-3 and 21 CLOSED, or asks US if ES-1.3, "Transfer to RHR Containment Sump," has been completed. COMMENTS:	___ SAT ___ UNSAT
STEP 5.: [FR-Z.1, Step 13] MONITOR if RHR Spray should be placed in service: a. CHECK the following: • At least one CCP AND one SI pump running. STANDARD: Operator verifies at least one CCP is running as indicated by Red light on HS-62-104A or 108A LIT. AND Verifies at least one SI pump is running as indicated by Red lights on HS-63-10A or 15A LIT. COMMENTS:	___ SAT ___ UNSAT
STEP 6.: 13.b CHECK both RHR pumps RUNNING. STANDARD: Operator checks that both RHR pumps are running as indicated by red lights on HS-74-10A and 20A "LIT". COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 7.: [13.c] ESTABLISH Train B RHR spray: [13.c.1] CHECK Train B RHR pump RUNNING. STANDARD: Operator checks that 1B-B RHR pump is running as indicated by red light on HS-74-20A "LIT". COMMENTS:	___ SAT ___ UNSAT
STEP 8.: [13.c] ESTABLISH Train B RHR spray: [13.c.2] ENSURE RHR crosstie FCV-74-35 CLOSED. STANDARD: Operator verifies FCV-74-35 in the CLOSED position as indicated by HS green light ON and red light OFF. COMMENTS:	___ SAT ___ UNSAT
STEP 9.: [13.c] ESTABLISH Train B RHR spray: [13.c.3] CLOSE RHR Injection FCV-63-94. STANDARD: Operator places handswitch for RHR injection FCV-63-94 in the CLOSED position and verifies the green light ON. This step is critical to ensure the 1B-B RHR discharge is isolated from the cold leg injection flowpath. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
Evaluator NOTE: The next step starts the alternate path.	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 10.: [13.c.4] OPEN RHR Spray FCV-72-41. **NOTE: FCV-72-41 will NOT open the operator must go to the RNO.** STANDARD: Operator places handswitch for RHR injection FCV-72-41 in the OPEN position and recognizes that the green light stays ON and the red light is OFF, goes to RNO column. This step is critical for the operator to recognize that the 1B-B RHR spray valve will not open and to proceed to attempt placing the 1A-A RHR spray in service. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
Evaluator NOTE: The following steps are from FR-Z.1, step 13.c RNO	
STEP 11.: **[13.c RNO a]** ENSURE RHR Spray FCV-72-41 CLOSED. STANDARD: Operator verifies FCV-72-41 is still closed as indicated by green light ON and red light OFF. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 12.: [13.c RNO b] IF RHR aligned for cold leg recirculation THEN ENSURE FCV-63-94 OPEN. STANDARD: Operator places handswitch for RHR injection FCV-63-94 in the OPEN position and verifies red light ON. This step is critical to realign the 1B-B RHR pump back into the CL injection mode as it cannot be used for RHR spray at this time. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 13.: [13.c RNO c.1] ESTABLISH Train A RHR spray: ENSURE RHR crosstie FCV-74-33 CLOSED. STANDARD: Operator verifies RHR crosstie FCV-74-33 in the CLOSED position as indicated by green light ON handswitch. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 14.: [13.c RNO c.2] CLOSE RHR Injection FCV-63-93. **NOTE: FCV-63-93 will NOT close.** STANDARD: Operator places handswitch for RHR injection FCV-63-93 in the CLOSED position and recognizes that the red light stays ON and the green light is OFF, continues in the RNO column. This step is critical because the operator must determine that Train A RHR spray can NOT be placed in service and continue with step 14.c RNO to realign Train A RHR to cold leg injection. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 15.: [13.c RNO c] IF Train A RHR CANNOT be established THEN [a] CLOSE RHR spray FCV-72-40. STANDARD: [a] Operator verifies FCV-72-40 is still closed as indicated by green light ON and red light OFF. COMMENTS:	___ SAT ___ UNSAT
STEP 16.: [b] IF RHR aligned for cold leg recirculation, THEN ENSURE FCV-63-93 OPEN. STANDARD: Operator verifies FCV-63-93 is still OPEN as indicated by red light ON and green light OFF. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
Evaluator NOTE: If examinee informs the US of RHR status at this point, stop procedure performance at this step. If so, N/A JPM steps 18, 19 and 20.	
STEP 17.: Communicates with US and informs him RHR spray status. STANDARD: Operator informs US that neither Train B RHR spray nor Train A RHR spray could be placed in service in accordance with FR-Z.1 due to FCV-72-41 failed to open and FCV-63-93 failed to close. COMMENTS: ***CUE: This completes the JPM***	___ SAT ___ UNSAT _______ Stop Time
STEP 18.: [14] MONITOR if containment spray should be stopped: [14.a] **CHECK** any containment spray pump RUNNING. STANDARD: Operator verifies 1B Cntmt Spray pump running, Red light on HS-74-20A "LIT" COMMENTS:	___ SAT ___ UNSAT
STEP 19.: [14.b] Check containment pressure less than 2.0 psig. STANDARD: Operator addresses CNMT pressure greater than 2 psig and goes to RNO and step [15], Return to procedure and step in effect. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 20.: Communicates with SRO and informs him/her of status of RHR spray. STANDARD: Operator informs US that neither Train B RHR spray nor Train A RHR spray could be placed in service in accordance with FR-Z.1 due to FCV-72-41 failed to open and FCV-63-93 failed to close. COMMENTS: ***CUE: This completes the JPM***	___ SAT ___ UNSAT ______ Stop Time

END OF JPM

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 has experienced a reactor trip and Safety Injection in conjunction with a large break LOCA.
2. The crew has been monitoring step 13 of FR-Z.1 since FR-Z.1 was implemented.
3. 1 hour has elapsed since the accident.

INITIATING CUES:

1. You are the Unit 1 OATC and the SRO directs you to initiate one train of RHR spray per FR-Z.1 starting at step 13.
2. Inform the SRO when a train of RHR spray has been established.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

FUNCTION RESTORATION PROCEDURE

FR-Z.1

HIGH CONTAINMENT PRESSURE

Revision **19**

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. Leary

EFFECTIVE DATE: 12/16/09

REVISION DESCRIPTION: Revised to delete hydrogen mitigation step. This step is no longer needed in this procedure as a result of PER 137597. Revised setpoint S.04 from 25 gpm to 50 gpm (PER 155417). Simplified Step 5.a based upon training feedback.

This procedure contains a Handout Page (2 copies).

HANDOUT

Page 1 of 1

STEP	ACTION
1.	**MONITOR** RWST level greater than 27%.
4.d RNO	(if any S/G is faulted and air return fans are NOT running) **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
6.	**MONITOR** containment air return fans: • **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
11. RNO.	**IF** all S/Gs Faulted, **THEN CONTROL** feed flow at greater than or equal to 50 gpm to each S/G.
13.	**MONITOR** if RHR spray should be placed in service: • Containment pressure greater than 9.5 psig • **AND** at least 1 hour has elapsed since beginning of accident • **AND** RHR suction ALIGNED to containment sump • **AND** at least one CCP **AND** one SI pump RUNNING.
13.d. RNO	(if RHR spray in service) **WHEN** Containment pressure is less than 4 psig, **THEN REMOVE** RHR spray from service.
14.	**MONITOR** if containment spray should be stopped: (containment pressure less than 2.0 psig)
14.c RNO	(if containment spray suction aligned to sump) **WHEN** directed by TSC, **THEN STOP** containment spray.

HANDOUT

Page 1 of 1

STEP	ACTION
1.	**MONITOR** RWST level greater than 27%.
4.d RNO	(if any S/G is faulted and air return fans are NOT running) **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
6.	**MONITOR** containment air return fans: • **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running.
11. RNO.	**IF** all S/Gs Faulted, **THEN CONTROL** feed flow at greater than or equal to 50 gpm to each S/G.
13.	**MONITOR** if RHR spray should be placed in service: • Containment pressure greater than 9.5 psig • **AND** at least 1 hour has elapsed since beginning of accident • **AND** RHR suction ALIGNED to containment sump • **AND** at least one CCP **AND** one SI pump RUNNING.
13.d. RNO	(if RHR spray in service) **WHEN** Containment pressure is less than 4 psig, **THEN REMOVE** RHR spray from service.
14.	**MONITOR** if containment spray should be stopped: (containment pressure less than 2.0 psig)
14.c RNO	(if containment spray suction aligned to sump) **WHEN** directed by TSC, **THEN STOP** containment spray.

1.0 PURPOSE

This procedure provides actions to respond to a high containment pressure.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 ENTRY CONDITIONS

FR-0 Status Trees:

- F-0.5, Containment RED condition:

  Containment pressure greater than or equal to 12.0 psig.

- F-0.5, Containment ORANGE condition:

  Containment pressure less than 12.0 psig

  AND

  Containment pressure greater than or equal to 2.8 psig.

3.0 OPERATOR ACTIONS

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
NOTE	If this procedure has been entered for an orange path and performance of ECA-1.1 (Loss of RHR Sump Recirculation) is required, FR-Z.1 may be performed concurrently with ECA-1.1.	
1.	**MONITOR** RWST level greater than 27%.	**IF** ES-1.3 has NOT been entered, **THEN** **GO TO** ES-1.3, Transfer to RHR Containment Sump.
2.	**VERIFY** Phase B valves CLOSED: • Panel 6K PHASE B GREEN • Panel 6L PHASE B GREEN.	**IF** 1-FCV-32-110 (2-FCV-32-111) is NOT closed, **THEN** **PERFORM** EA-32-3, Isolating Non-Essential Air to Containment. **IF** other valves NOT closed **AND** flow path is NOT necessary, **THEN** **CLOSE** valves.
3.	**ENSURE** RCPs STOPPED.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4.	**DETERMINE** if this procedure should be exited:	
	a. **CHECK** for faulted S/G: • Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig.	a. **GO TO** Step 5.
	b. **CHECK** containment pressure less than 12 psig.	b. **GO TO** Step 5.
	c. **CHECK** at least one containment spray pump RUNNING and delivering flow.	c. **IF** containment pressure is greater than 2.8 psig, **THEN** **GO TO** Step 5.
	d. **CHECK** at least one containment air return fan RUNNING.	d. **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN** **ENSURE** air return fans RUNNING.
	e. **RETURN** to procedure and step in effect.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	**VERIFY** containment spray operation:	
	a. **IF** ECA-1.1, Loss of RHR Sump Recirculation, is IN EFFECT, **THEN** **PERFORM** the following: 1) **OPERATE** containment spray as directed by ECA-1.1. 2) **GO TO** Step 6.	
	b. **VERIFY** containment spray pumps RUNNING.	b. **IF** containment pressure is greater than 2.8 psig, **THEN** **START** containment spray pumps.
	c. **CHECK** RWST level greater than 27%.	c. **IF** any of following conditions met: • RWST level less than or equal to 8% **OR** • containment sump level greater than 56%, **THEN** **PERFORM** the following: 1) **ENSURE** cntmt spray pump suction aligned for sump recirc **USING** ES-1.3, Transfer to RHR Containment Sump, Step 21. 2) **GO TO** Substep 5.e.

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	d. **VERIFY** containment spray suction ALIGNED to RWST: • FCV-72-22 OPEN • FCV-72-21 OPEN.	d. **ALIGN** valves as necessary.
	e. **VERIFY** containment spray discharge valves OPEN: • FCV-72-39 • FCV-72-2.	e. **OPEN** valves for running containment spray pumps.
	f. **VERIFY** containment spray recirc valves CLOSED: • FCV-72-34 • FCV-72-13.	f. **CLOSE** valves as necessary.
	g. **VERIFY** containment spray flow greater than 4750 gpm on each train.	g. **IF** NO train of containment spray is available, **THEN** **PERFORM** the following: 1) **CONTINUE** efforts to restore at least one train of containment spray. 2) **NOTIFY** TSC to evaluate restoring normal containment cooling **USING** EA-30-4, Restoring Containment Coolers.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	**MONITOR** containment air return fans: • **WHEN** at least 10 minutes have elapsed from Phase B, **THEN** **ENSURE** containment air return fans RUNNING.	
7.	**VERIFY** containment ventilation dampers CLOSED: • Panel 6K CNTMT VENT GREEN • Panel 6L CNTMT VENT GREEN.	**CLOSE** dampers.
8.	**VERIFY** Phase A valves CLOSED: • Panel 6K PHASE A GREEN • Panel 6L PHASE A GREEN.	**IF** flow path NOT necessary, **THEN** **CLOSE** valves.
9.	**VERIFY** cntmnt vacuum relief isolation valves CLOSED: [Pnl 6K MANUAL] • FCV-30-46 • FCV-30-47 • FCV-30-48.	**IF** containment pressure is greater than 1.5 psig, **THEN** **CLOSE** valves. [M-9]
10.	**VERIFY** MSIVs and MSIV bypass valves CLOSED.	**CLOSE** valves. **IF** any MSIV CANNOT be closed, **THEN** **CLOSE** MSIV locally **USING** EA-1-1, Closing MSIVs Locally.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
11.	**DETERMINE** if any S/G Intact: a. **CHECK** at least one S/G pressure: • CONTROLLED or RISING **AND** • Greater than 140 psig.	**IF** all S/Gs Faulted, **THEN** **PERFORM** the following: 1) **CONTROL** feed flow at greater than or equal to 50 gpm to each S/G. 2) **OPEN** MD AFW pump recirc valves FCV-3-400 and -401 as necessary. 3) **GO TO** Step 13.

CAUTION **Isolating all S/Gs will result in a loss of secondary heat sink.**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
12.	**DETERMINE** if any S/G Faulted: a. **CHECK** S/G pressures: • Any S/G pressure DROPPING in an uncontrolled manner **OR** • Any S/G pressure less than 140 psig.	a. **GO TO** Step 13.
	b. **ISOLATE** feed flow to affected S/G: • MFW • AFW	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	**MONITOR** if RHR spray should be placed in service:	
	a. **CHECK** the following: • Containment pressure greater than 9.5 psig **AND** • At least 1 hour has elapsed since beginning of accident **AND** • RHR suction ALIGNED to containment sump **AND** • At least one CCP **AND** one SI pump RUNNING.	a. **GO TO** Step 14.
	b. **CHECK** both RHR pumps RUNNING.	b. **IF** only one RHR pump running, **THEN** **PERFORM** the following: 1) **ENSURE** only one CCP RUNNING (same train as running RHR pump preferred). 2) **PLACE** non-operating CCP in PULL TO LOCK. 3) **ENSURE** only one SI pump RUNNING (same train as running RHR pump preferred). 4) **PLACE** non-operating SI pump in PULL TO LOCK.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. c. **ESTABLISH** Train B RHR spray:

    1) **CHECK** Train B RHR pump RUNNING.

    2) **ENSURE** RHR crosstie FCV-74-35 CLOSED.

    3) **CLOSE** RHR injection FCV-63-94.

    4) **OPEN** RHR spray FCV-72-41.

c. **IF** Train B RHR spray CANNOT be established,
THEN
PERFORM the following:

a) **ENSURE** RHR spray FCV-72-41 CLOSED.

b) **IF** RHR aligned for cold leg recirculation,
THEN
ENSURE FCV-63-94 OPEN.

c) **ESTABLISH** Train A RHR spray:

(1) **ENSURE** RHR crosstie FCV-74-33 CLOSED.

(2) **CLOSE** RHR injection FCV-63-93.

(3) **OPEN** RHR spray FCV-72-40.

IF Train A RHR spray CANNOT be established,
THEN
PERFORM the following:

a) **CLOSE** RHR spray FCV-72-40.

b) **IF** RHR aligned for cold leg recirculation,
THEN
ENSURE FCV-63-93 OPEN.

(Step continued on next page.)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
13.	d. **MONITOR** containment pressure greater than 4 psig.	d. **WHEN** containment pressure is less than 4 psig, **THEN** **PERFORM** the following: 1) **ENSURE** FCV-72-40 and FCV-72-41 CLOSED. 2) **IF** RHR aligned for cold leg recirculation, **THEN** **ENSURE** FCV-63-93 and FCV-63-94 OPEN. 3) **IF** ECCS is aligned for hot leg recirculation, **THEN** **ENSURE** RHR crosstie valves FCV-74-33 and FCV-74-35 aligned as required by ES-1.4.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
14.	**MONITOR** if containment spray should be stopped:	
	a. **CHECK** any containment spray pump RUNNING.	a. **GO TO** Step 15.
	b. **CHECK** containment pressure less than 2.0 psig.	b. **GO TO** Step 15.
	c. **CHECK** containment spray suction aligned to RWST.	c. **NOTIFY** TSC to determine when one or both trains of cntmt spray should be stopped. **WHEN** directed by TSC, **THEN** **PERFORM** Substeps 14.d through 14.f. **GO TO** Step 15.
	d. **RESET** Containment Spray.	
	e. **STOP** containment spray pumps and **PLACE** in A-AUTO.	
	f. **CLOSE** containment spray discharge valves: • FCV-72-39, Train A • FCV-72-2, Train B.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
15.	**RETURN TO** procedure and step in effect.	

END

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

SIM F (RO\SRO)

CALIBRATE POWER RANGE NUCLEAR INSTRUMENTATION

RO/SRO
JOB PERFORMANCE MEASURE

Task: Calibrate the Power Range Nuclear Instrumentation

Task #: 0150050201 (**RO**)

Task Standard:
1) Each channel of Power Range instrumentation (on its power range "A" drawer) will indicate within acceptance criteria tolerances of the calorimetric.
2) The unit is not tripped by a power range neutron flux rate trip.

Time Critical Task: **YES:** ____ **NO:** **X**

K/A Reference/Ratings:

015000 A4.02	(3.9 - 3.9)	015020 G13	(3.3 - 3.6)
015020 G9	(3.4 - 3.3)	015000 A1.01	(3.5 - 3.8)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** **X**

Evaluation Method:

Simulator **X** **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________________ / ______________________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **21 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

SIMULATOR OPERATOR INSTRUCTIONS:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize the simulator in IC 116. **[Rx Power should be ~ 100 %]**
4. If IC 116 is not available, initialize in IC 16 and perform the following setup
   - **MANUALLY ADJUST N-41 and N-43 power to between 100.5 and 101.0%.**
   - **ENSURE all other NIS reactor power indications are between 99.5 and 100.5%.**
5. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

0-SI-OPS-092-078.0, PR Neutron Flux Ch Cal. By Heat Balance Comparison, Sections 3.0, 6.1, 6.2, Appendix D

References:

	Reference	Title	Rev No.
1.	0-SI-OPS-092-078.0	Power Range Neutron Flux Channel Calibration By Heat Balance Comparison	21

==

DIRECTIONS TO TRAINEE on next page

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is at steady state conditions with all NIS channels and LEFM operable.

INITIATING CUES:

1. The US has directed you to perform 0-SI-OPS-092-078.0, Power Range Neutron Flux Channel Calibration By Heat Balance Comparison
2. Section 4.0 of 0-SI-OPS-092-078.0 has been completed.
3. Notify the US when the SI has been completed and any necessary adjustments have been made.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 1.: Obtain the appropriate procedure. STANDARD: Operator obtains 0-SI-OPS-092-078.0 and goes to section 6.0 “Performance”. COMMENTS:	___ SAT ___ UNSAT ________ **Start Time**
STEP 2.: **[1]VERIFY** availability of LEFM calorimetric power… ***Cue: Per initial conditions, LEFM calorimetric power is available.*** STANDARD: Operator pulls up LEFM ICS screen and annotates procedure that LEFM calorimetric power is available. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: **[2] IF** LEFM calorimetric power NOT available OR ICS computer NOT available, THEN…. ***Cue: Per initial conditions, ICS and LEFM calorimetric power are available.*** STANDARD: Operator marks step N/A. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
<u>STEP 4.</u>: **[3] DETERMINE** reactor core power level by performing the applicable appendix below. <u>STANDARD</u>: Operator goes to Appendix A. <u>COMMENTS:</u>	___ SAT ___ UNSAT
EVALUATOR NOTE: The following steps are from Appendix A.	
<u>STEP 5.</u>: **[1] ENSURE** S/G blowdown flows are updated by performing the following functions on ICS: [1.1] SELECT "NSS & BOP". [1.2] SELECT "CALORIMETRIC FUNCTION MENU". [1.3] SELECT "UPDATE OPERATOR ENTERED BLOWDOWN FLOW" ***Cue:*** ***The blowdown flow point is updating and manual blowdown flows are not required.*** <u>STANDARD</u>: Operator determines blowdown flow is updating, initials step 1.3.1 A and marks steps 1.3.1 B and 1.3.2 N/A. <u>COMMENTS:</u>	___ SAT ___ UNSAT
NOTE: The operator should transition back to section 6.1 at the completion of App A.	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 6.: **[2] SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND** PERFORM one of the following: [a] RECORD U2118 AND U1127 OR [b] PRINT power levels and NIS values. ***Cue:*** ***Recording the numbers displayed from ICS is preferred. U2118 is 3455 MW and U1127 is 100.00%.*** STANDARD: Operator records U2118 and U1127 or prints a copy from ICS. COMMENTS:	___ SAT ___ UNSAT
EVALUATOR NOTE: The following steps are from Section 6.1.	
STEP 7.: **[4] RECORD** "AS FOUND" power level from each of the four NIS A Channel drawers:	___ SAT ___ UNSAT

POWER RANGE CHANNEL	"AS-FOUND" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

STANDARD: Operator records NIS power range readings from the A channel drawers.

COMMENTS:

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 8.: **[5]COMPARE** NIS indication with core thermal power level. **AND** **CHECK** appropriate box to indicate whether the indicated NIS power level recorded in step 6.1[4] is equal to the core thermal power level recorded in step 6.1[3] to within ± 2%. STANDARD: Operator **CHECKS** to determine if NIS channels are within ± 2%. Checks **YES** for all NIS channels and signs step completion. This step is critical because the operator must verify all channels within 2% of recorded power level or adjust instruments per Tech Spec requirements. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**
STEP 9.: **[6]VERIFY** that all NIS channel indications are within ± 3 % of the determined core thermal power level. STANDARD: Operator checks the YES box. COMMENTS:	___ SAT ___ UNSAT
STEP 10.: **[7] IF** a NIS channel was more than 3 percent in error in the non-conservative direction (core thermal > NIS) THEN ... STANDARD: Operator marks this step N/A. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 11.: **[8] CHECK** appropriate box to indicate whether the indicated NIS power level recorded in step 6.1[4] is less than or equal to 100.5%. STANDARD: The operator checks **NO** for N-41 and N-43 and checks **YES** for N-42 and N-44. COMMENTS:	___ SAT ___ UNSAT
STEP 12.: **[9] IF** any NIS channels were inoperable during the performance of this instruction, THEN STANDARD: Operator marks this step N/A. COMMENTS:	___ SAT ___ UNSAT
STEP 13.: **[10] IF** any NIS channel does not meet acceptance criteria (step 6.1[5] and/or step 6.1[8]), OR NIS Channel Adjustment is desired, THEN • PERFORM adjustment using Section 6.2 STANDARD: The operator initials this step and proceeds to Section 6.2. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
EVALUATOR NOTE: The following steps are from Section 6.2	
STEP 14.: **[1] IF** calculated average power in Section 6.1 or on printed copy differs by more than 3% from average RCS delta T, **THEN...** NOTIFY Engineering to determine the cause STANDARD: Operator N/As this step. COMMENTS:	___ SAT ___ UNSAT
STEP 15.: **[2] VERIFY** reactor power has remained constant ($\pm$ 0.5%) since performance of section 6.1. STANDARD: Operator verifies power has remained stable since he/she took the readings by observing NIS readings and/or Ave Thermal Power has not changed since start of task. COMMENTS:	___ SAT ___ UNSAT
STEP 16.: **[3] IF** NIS power range channel is inoperable, THEN.... STANDARD: Operator N/As this step since all channels are operable. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 17.: **[4] ENSURE** all NIS power range channels are operable or bypassed with no bistables tripped. STANDARD: Operator verifies no bistables tripped. (Initial conditions had all channels operable) COMMENTS:	___ SAT ___ UNSAT
STEP 18.: **[5] ENSURE** rod control system is in MANUAL in accordance with 0-SO-85-1 STANDARD: Operator turns HS-85-5110 to the MANUAL position. This step is critical to ensure no automatic rod movement during NIS adjustments. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 19.: **[6] IF** rate trip exists (or occurs) on the NIS channel being calibrated, **THEN** **CLEAR** that channel's trip signal (momentarily set RATE MODE switch to RESET position) and annunciator XA-55-6A. *Cue:* ***For this step and the following steps, inform the operator that "for JPM purposes the CV is not required".*** STANDARD: Operator verifies NO rate trip signals are in on ANY of the PR and the annunciator is clear. * **CRITICAL PORTION: If rate trip occurs he/she resets the rate trip prior to continuing to the next channel.** This step is critical because failure to comply could result in a reactor trip during the next channel adjustment. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**
STEP 20.: [7] ADJUST gain potentiometer on associated channel's power range B drawer to bring that channel's indicated power level to within ± .5% of the calorimetric power recorded in section 6.1 or listed on the printed copy. AND ENSURE gain potentiometer latch re-engaged. STANDARD : **Operator must adjust N41 and N43 to satisfy criteria.** The operator should repeat step [6] prior to adjusting any subsequent PR. **(only the bold portion of the standard is critical)** This step is critical to ensure all adjustments have been satisfactorily completed on one channel to meet acceptance criteria prior to proceeding to the next channel. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
EVALUATOR NOTE: Step [8] on adjusting coarse adjust was omitted from JPM.	
STEP 21.: **[9] IF** additional NIS channel(s) require calibration, **THEN** RETURN to step **[6]** STANDARD: Operator may return to step [6] to adjust either N41 or N42. COMMENTS:	___ SAT ___ UNSAT
STEP 22.: **[10] WHEN** NIS adjustments have been completed, **THEN** **RECORD** the "as left" power level from NIS power range channels.	___ SAT ___ UNSAT

POWER RANGE CHANNEL	"AS-LEFT" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

STANDARD: Operator records NIS power range readings from the A channel drawers. COMMENTS:	
STEP 23.: **[11]** **IF** NIS power range channel is inoperable **THEN....** STANDARD: Operator N/As this step since all are operable. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	**SAT / UNSAT**
STEP 24.: **[12] CHECK** appropriate box to indicate whether the following "as left" acceptance criteria were satisfied. STANDARD: Operator checks **YES** box for N41, N42, N43, & N44, all being within $\pm$ .5% of calometric power. COMMENTS:	___ SAT ___ UNSAT
STEP 25.: **[13]** **IF** acceptance criteria were NOT satisfied for any NIS channel **THEN**..... STANDARD: Operator N/As this step. COMMENTS:	___ SAT ___ UNSAT
STEP 26.: **[14] RETURN** rod control system to AUTO in accordance with 0-SO-85-1. STANDARD: Operator places control rod bank selector switch to AUTO after waiting at least 3 minutes for signal to decay. COMMENTS:	___ SAT ___ UNSAT
STEP 27.: Notify SRO that the NIS channels have been calibrated. STANDARD: Operator notifies the SRO that the SI has been completed and all power range nuclear instruments have been adjusted to meet the acceptance criteria. COMMENTS: ***CUE: This completes the JPM***	___ SAT ___ UNSAT ________ **Stop Time**

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM, including any required communications. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

The unit is at steady state conditions with all NIS channels and LEFM operable.

INITIATING CUES:

1. You are the CRO and the US has directed you to perform 0-SI-OPS-092-078.0.
2. Section 4.0 of 0-SI-OPS-092-078.0 has been completed.
3. Notify the US when the SI has been completed and any necessary adjustments have been made.

TVA

Sequoyah Nuclear Plant

Unit 1 & 2

Surveillance Instruction

0-SI-OPS-092-078.0

POWER RANGE NEUTRON FLUX CHANNEL CALIBRATION BY HEAT BALANCE COMPARISON

Revision 0021

Quality Related

Level of Use: Continuous Use

Effective Date: 11-15-2009

Responsible Organization: OPS, Operations

Prepared By: W. T. Leary

Approved By: G. Garner

Current Revision Description

Provided parenthetical direction to N/A sub-step not performed in Appendix A Step [2] (09001296). This is an editorial change to clarify intent.
Modified Section 5.0 Acceptance Criteria "A" associated with a ±2% delta between NIS and core thermal power to reflect the Tech Spec requirement. Any channel deviating from core thermal power by more than 2.0% is required to be adjusted. Removed special message boxes from Section 6.1 that incorrectly indicated specific parameters as Acceptance Criteria. Steps 6.1[5] and 6.1[8] were modified to present the allowable deviations between NIS and core thermal power within the step rather than as Acceptance Criteria. (PER 167130)
Relocated step associated with SRO notification of requirements for testing inoperable channels to later in Section 6.1 to provide a more logical sequence. This is an alteration to an administrative requirement and is a minor change.
Modified the tables associated with Steps 6.1[5], 6.1[7] and 6.1[8] to clarify intent as a minor change.
A note was added prior to Step 6.1[10] to clarify pre-existing intent that bulleted steps are to be marked N/A as appropriate.
Added Precaution and Limitation H regarding the potential impact of Auxiliary Instrument Room temperature on core thermal power indication (09000640).

THIS PROCEDURE COULD AFFECT REACTIVITY

Table of Contents

Table of Contents (continued)

1.0 INTRODUCTION

1.1 Purpose

This Surveillance Instruction (SI) provides detailed steps for ensuring proper calibration of the power range neutron flux channels.

1.2 Scope

1.2.1 Surveillance Test to be Performed

This Instruction performs a comparison between the power level calculated by the Nuclear Instrumentation System (NIS) power range neutron flux channels and the "true" power level as determined by a secondary system heat balance based value. If necessary, the power range channels are adjusted to agree with the "true" power level.

This instruction also verifies availability of Leading Edge Flow Meter (LEFM) calorimetric power.

1.2.2 Requirements Fulfilled

Performance of this Instruction completely fulfills Technical Specification (TS) Surveillance Requirement (SR) 4.3.1.1.1.B.2 (Table 4.3-1, item 2, note 2) and Technical Requirements Manual (TR) 4.3.3.15.1.

1.2.3 Modes

A. Applicable Mode - 1 (above 15 percent power).

B. Performance Mode - 1 (above 15 percent power).

1.3 Frequency and Conditions

This test must be performed at least once every 24 hours when the reactor power level is greater than 15 percent. **[C.3]** To ensure NIS accuracy, this test should be performed when directed by 0-GO-4 or 0-GO-5.

In the event that the Plant Computer is unavailable, provisions have been incorporated in this procedure to fulfill the SR requirements. **[C.5]**

2.0 REFERENCES

2.1 Performance References

0-PI-SXX-000-022.2, *Calorimetric Calculation.* (Optional)

2.2 Developmental References

A. SQN Technical Specifications.

B. SPP-8.1, *Conduct of Testing*

C. NP-STD-4.4.7, Attachment 1, *Writer's Guide for Technical Documents*

D. 0-PI-NUC-092-082.0, Post Startup NIS Calibration following Core Load.

E. Memo from Reactor Engineering - RIMS S57 941219 934

F. Integrated Computer System Critical Design Requirements and Operator's Guide.

3.0 PRECAUTIONS AND LIMITATIONS

A. Reactor power must remain constant (± 0.5%) during the performance of Sections 6.1 and 6.2. It is desirable for any required NIS adjustment be made promptly during performance of these sections.

B. Average RCS temperature (T_{avg}) should be maintained within 0.5°F of RCS reference temperature (T_{ref}).

C. Caution should be exercised when adjusting NIS power range instrumentation to minimize the potential for a channel trip.

D. Only one NIS channel shall be adjusted at a time. If a rate trip occurs, the channel's trip signal and annunciator on panel XA-55-6A, "NC-41U or NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE" must be cleared before proceeding to the next NIS channel.

E. Operations and Engineering should be notified if larger than normal channel adjustments (as determined by the SRO) are required to bring the power range channels into alignment with calculated core thermal power. **[C.4]** An operability concern may exist if excessive error in the non-conservative direction adversely impacts the NIS high flux trip setpoint. The 3% tolerance for calibration error on the high flux trip setpoints was selected using the extrapolated error from the 30% power level.

F. The reactor cores have been loaded with a low leakage loading pattern which can affect NIS Reactor Power level indications such that differences greater than the Acceptance Criteria can occur between NIS and true power level. The impact of the NIS non-linearity due to low leakage loading pattern is in the conservative direction, since NIS indicated power rises faster than true power during a power increase. 0-GO-5 may direct performance of this procedure to ensure excessive errors in the non-conservative direction do not exist. During plant restarts, Reactor Engineering may perform 0-PI-NUC-092-082.0 at 4% power to provide an initial NIS correction for startup.

G. Technical Specifications require a heat balance calculation for adjustment of the NIS when the Plant is above 15% power within 24 hours. If the Leading Edge Flow Meter (LEFM) is available, LEFM data (from U2118 or LEFM Offline Calorimetric screen) is required to be used for the heat balance when greater than 15% power (TRM 3.3.3.15). If LEFM is not available, then Loop ΔT data should be used between 15 and 40% power due to potential inaccuracies in the feedwater flow venturi heat balance below 40%. If LEFM is not available above 40%, then venturi-based calorimetric power (U1118) should be used.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

H. An Auxiliary Instrument Room Temperature of approximately 90°F potentially impacts Computer Pint U1118 accuracy with the DCS Digital Feedwater modification installed. The DCS inputs the U118 venturi calculations and the accuracy of the card providing the input is adversely impacted by a card temperature of 95°F.

Unit 1

4.0 PREREQUISITE ACTIONS

NOTE

During the performance of this Instruction, any "**IF/THEN**" statement may be marked N/A when the corresponding stated condition does not occur.

4.1 Preliminary Actions

[1] **ENSURE** Instruction to be used is a copy of effective version and Data Package Cover Sheet is attached. J. D.

4.2 Measuring and Test Equipment, Parts, and Supplies

None

4.3 Field Preparations

[1] **ENSURE** reactor power and RCS average temperature are stable. J. D.

4.4 Approvals and Notifications

[1] **NOTIFY** SRO of test performance. J. D

5.0 ACCEPTANCE CRITERIA

A. If the indicated "as found" power level from any operable NIS channel differs from core thermal power by greater than ±2%, then the affected channel has been adjusted.

B. The indicated "as-left" power level from each operable NIS neutron flux channel that was adjusted must equal the core thermal power level to within ± 0.5%.

C. If the criteria stated above are NOT satisfied, the SRO shall be notified and Action Requirement 2 of TS Table 3.3-1 satisfied.

D. LEFM shall be used for the plant calorimetric measurement for power range NIS calibration by heat balance comparison. If this criteria is NOT satisfied, the SRO shall be notified and the applicable action of TRM 3.3.3.15 shall be entered.

Unit 1

6.0 PERFORMANCE

6.1 As-Found Data

NOTES
1) The following step determines if LEFM is available to satisfy TRM 3.3.3.15. If LEFM is NOT available, operators should notify US, document status and continue with next step.
2) Main feedwater temperature must be greater than or equal to 250°F for reliable LEFM data.

[1] **VERIFY** availability of LEFM calorimetric power:

[1.1] **CHECK** LEFM status NORMAL on ICS (NSSS and BOP) Current Calorimetric Data screen.

☐Yes ☐ No ________

[1.2] **CHECK** LEFM MFW header temperature (ICS point T8502MA) greater than or equal to 250°F.

☐Yes ☐ No ________

<u>**Acceptance Criteria:**</u> LEFM is available based upon the indications above.

Unit______

6.1 As-Found Data (continued)

NOTE
With LEFM unavailable, AFD limit lines in COLR must be made more restrictive by 1% and Rod Insertion Limit lines in COLR must be raised by 3 steps. Rod insertion limit alarms and ICS display are NOT automatically adjusted.

[2] **IF** LEFM calorimetric power NOT available
OR ICS computer NOT available,
THEN

PERFORM the following:

[2.1] **ENTER** applicable action of TRM 3.3.3.15. ________

[2.2] **ENSURE** work order initiated as required. ________

[2.3] **IF** LEFM calorimetric power CANNOT be restored in time to complete this surveillance,
THEN

PERFORM the following:

A. **REDUCE** reactor power to
98.7% (3411 MWt) or less
USING U1118 (if available) or NIS. ________

B. **WHEN** reactor power is less than 98.7%,
THEN

CONTINUE this instruction using alternate power indications as specified below. ________

Unit______

6.1 As-Found Data (continued)

NOTE

If Engineering has performed 0-PI-SXX-000-022.2, then the applicable section(s) of 0-PI-SXX-000-022.2 may be used in place of Appendix C or D to obtain the current calorimetric power.

[3] **DETERMINE** reactor core power level by performing the applicable appendix below:

CONDITION	APPENDIX	✓
RCS ΔT greater than 15% and LEFM core thermal power (U2118) available (step [1] acceptance criteria met)	A	☐
RCS ΔT between 15% and 40% and LEFM core thermal power (U2118) NOT available	B	☐
RCS ΔT greater than 40% LEFM core thermal power (U2118) NOT available but ICS point U1118 is available	C	☐
RCS ΔT greater than 40% and ICS computer NOT available	D	☐
RCS ΔT greater than 40% and ICS core thermal power indication (U1118 and U2118) NOT available due to bad feedwater pressure input (ICS and LEFM feedwater flow data remain operable)	E	☐

AND RECORD below (**N/A** power if using printout from ICS):

% Rated Core Thermal Power =________%   ________

Unit______

6.1 As-Found Data (continued)

NOTE

Data for an inoperable NIS channel may be marked N/A.

[4] **RECORD** “as-found” power level from each of the four NIS power range A channel drawers:

POWER RANGE CHANNEL	"AS-FOUND" NIS POWER (%)
N-41 (XI-92-5005B)	
N-42 (XI-92-5006B)	
N-43 (XI-92-5007B)	
N-44 (XI-92-5008B)	

[5] **COMPARE** NIS indication with core thermal power level **AND**
CHECK appropriate box to indicate whether the indicated NIS power level recorded in step 6.1[4] is equal to the core thermal power level recorded in step 6.1[3] or as listed on the printed copy to within ± 2.0 percent:

	YES (<2.0%)	NO (≥2.0%)	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____
RO or SRO

Unit______

6.1 As-Found Data (continued)

[6] **VERIFY** that all NIS channel indications are within ±3 percent of the determined core thermal power level.

☐Yes ☐ No ________

[7] **IF** a NIS channel was more than 3 percent in error in the non-conservative direction (core thermal power > NIS), **THEN**

NOTIFY Engineering to determine if the calibration error impacts operability of the NIS high flux trip. ________

[8] **CHECK** appropriate box to indicate whether the indicated NIS power level recorded in step 6.1[4]is less than or equal to 100.5 percent.:

	YES (≤100.5%)	NO (>100.5%)	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____

RO or SRO

[9] **IF** any NIS channels were inoperable during the performance of this Instruction, **THEN**

NOTIFY applicable unit SRO that this SI must be performed on all inoperable NIS channels when they are returned to service. ________

Unit______

6.1 As-Found Data (continued)

NOTES

1) Consistency between the four NIS Power Range Channels is to be considered when determining if an adjustment is desired.

2) The adjustment of any NIS channel that displays a value with an absolute difference of greater than 2% from core thermal power meets the requirement found in SR 4.3.1.1.1.

3) One or both of the bulleted steps below may be marked N/A dependent on specific circumstances.

[10] **IF** any channel does not meet acceptance criteria (Step 6.1[5] and/or Step 6.1[8]),
OR
NIS Channel Adjustment is desired, **THEN**

- **PERFORM** adjustment using Section 6.2

AND/OR

- **REDUCE** reactor power not to exceed 100 percent. ______

END OF TEXT

Unit______

6.2 NIS Channel Adjustment

NOTES

1) Performance of this section is required only for those PR channels designated by the Reactor Operator or that did not satisfy the acceptance criteria in Section 6.1. All other NIS channels may be marked N/A.

2) During the performance of Section 6.2, data required for an inoperable NIS channel may be marked N/A.

[1] **IF** calculated average power in Section 6.1 or on printed copy differs by more than 3% from average RCS delta T,
THEN

NOTIFY Engineering to determine the cause. _____

[2] **VERIFY** reactor power has remained constant (± 0.5 %) since performance of Section 6.1. _____

NOTE

The inoperable channel may be bypassed for up to 4 hours for surveillance testing of other channels.

[3] **IF** NIS power range channel is inoperable,
THEN

REQUEST Instrument Maintenance to Bypass inoperable NIS channel in accordance with 0-PI-IXX-092-001.0. _____

[4] **ENSURE** all NIS power range channels are operable or bypassed with no bistables tripped. _____

[5] **ENSURE** rod control system is in MANUAL in accordance with 0-SO-85-1. _____

Unit______

6.2 NIS Channel Adjustment (continued)

NOTES
1) Steps 6.2[6] through 6.2[9] must be completed on one NIS channel before proceeding to the next channel.
2) NIS channels in the following step may be performed out of sequence.

[6] **IF** a rate trip exists (or occurs) on the NIS channel being calibrated, **THEN**

CLEAR that channels trip signal (momentarily set RATE MODE switch to RESET position) and annunciator on panel XA-55-6A, "NC-41U or NC-41K NIS POWER RANGE HIGH NEUTRON FLUX RATE," before proceeding to the next NIS channel.

	Trip Cleared	N/A
NIS Channel N-41	☐	☐
NIS Channel N-42	☐	☐
NIS Channel N-43	☐	☐
NIS Channel N-44	☐	☐

First Person ____________________

CV____________________

Unit______

6.2 NIS Channel Adjustment (continued)

[12] **CHECK** appropriate box to indicate whether the following "as-left" acceptance criteria were satisfied.

<u>**Acceptance Criteria:**</u> The indicated NIS power level recorded in step 6.2[10] is within $\pm$ 0.5 percent the calorimetric power level recorded in Section 6.1 or as listed on the printed copy.

	YES	NO	N/A
NIS Channel N-41	☐	☐	☐
NIS Channel N-42	☐	☐	☐
NIS Channel N-43	☐	☐	☐
NIS Channel N-44	☐	☐	☐

____
RO or SRO

[13] **IF** acceptance criteria were NOT satisfied for any NIS channel, **THEN**

NOTIFY Shift Manager that acceptance criteria were NOT met and another performance of this test is necessary, subsequently action 2 of LCO 3.3.1.1 (Unit 1) or LCO 3.3.1 (Unit 2) must be satisfied if the other performance does not meet acceptance criteria. ______

NOTE

NIS channel adjustment may cause step change in input to rod control. A delay of at least 3 minutes prior to returning rod control to automatic will allow lead/lag signal to decay off.

[14] **RETURN** Rod Control System to AUTO in accordance with 0-SO-85-1. ______

END OF TEXT

Unit______

7.0 POST PERFORMANCE ACTIVITY

[1] **NOTIFY** SRO that test has been completed. ________

Appendix D
(Page 1 of 8)

CALCULATION OF CORE THERMAL POWER LEVEL WITH INOPERABLE PLANT COMPUTER (RCS ΔT GREATER THAN 40%)

Unit______

1.0 PERFORMANCE

NOTES

1) This appendix provides guidance determining calorimetric power when ICS core thermal power indication (U1118 and U2118) is unavailable with power above 40% and the computer cannot be restored in time to complete SR 4.3.1.1.1.

2) 0-PI-SXX-000-022.2 requires several hours from initiation until completion of power calculation.

[1] **IF** 0-PI-SXX-000-022.2 will be used for calorimetric data,
THEN

PERFORM the following:

[1.1] **NOTIFY** Systems Engineering to perform manual calorimetric calculation using 0-PI-SXX-000-022.2. _________

[1.2] **MARK** remaining steps "N/A" in this appendix. _________

Appendix D
(Page 2 of 8)

Unit______

1.0 PERFORMANCE (continued)

NOTES

1) The remaining steps determine core thermal power by manually entering calorimetric data on opposite unit's ICS computer. This method requires adding 3.5% to the calculated power level for additional conservatism due to greater errors associated with indicator error and readability. Therefore, power level should be reduced to less than or equal to 96.5% before performance.

2) Calorimetric calculation on opposite unit's ICS assumes that blowdown flow is identical on each unit. This error is accounted for in the 3.5% correction factor.

[2] **IF** opposite unit's ICS will be used to perform a calorimetric calibration,
THEN

PERFORM the following:

[2.1] **ENSURE** reactor power less than or equal to 96.5%. ________

[2.2] **ENSURE** reactor power and RCS temperature stable. ________

Appendix D
(Page 3 of 8)

Unit______

1.0 PERFORMANCE (continued)

NOTES

1) If ICS is unavailable, LEFM Feed flow and feed temperature may still be available on LEFM panel [LOCL-500-R183] in Aux Inst Rm.

2) MFW header temp must be greater than 250°F for reliable LEFM data.

[3] **IF** LEFM feed flow and feed temperature is available on local LEFM panel, **THEN**

PERFORM the following:

[3.1] **RECORD** the following data:

Parameter	Indication	Reading
Loop 1 Feedwater Pressure	PI-3-37 [M-3]	psig
Loop 2 Feedwater Pressure	PI-3-50 [M-3]	psig
Loop 3 Feedwater Pressure	PI-3-92 [M-3]	psig
Loop 4 Feedwater Pressure	PI-3-105 [M-3]	psig
Loop 1 S/G Pressure	PI-1-2A or 2B [M-4]	psig
Loop 2 S/G Pressure	PI-1-9A or 9B [M-4]	psig
Loop 3 S/G Pressure	PI-1-20A or 20B [M-4]	psig
Loop 4 S/G Pressure	PI-1-27A or 27B [M-4]	psig
Total Feedwater Flow	LEFM	lbm/hr
Feedwater Temperature (must be > 250°F)	LEFM	°F

______

______ IV

[3.2] **SELECT** Calorimetric Main Menu screen on other unit's ICS computer. ______

(step continued on next page)

Unit______

1.0 PERFORMANCE (continued)

[3.3] **SELECT** LEFM Special Offline Calorimetric on Calorimetric Menu. ________

[3.4] **ENTER** data in ICS from table in subStep **3 [a]**. ________

[3.5] **SELECT** function key F3 to execute calculation. ________

[3.6] **PRINT** calorimetric results. ________

[3.7] **VERIFY** data was correctly entered in ICS from table in subStep **3 [a]**. ________
IV

[3.8] **RECORD** Total S/G Thermal Power from calorimetric printout:

________MWt ________

[3.9] **CALCULATE** percent power corresponding to item 1.0[3.8]

$$\frac{\_\_\_\_\_\_\_\_ \text{MWt}}{34.55} = \_\_\_\_\_\_\_\_ \%$$ ________

Appendix D
(Page 5 of 8)

Unit______

1.0 PERFORMANCE (continued)

NOTE
The following step adds 3.5% to calorimetric power to compensate for additional errors in this method. The corrected power value below should be used in Section 6.1.

[3.10] **CALCULATE** corrected core thermal power:

(substep 1.0[3.9]) ______%+ 3.5%= ________% ________

[3.11] **VERIFY** substeps 1.0[3.7] through 1.0[3.9]. ________
IV

Appendix D
(Page 6 of 8)

Unit______

1.0 PERFORMANCE (continued)

NOTE
1,2-PI-ICC-003-036.0 provides details on required test equipment for feedwater temperature measurement.

[4] **IF** LEFM feed flow and feed temperature is NOT available, **THEN**

PERFORM the following:

[4.1] **NOTIFY** MIG or Systems Engineering to install precision temperature monitoring equipment in feedwater header temperature wells TW-3-197 and TW-3-198 [TB el. 685]. ______

[4.2] **RECORD** average feedwater header temperature:

__________ °F

____
MIG or Eng

____
IV

(step continued on next page)

Appendix D
(Page 7 of 8)

Unit______

1.0 PERFORMANCE (continued)

[4.3] **RECORD** the following data:

Parameter	Indication	Reading
Loop 1 Feedwater Press	PI-3-37 [M-3]	psig
Loop 2 Feedwater Press	PI-3-50 [M-3]	psig
Loop 3 Feedwater Press	PI-3-92 [M-3]	psig
Loop 4 Feedwater Press	PI-3-105 [M-3]	psig
Loop 1 S/G Pressure	PI-1-2A or 2B [M-4]	psig
Loop 2 S/G Pressure	PI-1-9A or 9B [M-4]	psig
Loop 3 S/G Pressure	PI-1-20A or 20B [M-4]	psig
Loop 4 S/G Pressure	PI-1-27A or 27B [M-4]	psig
Loop 1 Feedwater Flow	FI-3-35A or 35B [M-4]	lbm/hr
Loop 2 Feedwater Flow	FI-3-48A or 48B [M-4]	lbm/hr
Loop 3 Feedwater Flow	FI-3-90A or 90B [M-4]	lbm/hr
Loop 4 Feedwater Flow	FI-3-103A or 103B [M-4]	lbm/hr

____

____
IV

[4.4] **SELECT** Calorimetric Main Menu screen on other unit's ICS computer. ________

[4.5] **SELECT** Special Offline Calorimetric on Calorimetric Menu. ________

(step continued on next page)

Appendix D
(Page 8 of 8)

Unit______

1.0 PERFORMANCE (continued)

[4.6] **ENTER** data in ICS from substeps 1.0[4.2] and1.0[4.3]. ________

[4.7] **SELECT** function key F3 to execute calculation. ________

[4.8] **PRINT** calorimetric results. ________

[4.9] **VERIFY** data from subSteps 1.0[4.2] and 1.0[4.3] as correctly entered in ICS. ________
IV

[4.10] **RECORD** Total S/G Thermal Power from calorimetric printout:

_______MWt ________

[4.11] **CALCULATE** percent power corresponding to item1.0[4.10]

$$\frac{\_\_\_\_\_\_\_ \text{MWt}}{34.55} = \_\_\_\_\_\_\_\_ \%$$ ________

NOTE
The following step adds 3.5% to calorimetric power to compensate for additional errors in this method. The corrected power value below should be used in Section 6.1.

[4.12] **CALCULATE** corrected core thermal power:

(substep 1.0[4.11]) ______%+ 3.5%= ________% ________

[4.13] **VERIFY** substeps 1.0[4.10] through 1.0[4.11]. ________
IV

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

SIM G (RO\SRO)

Initiate Makeup to the Refueling Cavity

RO/SRO
JOB PERFORMANCE MEASURE

Task: Initiate Makeup to the Refueling Cavity

Task #: 3210110401 **(RO)**

Task Standard: Makeup to the refueling cavity via the RHR Pumps is initiated per AOP-M.04.

Time Critical Task: **YES:** ____ **NO:** X

K/A Reference/Ratings: 036AA2.02 (3.4/4.1) 004A4.08 (3.8/3.4)
036AK3.03 (3.7/4.1)

Method of Testing:

Simulated Performance: ________ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ________ **Classroom** ________

Main Control Room ________ **Mock-up** ________

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ________
Name / Signature DATE

Performance Rating: **SAT:** ________ **UNSAT:** ________

Validation Time: **15 minutes** **Total Time:** ________

Performance Time: **Start Time:** ________ **Finish Time:** ________

COMMENTS

____

____

____

____

____

SIMULATOR OPERATOR INSTRUCTIONS:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize the simulator to IC-114.
4. If IC #114 is not available, initialize in IC 40 and complete the following setup.
   - **Override # AN:OVRDN_584** to **ON**, to bring in alarm for SPENT FUEL PIT LEVEL.
   - **Override ZAOLI68320, ZAOLI68321, ZAOLI68335A, ZAOLI68339A at 50** to simulate PZR at refueling level.
   - **Override ZAOPI6866A, ZAOPI6869, ZAOPI6862 at 35** to simulate refuel flood up pressure.
   - **Override AN:OVRDN_1695 to OFF** to keep midloop high level alarm from alarming.
   - **Override (FCV-62-135 & 136, CCP Suction from VCT, CLOSED. (ZLOHS62135A_Green f:ON, ZLOHS62136A_Green f:ON, ZDIHS62135A f:0 (close), ZDIHS62136A f:0 (close)**
   - Add Caution Order tag to FCV-63-1 per 0-GO-13 App. O. (jumpers placed to remove seal in)
5. Insure operator performs the following required actions for **SELF-CHECKING**;
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

AOP-M.04, Section 2.0, 2.1, and Appendix A & B

REFERENCES:

	AOP-M.04, Sect 2.1 & Appendix A	Refueling Malfunctions	Rev No. 9

DIRECTIONS TO TRAINEE on next page

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. All steps shall be performed for this task. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in mode 6 performing refueling operations. Approximately 1/2 of the core has been off-loaded at this time.
2 There is one fuel assembly in transit to the spent fuel pit from the core. It is presently in the upender cart in transient to the spent fuel pit.
3 The refueling SRO in the reactor building has just informed you that there is an obvious drop in reactor cavity level.
4 A dedicated operator that has been assigned to monitor vessel level instruments, informs you that there is a decreasing trend in Reactor cavity level indicators.

INITIATING CUES:

1. The refueling SRO reports a confirmed reactor cavity seal failure is occurring.
2. Alarm on panel 1-M-6D (D3) “SPENT FUEL PIT LEVEL HIGH-LOW” has just actuated.
3. The refueling SRO has requested makeup to the refueling cavity from the RWST as soon as possible
4. The US directs you to perform AOP-M.04, Refueling Malfunctions (single performer method).
5. Inform the refueling SRO (and Unit SRO) as soon as makeup is initiated.

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
NOTE: If operator responds using AR-M6-D window D-3. AUO is dispatched to the SFP to investigate the alarm. Operator determines that AOP-M.04 is the appropriate procedure.	
STEP 1: Obtain the appropriate procedure. STANDARD: Operator obtains a copy of AOP-M.04. COMMENTS:	___ SAT ___ UNSAT ________ **Start Time**
STEP 2: 1. EVALUATE the following Tech Specs for applicability: ▪ 3.9.8.2, RHR - Low Water Level ▪ 3.9.10, Rx Vessel Water Level ▪ 3.9.11, Refueling Operations - Spent Fuel Pit Water Level ***Cue:*** ***The US will evaluate the Tech Specs for applicability*** STANDARD: Operator notifies US of the need to evaluate these three COMMENTS:	___ SAT ___ UNSAT
STEP 3: 2. EVALUATE EPIP-1, Emergency Plan Initiating Conditions Matrix. ***Cue:*** ***The SM will evaluate the Emergency Plan*** STANDARD: Operator notifies US/SM of the need to evaluate the Emergency Plan. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 4: 3. Diagnose conditions to determine appropriate section, of AOP-M.04, to perform. STANDARD: Based on plant indications and initial conditions, determines that section 2.1 must be performed and proceeds to page 4. COMMENTS:	___ SAT ___ UNSAT
Caution 1: Loss of Spent Fuel Pit or Refueling Cavity level and subsequent loss of shielding may result in extremely high dose rates in Containment and Spent Fuel Pit areas.	
Caution 2: If the reactor cavity water level drops to flange elevation with upender in vertical position, the top 0.25 inch of upender will extend above surface of water.	
Note: Fuel Handling SRO, personnel required to place fuel in safe location, and Radcon personnel remain (if possible) until required actions are completed.	
STEP 5: 2.1.1 **ANNOUNCE** to all non-essential personnel to evacuate Containment and AB el. 734 Refuel Floor. ***Cue: The SM would like you to make that announcement.*** STANDARD: Operator makes this announcement. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 6: 2.1.2 **ENSURE** the following personnel notified that seal failure has occurred: • Control Room • RADCON - to monitor refueling area and Aux Bldg as required • Fuel Handling Supervisor ***Cue:*** ***The SM will ensure all control room personnel and the Fuel Handling Supervisor are aware of the event and that RADCON begins monitoring CNMT and the Aux Bldg.*** STANDARD: Operator ensures these people are notified. COMMENTS:	___ SAT ___ UNSAT
Caution: Failure to maintain RWST level greater than 5% may cause CCPs or RHR pumps to lose suction.	
STEP 7: 2.1.3 **MAINTAIN** Refueling Cavity level as necessary: a. INITIATE makeup from RWST using Appendix A, "Filling Refueling Cavity from RWST." b. ***Cue:*** ***US directs makeup from RWST using CCP*** STANDARD: Operator obtains a copy of Appendix A Section A of AOP-M.04. COMMENTS:	___ SAT ___ UNSAT
NOTE: The following are from Appendix A, Filling Refueling Cavity From RWST, Section A of AOP-M.04.	

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 8: A.1.a. **VERIFY** RWST level greater than 8%. STANDARD: Operator verifies RWST level greater than 8% using one or more of the RWST level indicators located on M-6. COMMENTS:	___ SAT ___ UNSAT
STEP 9: A.1.b. **ENSURE** the following charging valves OPEN: FCV-62-90 STANDARD: Operator verifies FCV-62-90 open by observing 1-HS-62-90A RED light LIT. COMMENTS:	___ SAT ___ UNSAT
STEP 10: A.1.b. **ENSURE** the following charging valves OPEN: FCV-62-91 STANDARD: Operator verifies FCV-62-91 open by observing 1-HS-62-91A RED light LIT COMMENTS:	___ SAT ___ UNSAT
STEP 11: A.1.b. **ENSURE** the following charging valves OPEN: FCV-62-85 OR FCV-62-86 STANDARD: Operator verifies FCV-62-85 or 86 is open by observing 1-HS-62-85A or 1-HS-62-86A RED light LIT. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 12: A.1. c **OPEN** the following valves: FCV-62-135 and 136, CCP suction from RWST. STANDARD: Operator pushes HSs (1-HS-62-135A and 1-HS-62-136A) IN and turns to the OPEN position and determines that neither valve opens Green lights remain LIT for FCVs-62-135 and 136. ***Cue*:** **If required, prompt operator to attempt to open FCV-62-136 following failure of FCV-62-135 to open.** This step is critical to attempt a supply to the refueling cavity makeup flowpath and then for the UO to determine the valve failure so the alternate path may be utilized. COMMENTS:	___ SAT ___ UNSAT **Critical Step (shaded portion)**
NOTE: This will direct the Operator to the Alternate path.	
STEP 13: Operator reports to US that neither CCP suction from the RWST will open. ***Cue:*** ***After operator reports not being able to open CCP suction valves, report as the US that you will contact Maintenance Shift Supervisor to investigate the cause of the valve failure and directs the operator to fill the Reactor Cavity using alternate method (step 2 of Appendix A uses RHR pump to fill cavity)*** STANDARD: Operator determines that step 2 of Appendix A is appropriate action to take. COMMENTS:	___ SAT ___ UNSAT
NOTE: The following are from Appendix A, Section A, Step 2 of AOP-M.04.	

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 14: A.2. **IF** initiating makeup from RWST using RHR Pump suction, **THEN PERFORM** the following: a. VERIFY RWST level greater than 8%. STANDARD: Operator verifies RWST level greater than 8% using one or more of the RWST level indicators located on M-6. COMMENTS:	___ SAT ___ UNSAT
STEP 15: A.2. **IF** initiating makeup from RWST using RHR Pump suction, **THEN PERFORM** the following: b. OPEN FCV-63-1, RWST supply. STANDARD: Operator uses HS-63-1A and opens FCV-63-1, Observes Red light ON, Green light OFF. This step is critical to provide a makeup flowpath from the RWST to the refueling cavity. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 16: A.2. **IF** initiating makeup from RWST using RHR Pump suction, **THEN PERFORM** the following: c. CLOSE one the following valves: ▪ FCV-74-1, RHR suction from Hot Leg No.4 or ▪ FCV-74-2, RHR suction from Hot Leg No. 4. STANDARD: Operator uses HS-74-1A and CLOSES FCV-74-1, Observes Red light OFF, Green light ON. OR Operator uses HS-74-2A and CLOSES FCV-74-2, Observes Red light OFF, Green light ON This step is critical to isolate the normal RHR suction flowpath and to swap over to the RWST suction flowpath. COMMENTS:	___ SAT ___ UNSAT **Critical Step** **(shaded portion)**
STEP 18: A.2.d VERIFY flow to RCS. STANDARD: Operator verifies flow into the RCS by observing flow on 1-FI-63-91B or 1-FI-63-92B. COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist

STEP/STANDARD	SAT / UNSAT
STEP 19: Inform the US of flow from RWST to Spent Fuel Pit. STANDARD: Operator informs US and/or SM that flow has been established from RWST to Spent Fuel Pit. ***Cue:*** ***After operator reports that flow has been established, State "This completes the JPM."*** COMMENTS:	___ SAT ___ UNSAT ______ **Stop Time**

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. All steps shall be performed for this task. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in mode 6 performing refueling operations. Approximately 1/2 of the core has been off-loaded at this time.
2. There is one fuel assembly in transit to the spent fuel pit from the core. It is presently in the upender cart in transient to the spent fuel pit.
3. The refueling SRO in the reactor building has just informed you that there is an obvious drop in reactor cavity level.
4. A dedicated operator that has been assigned to monitor vessel level instruments, informs you that there is a decreasing trend in Reactor cavity level indicators.

INITIATING CUES:

1. The refueling SRO reports a confirmed reactor cavity seal failure is occurring.
2. Alarm on panel 1-M-6D (D3) “SPENT FUEL PIT LEVEL HIGH-LOW” has just actuated.
3. The refueling SRO has requested makeup to the refueling cavity from the RWST as soon as possible
4. The US directs you to perform AOP-M.04, Refueling Malfunctions (single performer method).
5. Inform the refueling SRO (and Unit SRO) as soon as makeup is initiated.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-M.04

REFUELING MALFUNCTIONS

Revision **9**

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: Aaron Bergeron

EFFECTIVE DATE: 10/26/09

REVISION DESCRIPTION: Revised Section 2.2 to reflect the equipment hatch and airlock doors being closed (PER 167420). Added reference to FHI-19 (PCR 09000953). Changed Section 2.1 to enhance step sequence. Added new Appendix F for closing wafer valve.

1.0 PURPOSE

This procedure provides the actions necessary to mitigate the effects of a dropped fuel assembly, damaged fuel assembly, or refueling cavity seal failure.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.0 OPERATOR ACTIONS

1. **EVALUATE** the following Tech Specs for applicability:

   - 3.9.8.2, RHR - Low Water Level
   - 3.9.10, Rx Vessel Water Level
   - 3.9.11, Refueling Operations - Spent Fuel Pit Water Level

2. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

3. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Reactor cavity seal has failed	2.1	4
Irradiated fuel assembly has been dropped or damaged <u>inside</u> containment	2.2	12
Irradiated fuel assembly has been dropped or damaged <u>outside</u> containment	2.3	17
New fuel assembly has been dropped or damaged	2.4	21

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure [C.1]

CAUTION 1: **Loss of Spent Fuel Pit or Refueling Cavity level and subsequent loss of shielding may result in extremely high dose rates in Containment and Spent Fuel Pit areas. [C.1]**

CAUTION 2: **If the reactor cavity water level drops to flange elevation with upender in vertical position, the top 0.25 inch of upender will extend above surface of water.**

NOTE: Fuel Handling SRO, personnel required to place fuel in safe location, and Radcon personnel should remain (if possible) until required actions are completed.

1. **ANNOUNCE** to all non-essential personnel to evacuate Containment and AB el. 734 Refuel Floor.

2. **ENSURE** the following personnel notiifed that seal failure has occurred: **[C.2]**

   - Control Room staff

   - RADCON - to monitor refueling area and Aux Bldg as required

   - Fuel Handling Supervisor

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure (cont'd)

CAUTION: Failure to maintain RWST level greater than 5% may cause CCPs or RHR pumps to lose suction.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	**MAINTAIN** Refueling Cavity level as necessary:	
	a. **INITIATE** makeup from RWST **USING** Appendix A, Filling Refueling Cavity from RWST.	a. **IF** RWST NOT available, **THEN** **PERFORM** the following: 1) **INITIATE** makeup using normal charging with CCP suction aligned to VCT **USING** App. E, Refueling Cavity Makeup Using Normal Charging. 2) **INITIATE** actions to restore RWST level **USING** 0-SO-62-4 (to transfer HUT to RWST) or other applicable procedures. 3) **EVALUATE** need to staff TSC and OSC. 4) **GO TO** Step 4.
	b. **MAINTAIN** RWST level greater than 5%.	b. **REALIGN** pump suctions **USING** Appendix A, Filling Refueling Cavity from RWST: • RHR Pump suction to RCS Loop 4 hot leg • CCP suction to VCT

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.1	**Reactor Cavity Seal Failure [C.1]**	
4.	**IF** transfer tube wafer valve is OPEN **OR** position is unknown, **THEN** **DISPATCH** two operators to perform Appendix F, Closing Wafer Valve.	
5.	**CHECK** for any of the following: • fuel movement in progress **OR** • any irradiated fuel assembly out of normal storage location (core or spent fuel pool).	**PERFORM** the following: a. **IF** any radioactive component is being handled in Spent Fuel Pool or Refueling Cavity, **THEN** **NOTIFY** Fuel Handling Supervisor to ensure component is placed in storage location or lowered fully. b. **GO TO** Step 8.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure [C.1]

6.	**VERIFY** RCCA change fixture empty of irradiated fuel.	**IF** fuel in manipulator crane, **THEN** **PERFORM** the following: a. **PLACE** irradiated fuel assembly located in manipulator crane into reactor side upender. b. **TRANSPORT** irradiated fuel assembly to SFP side upender. c. **TERMINATE** transporting with SFP side upender in horizontal position. d. **REMOVE** irradiated fuel assembly from RCCA change fixture. e. **INSERT** irradiated fuel assembly as far as possible into any available core location. f. **RECORD** location ______________ **IF** NO fuel in manipulator crane, **THEN** **PERFORM** the following: a. **REMOVE** irradiated fuel assembly from RCCA change fixture. b. **INSERT** irradiated fuel assembly as far as possible into any available core location. c. **RECORD** location ______________

(step continued on next page)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure [C.1]

6.	Continued	**IF** more than one irradiated fuel assembly in RCCA Change Fixture **AND** time allows, **THEN** **PERFORM** the following: a. **REMOVE** second irradiated fuel assembly from RCCA change fixture. b. **INSERT** irradiated fuel assembly as far as possible into any available core location. c. **RECORD** location ________________
7.	**VERIFY** manipulator crane empty of fuel.	**INSERT** fuel assembly as far as possible into any available core location. **RECORD** location ____________________
8.	**ENSURE** the following: • Fuel transfer cart on SFP side • Upender in horizontal position	
9.	**WHEN** transfer cart is on SFP side, **THEN** **NOTIFY** operators with Appendix F to ensure wafer valve CLOSED.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
10.	**VERIFY** SFP bridge hoist empty of fuel.	**PERFORM** the following: a. **TRANSPORT** fuel assembly on SFP bridge hoist to SFP. b. **INSERT** fuel assembly into any SFP location. c. **RECORD** location ________________
11.	**VERIFY** SFP water level above SFP cooling pump suction strainer.	**PERFORM** the following: a. **STOP** running SFP cooling pumps [Aux Bldg, 714' elev, SFP Pump Platform] b. **FILL** SFP **USING** 0-SO-78-1, Spent Fuel Pit Cooling System. c. **IF** additional makeup is needed, **THEN** 1) **NOTIFY** Chem Lab Supervisor. 2) **INITIATE** makeup from Fire water to SFP using hose reel station as required. d. **WHEN** SFP water level above SFP cooling pump suction strainer, **THEN** **CONTINUE** with this procedure. e. **VENT** SFP cooling pumps casings. f. **START** SFP cooling pump.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 Reactor Cavity Seal Failure (cont'd)

12. **EVALUATE** need to close containment equipment hatch:

    a. **CHECK** equipment hatch OPEN.

    RNO: a. **GO TO** Substep d.

    b. **CONSULT** Fuel Handling SRO and Radcon.

    c. **IF** equipment hatch requires closure,
    THEN
    NOTIFY Outage Management to initiate closure of equipment hatch.

    d. **EVALUATE** need to install equipment hatch concrete shield.

NOTE: Appendix B, Elevations and Distances, may be helpful in determining levels to be maintained.

13. **MAINTAIN** SFP and Rx cavity levels as directed by Fuel Handling SRO.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.1	**Reactor Cavity Seal Failure (cont'd)**	
14.	**CHECK** TSC staffed.	**EVALUATE** OPDP-9, Emergent Issue Response.
15.	**NOTIFY** Chem Lab Supervisor to sample Containment Pit Sump for processing.	
16.	**GO TO** appropriate plant procedure.	

END OF SECTION

APPENDIX A

FILLING REFUELING CAVITY FROM RWST

A. Initiation of Makeup from RWST

1. **IF** initiating makeup from RWST using CCP,
THEN
PERFORM the following:

   a. **VERIFY** RWST level greater than 8%. ☐

   b. **ENSURE** the following charging valves OPEN:

      - FCV-62-90 ☐
      - FCV-62-91 ☐
      - FCV-62-86 or FCV-62-85 ☐

   c. **OPEN** the following valves:

      - FCV-62-135, CCP Suction from RWST ☐
      - FCV-62-136, CCP Suction from RWST ☐

   d. **CLOSE** the following valves:

      - FCV-62-132, CCP Suction from VCT ☐
      - FCV-62-133, CCP Suction from VCT ☐

   e. **CLOSE** FCV-62-83, RHR Letdown. ☐

   f. **CLOSE** FCV-62-81, Letdown Back Pressure Control Valve. ☐

   g. **ENSURE** CCP running. ☐

   h. **VERIFY** flow to RCS. ☐

APPENDIX A

FILLING REFUELING CAVITY FROM RWST

A. Initiation of Makeup from RWST (cont'd)

2. **IF** initiating makeup from RWST using RHR Pump suction,
   THEN
   PERFORM the following:

   a. **VERIFY** RWST level greater than 8%. ☐

   b. **OPEN** FCV-63-1, RWST Supply. ☐

   c. **CLOSE** one of the following valves:

   - FCV-74-1, RHR Supply from Hot Leg No. 4 ☐

     OR

   - FCV-74-2, RHR Supply from Hot Leg No. 4 ☐

   d. **VERIFY** flow to RCS. ☐

APPENDIX A

FILLING REFUELING CAVITY FROM RWST

B. Restoration from RWST Filling Alignment

CAUTION 1 **LCO 3.9.8.1 must be entered when RHR flow is less than 2000 gpm with fuel in reactor vessel.**

CAUTION 2 **LCO 3.9.8.2 must be entered when realigning RHR suction valves with cavity level less than 725' 1.5" (less than 23 feet above flange).**

1. **IF** restoring from RWST makeup using RHR Pump suction,
   THEN
   PERFORM the following:

   a. **ENSURE** RHR Pumps STOPPED. ☐

   b. **CLOSE** FCV-63-1, RWST Supply. ☐

   c. **ENSURE** the following valves OPEN:

   - FCV-74-1, RHR Supply from Hot Leg No. 4 ☐
   - FCV-74-2, RHR Supply from Hot Leg No. 4 ☐

   d. **ENSURE** RHR pump running. ☐

   e. **ENSURE** flow established to RCS. ☐

APPENDIX A

FILLING REFUELING CAVITY FROM RWST

B. Restoration from RWST Filling Alignment (cont'd)

2. **IF** restoring from RWST makeup using CCP,
   THEN
   PERFORM the following:

   a. **ENSURE** VCT makeup initiated as necessary to maintain VCT level above 20%. ☐

   b. **OPEN** the following valves:

   - FCV-62-132, CCP Suction from VCT ☐
   - FCV-62-133, CCP Suction from VCT ☐

   c. **CLOSE** the following valves:

   - FCV-62-135, CCP Suction from RWST ☐
   - FCV-62-136, CCP Suction from RWST ☐

   d. **ENSURE** CCP running. ☐

   e. **ENSURE** flow established to RCS. ☐

   f. **IF** RHR letdown is desired,
   THEN
   OPEN or **THROTTLE** the following valves:

   - FCV-62-81, Letdown Back Pressure Control Valve. ☐
   - FCV-62-83, RHR Letdown. ☐

APPENDIX B

ELEVATIONS AND DISTANCES

The purpose of this appendix is to provide information to aid the decision making processes as follows:

- Placing Irradiated fuel assemblies and reactor vessel lower internals below the reactor vessel flange level with maximum water coverage in a safe storage position
- Limiting loss of water from the Spent Fuel Pit by closing the wafer valve
- Providing guidelines for makeup to the refueling cavity and Spent Fuel Pit in the event of a reactor cavity water seal failure

The following may be useful for decision making:

DESCRIPTION	ELEVATION
Rx flange	702' 1.5"
Bottom of gate between SFP and transfer canal	702' 1.5"
Top of erect upenders	702' 1.75"
Top of fuel racks	701' 0.75"

DESCRIPTION	LENGTH
Length of guide studs	16' 9.6"

DESCRIPTION	DISTANCE (Rx Flange to Refuel Floor)
Equipment storage area	11' 3"
Transfer canal	15' 10.75"

A maximum leak rate of 3176 gpm has been calculated assuming 1/16-inch gap between the seal and the reactor vessel flange. At this leak rate and with the wafer valve closed, it has been estimated that it would take 70 minutes for the refuel cavity to drain to flange elevation.

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

SIM H (RO)

Shutdown the Diesel Generators
(1A-A & 1B-B)

RO/SRO

JOB PERFORMANCE MEASURE

Task: Shutdown the Diesel Generators (1A-A & 1B-B)

Task #: 0640060101 (**RO**)

Task Standard: Diesel Generators "1A-A" & "1B-B" have been shutdown in accordance with EA-82-1.

Time Critical Task: **YES:** ______ **NO:** __X__

K/A Reference/Ratings: 064A4.06(3.9/3.9)
064A2.08 (2.5/2.7)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** __X__

Evaluation Method:

Simulator __X__ **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ________________________________
Trainee Name

Evaluator: ________________ / ________________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **20 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize in IC #188.
4. If IC-(188) not available, reset to IC #16, Trip the reactor, use 1-M-1 hand switch to emergency start the diesels generators. Close TDAFW level control valves.
5. **To perform local actions of section 4.2, set BOTH RF EGR11 and EGR12 to TEST and THEN BOTH back to NORMAL** to reset the D/G start signal. Set **EGR07** and **EGR 08** to **RESET** to reset the 86LOR for the DGs.
6. Load Override AN:OVRDN[905] to OFF to clear the 40 RPM running alarm.
7. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

EA-82-1, Placing D/Gs in Standby

References:

	Reference	Title	Rev No.
1.	EA-82-1	Placing D/Gs in Standby	2

==

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The Unit tripped due to an inadvertent safety injection.
2. The safety injection has been terminated and the plant has been stabilized in MODE 3.
3. The Diesel Generators have been running unloaded for 2 hours and 40 minutes.
4. The status file is complete and there are no outstanding configuration log entries present for the Diesel Generators.
5. All Shutdown Boards are energized by offsite power and the SI signal has been reset.
6. EA-82-1, Sect 4.2, "Resetting D/G Auto Start Signals," has been performed.

INITIATING CUES:

1. You have been directed to shutdown the Unit 1 Diesel Generators per EA-82-1.
2. The 1A-A D/G is to be shutdown first.
3. Inform the SM when 1A and 1B D/Gs have been shutdown per EA-82-1.

Job Performance Checklist:

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>STEP 1.: Obtain appropriate copy of procedure.

STANDARD: Operator obtains a copy of EA-82-1 and proceeds to Section 4.1.

COMMENTS:</td><td>_____ SAT
_____ UNSAT

Start Time ____</td></tr>
<tr><td>STEP 2.: 1. SELECT D/G to be shut down:
• D/G 1A-A _____
• D/G 1B-B _____
• D/G 2A-A _____
• D/G 2B-B _____.

STANDARD: Operator checks 1A-A and 1B-B diesel generators being selected.

COMMENTS:</td><td>_____ SAT
_____ UNSAT</td></tr>
<tr><td>STEP 3.: 2. IF EA-202-1 was NOT used to unload the selected D/G, THEN DISPATCH AUO to perform Section 4.2 to reset selected D/G emergency start signal.

STANDARD: Operator acknowledges, from initial conditions, that section 4.2 has previously been performed and moves to next step.

COMMENTS:</td><td>_____ SAT
_____ UNSAT</td></tr>
<tr><td>STEP 4.: 3. GO TO appropriate section based on table below:

<table>
<tr><th>IF SELECTED D/G</th><th>THEN GO TO SECTION</th><th>D/G 1A-A √</th><th>D/G 1B-B √</th><th>D/G 2A-A √</th><th>D/G 2B-B √</th></tr>
<tr><td>Unloaded greater than 2 hours,</td><td>Section 4.3, Purging D/G Combustibles.</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
<tr><td>Unloaded less than 2 hours,</td><td>Section 4.4, Shutting Down D/G.</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr>
</table>

STANDARD: Operator determines that section 4.3 is the appropriate section since the D/G has been running unloaded more than 2 hours. (also checks the 1A-A and 1B-B boxes.)

COMMENTS:</td><td>_____ SAT
_____ UNSAT</td></tr>
</table>

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
NOTE: The following steps are from section 4.3.	

STEP 5.: 1. **POSITION** selected D/G MODE SELECTOR switch to PARALLEL:

D/G	MODE SELECTOR SWITCH	PARALLEL √
1A-A	HS-82-18	☐
1B-B	HS-82-48	☐
2A-A	HS-82-78	☐
2B-B	HS-82-108	☐

STANDARD: Operator places 0-HS-82-18, DG 1A-A MODE SELECTOR, to PARALLEL.

This step is critical to allow paralleling of DG to Shutdown bus

COMMENTS:

___ SAT

___ UNSAT

Critical Step

STEP 6.: 2. **TURN** selected D/G SYNCHRONIZE switch to SYN:

D/G	SYNCHRONIZE SWITCH	SYN √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

STANDARD: Operator places 0-HS-57-47 DG 1A-A SYNCHRONIZE, to SYN.

This step is critical to allow DG breaker to be closed.

COMMENTS:

______ SAT

______ UNSAT

Critical Step

STEP 7.: PULL-P- 3. **ENSURE** selected D/G VOLTAGE REGULATOR switch in AUTO:

D/G	VOLTAGE REGULATOR SWITCH	PULL-P-AUTO √
1A-A	HS-82-12	☐
1B-B	HS-82-42	☐
2A-A	HS-82-72	☐
2B-B	HS-82-102	☐

STANDARD: Operator verifies 0-HS-82-12, DG 1A-A VOLTAGE REGULATOR to PULL-P-AUTO.

COMMENTS:

______ SAT

______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 8.: 4. **ADJUST** running voltage to match incoming voltage **USING** D/G VOLTAGE REGULATOR switch:	_______ SAT _______ UNSAT **Critical Step**

D/G	INCOMING VOLTAGE	RUNNING VOLTAGE	VOLTAGE MATCHED √
1A-A	EI-82-4	EI-82-5	☐
1B-B	EI-82-34	EI-82-35	☐
2A-A	EI-82-64	EI-82-65	☐
2B-B	EI-82-94	EI-82-95	☐

STANDARD: Operator adjusts 0-HS-82-12, DG 1A-A VOLTAGE REGULATOR, to match voltages on 0-EI-82-4 and 0-EI-82-5.

This step is critical to allow safe parallel operation of the D/G.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 9.: 5. **ADJUST** selected D/G SPEED CONTROL switch UNTIL associated synchroscope rotating slowly in FAST direction:	_______ SAT _______ UNSAT **Critical Step**

D/G	SPEED CONTROL SWITCH	SYNCHROSCOPE	SLOWLY IN FAST DIRECTION √
1A-A	HS-82-13	XI-82-1	☐
1B-B	HS-82-43	XI-82-31	☐
2A-A	HS-82-73	XI-82-61	☐
2B-B	HS-82-103	XI-82-91	☐

STANDARD: Operator adjusts 0-HS-82-13 until synchroscope 0-XI-82-1 is rotating slowly in the fast direction.

This step is critical to allow DG breaker to closed without tripping the DG breaker on reverse power and or DG picking up too much load.

COMMENTS:

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 10.: 6. **WHEN** synchroscope needle is at 12 o'clock" position, **THEN CLOSE** selected D/G output breaker:	______ SAT ______ UNSAT **Critical Step**

D/G	SYNCHROSCOPE	D/G OUTPUT BREAKER	CLOSED √
1A-A	XI-82-1	1-HS-57-46A	☐
1B-B	XI-82-31	1-HS-57-73A	☐
2A-A	XI-82-61	2-HS-57-46A	☐
2B-B	XI-82-91	2-HS-57-73A	☐

STANDARD: Operator places 1-HS-57-46A to the close position when synchroscope 0-XI-82-1 is at the 12 0'clock position resulting in the closing of the DG electrical breaker as indicated by Red Light LIT above the breaker hand switch.

This is a critical step so that the DG breaker won't trip back open due the DG being paralleled out of sync with the SD bus.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 11.: 7. **ADJUST** selected D/G SPEED CONTROL switch to raise D/G MW load to 1.6 MW:	______ SAT ______ UNSAT **Critical Step**

D/G	SPEED CONTROL SWITCH	D/G MEGAWATTS	1.6 MW √
1A-A	HS-82-13	EI-82-10A	☐
1B-B	HS-82-43	EI-82-40A	☐
2A-A	HS-82-73	EI-82-70A	☐
2B-B	HS-82-103	EI-82-100A	☐

STANDARD: Operator intermittently places 0-HS-82-13 to RAISE until the MW loading on 0-EI-82-10A increases to 1.6 MW.

This is a critical step to ensure that the DG does not trip on reverse power

COMMENTS:

Job Performance Checklist:

<table>
<tr><th>STEP / STANDARD</th><th>SAT / UNSAT</th></tr>
<tr><td>
STEP 12.: 8. MAINTAIN +1 MVAR (OUT) for selected D/G, WHILE paralleled with offsite power:

<table>
<tr><th>D/G</th><th>D/G VOLTAGE REGULATOR SWITCH</th><th>D/G MEGAVARS</th><th>+1 MVAR √</th></tr>
<tr><td>1A-A</td><td>HS-82-12</td><td>EI-82-11A</td><td>☐</td></tr>
<tr><td>1B-B</td><td>HS-82-42</td><td>EI-82-41A</td><td>☐</td></tr>
<tr><td>2A-A</td><td>HS-82-72</td><td>EI-82-71A</td><td>☐</td></tr>
<tr><td>2B-B</td><td>HS-82-102</td><td>EI-82-101A</td><td>☐</td></tr>
</table>
STANDARD: Operator places 0-HS-82-12 to RAISE to establish the MVAR loading on 0-EI-82-11A to +1 MVAR outgoing, then maintains this MVAR loading as the DG is loaded by intermittently placing 0-HS-82-12 to RAISE.

This is a critical step to ensure the DG is operated within normal parameters to prevent excessive generator heating.

COMMENTS:
</td><td>
______ SAT

______ UNSAT

Critical Step
</td></tr>
<tr><td>
STEP 13.: 9. DISPATCH an AUO to selected D/G building to monitor stack exhaust WHILE loading selected D/G.

Cue: Role Play as AUO acknowledge the direction to monitor the D/G 1A-A exhaust stack.

STANDARD: Operator dispatches an AUO to the D/G building to monitor D/G 1A-A exhaust.

COMMENTS:
</td><td>
______ SAT

______ UNSAT
</td></tr>
</table>

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 14.: 10. **LOAD** selected D/G to 4.0 MW **USING** its D/G SPEED CONTROL switch WHILE observing the following guidelines: a. **IF** stack exhaust smoke becomes twice as dense as normal during loading, **THEN** **STOP** D/G loading UNTIL condition clears. b. **WHEN** exhaust smoke returns to normal, **THEN** **CONTINUE** D/G loading. c. **DO NOT CONTINUE** this procedure UNTIL the following conditions are met: • D/G load at 4.0 MW **AND** • Stack exhaust NORMAL. ***Cue:*** ***When the AUO is asked, state the exhaust has cleared up and now appears normal.*** STANDARD: Operator loads the D/G 1A-A to 4.0 MW by intermittently placing 0-HS-82-13 to RAISE until the MW loading on 0-EI-82-10A increases to 4.0 mw. This step is critical to ensure the DG is loaded to greater than minimum to clear the exhaust system of unused fuel which could cause a fire. COMMENTS:	_____ SAT _____ UNSAT **Critical Step (shaded portion only)**
STEP 15.: 11. **ADJUST** selected D/G SPEED CONTROL switch to lower D/G MW load to 0.5 MW: STANDARD: Operator places 0-HS-82-13 to LOWER until the MW loading on 0-EI-82-10A reduces to 0.5 mw. This is critical to reduce DG load in preparation of shutdown COMMENTS:	_____ SAT _____ UNSAT **Critical Step**

D/G	SPEED CONTROL SWITCH	0.5 MW √
1A-A	HS-82-13	☐
1B-B	HS-82-43	☐
2A-A	HS-82-73	☐
2B-B	HS-82-103	☐

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 16.: 12. **ADJUST** selected D/G VOLTAGE REGULATOR switch to lower D/G MVAR load to zero:	______ SAT ______ UNSAT

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	0 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

STANDARD: Operator places 0-HS-82-12 to LOWER until the MVAR loading on 0-EI-82-11A reduces to 0.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 17.: 13. **PLACE** selected D/G output breaker control switch to TRIP:	___ SAT ___ UNSAT **Critical Step**

D/G	D/G OUTPUT BREAKER	TRIPPED √
1A-A	1-HS-57-46A	☐
1B-B	1-HS-57-73A	☐
2A-A	2-HS-57-46A	☐
2B-B	2-HS-57-73A	☐

STANDARD: Operator places 1-HS -57-46A to the TRIP position.

This is a critical step needed to shutdown the DG.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 18.: 14. **GO TO** Section 4.4 to shut down D/G.	___ SAT ___ UNSAT

STANDARD: Operator goes to section 4.4 to shut down the D/G 1A-A.

COMMENTS:

Evaluator Note: The following steps are from Section 4.4

STEP / STANDARD	SAT / UNSAT
STEP 19.: 1. **VERIFY** selected D/G unloaded with output breaker open:	___ SAT ___ UNSAT

D/G	D/G OUTPUT BREAKER	BREAKER HANDSWITCH	UNLOADED & OUTPUT BREAKER OPEN √
1A-A	1912	1-HS-54-46A	☐
1B-B	1914	1-HS-57-73A	☐
2A-A	1922	2-HS-54-46A	☐
2B-B	1924	2-HS-57-73A	☐

STANDARD: Operator verifies D/G 1A-a output breaker open by green light LIT over Handswitch 1-HS-54-46A.

COMMENTS:

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 20.: **2. PLACE** selected D/G(s) CONTROL START-STOP switch to STOP:	___ SAT ___ UNSAT **Critical Step**

D/G	D/G CONTROL START-STOP SWITCH	STOP √
1A-A	HS-82-14	☐
1B-B	HS-82-44	☐
2A-A	HS-82-74	☐
2B-B	HS-82-104	☐

NOTE: Operator may elect to turn the synchroscope on to verify D/G goes to idle speed when HS is placed to stop.

STANDARD: Operator places hand switch 0-HS-82-14, on panel 0-M-26, to the STOP.

This step is critical to stop the DG.

COMMENTS:

NOTE: Override AN:OVRDN[905] to OFF to clear the 40 RPM running alarm.

STEP / STANDARD	SAT / UNSAT
STEP 21.: 3. **WHEN** selected D/G(s) has run at idle speed (400 rpm) for 10 minutes, **THEN** **VERIFY** D/G shuts down and speed drops to zero:	___ SAT ___ UNSAT

D/G	ZERO RPM √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

Cue:* *When alarm clears, CUE: 10 minutes have elapsed

Cue:* *If AUO notified, role play and state: D/G is now at zero speed.

STANDARD: Operator addresses need to monitor this step. They may contact the AUO to have him/her contact the UO when speed is zero.

COMMENTS:

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 22.: 4. **ENSURE** selected D/G MODE SELECTOR switch in **PUSH IN UNIT** position:	___ SAT ___ UNSAT **Critical Step**

D/G	MODE SELECTOR SWITCH	PUSH IN UNIT √
1A-A	1-HS-82-18	☐
1B-B	1-HS-82-48	☐
2A-A	2-HS-82-78	☐
2B-B	2-HS-82-108	☐

STANDARD: Operator places hand switch 1-HS-82-18, on panel 0-M-26, to be in PUSH TO UNIT position.

This step is critical to ensure the DG is in its normal start alignment.

COMMENTS:

STEP / STANDARD	SAT / UNSAT
STEP 23.: 5. **ENSURE** selected D/G SYNCHRONIZE switch is in OFF:	___ SAT ___ UNSAT

D/G	SYNCHRONIZE SWITCH	OFF √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

STANDARD: Operator places handswitch 1-HS-57-47, on panel 0-M-26, in the OFF position.

COMMENTS:

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT

STEP 24.: 6. **WHEN** selected D/G(s) have cooled,
THEN
ENSURE ERCW valves to D/G heat exchangers closed:

D/G	ERCW TO D/G HEAT EXCHANGERS	CLOSED √
1A-A	1-HS-67-66A 1-HS-67-68A	☐ ☐
1B-B	1-HS-67-67A 1-HS-67-65A	☐ ☐
2A-A	2-HS-67-66A 2-HS-67-68A	☐ ☐
2B-B	2-HS-67-67A 2-HS-67-65A	☐ ☐

Cue: ***Play role of AUO: I will monitor D/G temperature and ensure DG 1A-A ERCW valves are closed when D/G reaches ambient temp.***

STANDARD: Operator addresses need to monitor this step. They may contact the AUO to have him/her monitor D/G temperatures and shut the ERCW valve, 1-FCV-67-66, when the D/G is at ambient conditions.

COMMENTS:

___ SAT

___ UNSAT

STEP 25.: 7. **GO TO** Section 4.1, step in effect.

STANDARD: Operator returns to section 4.1 and determines the other DG needs to be shutdown.

Cue: ***When candidate returns to section 4.1 to shutdown the other Diesel Generator, state "This completes the JPM."***

COMMENTS:

______ SAT

______ UNSAT

Stop Time____

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The Unit tripped due to an inadvertent safety injection.
2. The safety injection has been terminated and the plant has been stabilized in MODE 3.
3. The Diesel Generators have been running unloaded for 2 hours and 40 minutes.
4. The status file is complete and there are no outstanding configuration log entries present for the Diesel Generators.
5. All Shutdown Boards are energized by offsite power and the SI signal has been reset.
6. EA-82-1, Sect. 4.2, "Resetting D/G Auto Start Signals," has been performed.

INITIATING CUES:

1. You have been directed to shutdown the Unit 1 Diesel Generators per EA-82-1.
2. The 1A-A D/G is to be shutdown first.
3. Inform the SM when 1A and 1B D/Gs have been shutdown per EA-82-1.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

EMERGENCY ABNORMAL PROCEDURE

EA-82-1

PLACING D/Gs IN STANDBY

Revision **2**

QUALITY RELATED

PREPARED/PROOFREAD BY: Marie Hankins

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: J.A. DVORAK

EFFECTIVE DATE: 26 May 03

REVISION DESCRIPTION: Revised section 4.4 to add steps to place the Mode Selector switch in PUSH IN UNIT position and turn the Sync Switch to OFF. This is an intent change.
Added HS UNID for D/G output breakers in section 4.4 step 1.
Added a note in section 4.1 to clarify D/G's have not been returned to TS operability but are placed in a condition for Auto Restart, if required prior to exiting the EOP's. This is a non-intent change.

1.0 PURPOSE

To shut down unloaded D/Gs and place the D/Gs in a standby condition. If a D/G has been running unloaded greater than 2 hours, this EAP will load it to purge combustibles and then unload it and shut it down.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 Entry Conditions

A. E-0, Reactor Trip or Safety Injection.

B. E-1, Loss of Reactor or Secondary Coolant.

C. E-3, Steam Generator Tube Rupture.

D. ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

E. ECA-3.1, SGTR and LOCA - Subcooled Recovery.

F. ECA-3.2, SGTR and LOCA - Saturated Recovery.

G. ECA-3.3, SGTR Without Pressurizer Pressure Control.

H. ES-1.1, SI Termination.

I. ES-1.2, Post LOCA Cooldown and Depressurization.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

A. If the accountability siren sounds, the operator should continue performing this procedure. The SOS will remain aware of procedure progress and location of performing personnel.

3.2 Limitations

A. This EAP does NOT meet all procedural and Technical Specification requirements for returning the D/Gs to a full standby condition. This procedure only returns the D/Gs to a condition for auto-restart to ensure availability if needed prior to exiting the EOPs.

4.0 OPERATOR ACTIONS

4.1 Section Applicability

1. **SELECT** D/G to be shut down:

   - D/G 1A-A ______
   - D/G 1B-B ______
   - D/G 2A-A ______
   - D/G 2B-B ______.

NOTE If EA-202-1 was used to unload the selected D/G, then the D/G emergency start signal and the shutdown board blackout relays have already been reset.

2. **IF** EA-202-1 was NOT used to unload the selected D/G, **THEN**

   DISPATCH AUO to perform Section 4.2 to reset selected D/G emergency start signal. ☐

3. **GO TO** appropriate section based on table below:

IF SELECTED D/G	THEN GO TO SECTION	D/G 1A-A √	D/G 1B-B √	D/G 2A-A √	D/G 2B-B √
Unloaded greater than 2 hours,	Section 4.3, Purging D/G Combustibles.	☐	☐	☐	☐
Unloaded less than 2 hours,	Section 4.4, Shutting Down D/G.	☐	☐	☐	☐

4.1 Section Applicability (Continued)

4. **IF** another D/G to be shut down,
THEN
GO TO Step 4.1.1 ☐

NOTE This procedure places the D/G's in a condition for Auto-Restart, if required prior to exiting the EOP's. Restoration to TS operability and procedural requirements for standby alignment is performed after the EOP's are exited.

5. **RETURN TO** procedure and step in effect. ☐

END OF SECTION

4.2 Resetting D/G Auto Start Signals

NOTE Performance of Steps 4.2.1 and 4.2.2 are required the first time this section is performed but their performance is not required on subsequent passes through this section.

1. **NOTIFY** UO to verify SI reset. ☐

2. **RESET** D/G emergency start signals by performing the following:

   [6.9 KV shutdown board room]

   a. **PLACE** all D/G **[43T(L)]** switches to TEST:

SHUTDOWN BOARD LOGIC PANEL	SWITCH	TEST √
1A-A	43T(L)	☐
1B-B	43T(L)	☐
2A-A	43T(L)	☐
2B-B	43T(L)	☐

   b. **VERIFY** emergency start signals RESET by observing amber lights lit:

SHUTDOWN BOARD LOGIC PANEL	AMBER LIGHT LIT √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

4.2 **Resetting D/G Auto Start Signals** (Continued)

c. **PLACE** all D/G **[43T(L)]** switches to NOR:

SHUTDOWN BOARD LOGIC PANEL	SWITCH	NOR √
1A-A	43T(L)	☐
1B-B	43T(L)	☐
2A-A	43T(L)	☐
2B-B	43T(L)	☐

3. **PERFORM** the following:

a. **VERIFY** D/G **[86 LOR]** red lights DARK:

D/G RELAY BOARD	RED LIGHT DARK √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

b. **PLACE** selected D/G **[86 LOR]** switch to RESET:

D/G RELAY BOARD	SWITCH	RESET √
1A-A	86 LOR	☐
1B-B	86 LOR	☐
2A-A	86 LOR	☐
2B-B	86 LOR	☐

4.2 Resetting D/G Auto Start Signals (Continued)

4. **GO TO** Section 4.1, step in effect. ☐

END OF SECTION

4.3 Purging D/G Combustibles

CAUTION **Only one diesel shall be operated in parallel with off-site power at any time.**

NOTE This section purges the D/G of any combustibles accumulated during the unloaded condition prior to shutting down the D/G.

1. **POSITION** selected D/G MODE SELECTOR switch to PARALLEL:

D/G	MODE SELECTOR SWITCH	PARALLEL √
1A-A	HS-82-18	☐
1B-B	HS-82-48	☐
2A-A	HS-82-78	☐
2B-B	HS-82-108	☐

2. **TURN** selected D/G SYNCHRONIZE switch to SYN:

D/G	SYNCHRONIZE SWITCH	SYN √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

4.3 Purging D/G Combustibles (Continued)

3. **ENSURE** selected D/G VOLTAGE REGULATOR switch in PULL-P-AUTO:

D/G	VOLTAGE REGULATOR SWITCH	PULL-P-AUTO √
1A-A	HS-82-12	☐
1B-B	HS-82-42	☐
2A-A	HS-82-72	☐
2B-B	HS-82-102	☐

4. **ADJUST** running voltage to match incoming voltage **USING** D/G VOLTAGE REGULATOR switch:

D/G	INCOMING VOLTAGE	RUNNING VOLTAGE	VOLTAGE MATCHED √
1A-A	EI-82-4	EI-82-5	☐
1B-B	EI-82-34	EI-82-35	☐
2A-A	EI-82-64	EI-82-65	☐
2B-B	EI-82-94	EI-82-95	☐

5. **ADJUST** selected D/G SPEED CONTROL switch UNTIL associated synchroscope rotating slowly in FAST direction:

D/G	SPEED CONTROL SWITCH	SYNCHROSCOPE	SLOWLY IN FAST DIRECTION √
1A-A	HS-82-13	XI-82-1	☐
1B-B	HS-82-43	XI-82-31	☐
2A-A	HS-82-73	XI-82-61	☐
2B-B	HS-82-103	XI-82-91	☐

4.3 **Purging D/G Combustibles** (Continued)

NOTE When closing the D/G output breaker at 12 o'clock position, consideration should be given to speed of rotation of synchroscope needle and time it takes to close the breaker.

6. **WHEN** synchroscope needle is at 12 o'clock" position, **THEN CLOSE** selected D/G output breaker:

D/G	SYNCHROSCOPE	D/G OUTPUT BREAKER	CLOSED √
1A-A	XI-82-1	1-HS-57-46A	☐
1B-B	XI-82-31	1-HS-57-73A	☐
2A-A	XI-82-61	2-HS-57-46A	☐
2B-B	XI-82-91	2-HS-57-73A	☐

7. **ADJUST** selected D/G SPEED CONTROL switch to raise D/G MW load to 1.6 MW:

D/G	SPEED CONTROL SWITCH	D/G MEGAWATTS	1.6 MW √
1A-A	HS-82-13	EI-82-10A	☐
1B-B	HS-82-43	EI-82-40A	☐
2A-A	HS-82-73	EI-82-70A	☐
2B-B	HS-82-103	EI-82-100A	☐

8. **MAINTAIN** +1 MVAR (OUT) for selected D/G, **WHILE** paralleled with offsite power:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	+1 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

4.3 **Purging D/G Combustibles** (Continued)

9. **DISPATCH** an AUO to selected D/G building to monitor stack exhaust WHILE loading selected D/G. ☐

10. **LOAD** selected D/G to 4.0 MW
USING its D/G SPEED CONTROL switch
WHILE observing the following guidelines:

    a. **IF** stack exhaust smoke becomes twice as dense as normal during loading,
    THEN
    STOP D/G loading UNTIL condition clears. ☐

    b. **WHEN** exhaust smoke returns to normal,
    THEN
    CONTINUE D/G loading. ☐

    c. **DO NOT CONTINUE** this procedure
    UNTIL the following conditions are met:

    - D/G load at 4.0 MW ☐

      AND

    - Stack exhaust NORMAL. ☐

11. **ADJUST** selected D/G SPEED CONTROL switch
to lower D/G MW load to 0.5 MW:

D/G	SPEED CONTROL SWITCH	0.5 MW √
1A-A	HS-82-13	☐
1B-B	HS-82-43	☐
2A-A	HS-82-73	☐
2B-B	HS-82-103	☐

4.3 Purging D/G Combustibles (Continued)

12. **ADJUST** selected D/G VOLTAGE REGULATOR switch to lower D/G MVAR load to zero:

D/G	D/G VOLTAGE REGULATOR SWITCH	D/G MEGAVARS	0 MVAR √
1A-A	HS-82-12	EI-82-11A	☐
1B-B	HS-82-42	EI-82-41A	☐
2A-A	HS-82-72	EI-82-71A	☐
2B-B	HS-82-102	EI-82-101A	☐

13. **PLACE** selected D/G output breaker control switch to TRIP:

D/G	D/G OUTPUT BREAKER	TRIPPED √
1A-A	1-HS-57-46A	☐
1B-B	1-HS-57-73A	☐
2A-A	2-HS-57-46A	☐
2B-B	2-HS-57-73A	☐

14. **GO TO** Section 4.4 to shut down D/G. ☐

END OF SECTION

4.4 Shutting Down D/G

1. **VERIFY** selected D/G unloaded with output breaker open:

D/G	D/G OUTPUT BREAKER	BREAKER HANDSWITCH	UNLOADED & OUTPUT BREAKER OPEN √
1A-A	1912	1-HS-54-46A	☐
1B-B	1914	1-HS-57-73A	☐
2A-A	1922	2-HS-54-46A	☐
2B-B	1924	2-HS-57-73A	☐

2. **PLACE** selected D/G(s) CONTROL START-STOP switch to STOP:

D/G	D/G CONTROL START-STOP SWITCH	STOP √
1A-A	HS-82-14	☐
1B-B	HS-82-44	☐
2A-A	HS-82-74	☐
2B-B	HS-82-104	☐

3. **WHEN** selected D/G(s) has run at idle speed (400 rpm) for 10 minutes,
THEN
VERIFY D/G shuts down and speed drops to zero:

D/G	ZERO RPM √
1A-A	☐
1B-B	☐
2A-A	☐
2B-B	☐

4.4 Shutting Down D/G (Continued)

4. **ENSURE** selected D/G MODE SELECTOR switch in **PUSH IN UNIT** position:

D/G	MODE SELECTOR SWITCH	PUSH IN UNIT √
1A-A	1-HS-82-18	☐
1B-B	1-HS-82-48	☐
2A-A	2-HS-82-78	☐
2B-B	2-HS-82-108	☐

5. **ENSURE** selected D/G SYNCHRONIZE switch is in OFF:

D/G	SYNCHRONIZE SWITCH	OFF √
1A-A	1-HS-57-47	☐
1B-B	1-HS-57-74	☐
2A-A	2-HS-57-47	☐
2B-B	2-HS-57-74	☐

4.4 Shutting Down D/G (Continued)

6. **WHEN** selected D/G(s) have cooled,
   THEN
   ENSURE ERCW valves to D/G heat exchangers closed:

D/G	ERCW TO D/G HEAT EXCHANGERS	CLOSED √
1A-A	1-HS-67-66A 1-HS-67-68A	☐ ☐
1B-B	1-HS-67-67A 1-HS-67-65A	☐ ☐
2A-A	2-HS-67-66A 2-HS-67-68A	☐ ☐
2B-B	2-HS-67-67A 2-HS-67-65A	☐ ☐

7. **GO TO** Section 4.1, step in effect. ☐

END OF TEXT

5.0 REFERENCES

None.

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

SIM ALT A (RO\SRO)

Rod Control Urgent Failure Alarm During Reactor Startup to 1% Power

RO/SRO
JOB PERFORMANCE MEASURE

Task: Operate the Control Rod Drive System to bring the reactor critical. Then, raise power to 1% RTP

JA/TA task # 0010190101 RO/SRO

Task Standard: Respond to Rod Control System Urgent Failure diromg Reactor Startup

Time Critical Task: **YES:** ____ **NO:** X

K/A Ratings: 001A1.06 (4.1/4.4) 001A2.14 (3.7/3.9)

Method of Testing:

Simulated Performance: ________ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ________ **Classroom** ________

Main Control Room ________ **Mock-up** ________

==

Performer: ______________________________________
Trainee Name

Evaluator: __________________ / __________________
Name / Signature

Performance Rating: **SAT:** ________ **UNSAT:** ________

Validation Time: 8 minutes **Total Time:** ________

Performance Time: **Start Time:** ________ **Finish Time:** ________

==

COMMENTS

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Task should begin at the Simulator.
3. Ensure operator performs the following required actions for **SELF-CHECKING**;
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.
4. Reset the simulator to IC 187 and ensure the following is inserted and linked to KEY 1
   a. **AN_OV_306**, Rod Control System Urgent Failure Alarm Override ON
   b. **IMF RD08** Rods Fail to Move
5. Place the simulator in RUN when the student assumes the shift
6. Insert KEY 1 at the Evaluator's Cue.

Tools/Equipment/Procedures Needed:

1. 1-AR-M4-B Rod Control System Urgent Failure Annunciator
2. AOP-C.01 Rod Control System Malfunction
3. 0-GO-3 Power Ascension From Reactor Critical to Less Than 5% Reactor Power

REFERENCES:

	Reference	Title	Rev No.
1.	1-AR-M4-B	Rod Control System Urgent Failure Annunciator	28
2.	AOP-C.01	Rod Control System Malfunction	20
3.	0-GO-3	Power Ascension From Reactor Critical to Less Than 5% Reactor Power	23

==

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. All steps shall be performed for this task. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The plant is recovering from a reactor trip.
2. The cause of the trip has been identified.
3. The Reactor is now critical at 1.0E-3% Power. 0-GO-3, "Power Ascension from Reactor Critical to less than 5 Percent Reactor Power," is in affect.
4. All prerequisites, precautions and limitations are met.

INITIATING CUES:

1. You are the OATC.
2. The Unit Supervisor has ordered you to perform Section 5.2 Step 1 of 0-GO-3, Withdraw Rods to bring the reactor power to between 1 and 2%.
3. Other members of the control room team will address concurrent activities associated with Section 5.2.
4. You are to withdraw control rods per the procedure and inform the US when reactor power is stable at 1-2%.

STEP 1.: Obtain to copy of 0-GO-3. STANDARD: Obtains procedure copy; **OR** a copy marked-up to Section 5.2, Step 1 of 0-GO-3, "Withdraw Rods to bring the reactor power to between 1 and 2%," may be provided. COMMENTS:	___ SAT ___ UNSAT Start time ____
Evaluator NOTE: The evaluator should cue the console operator to insert the Rod Control Urgent failure after a stable positive SUR is obtained.	
STEP 2.: **[1]** Withdraw rods to establish a positive SUR and monitor for proper response. STANDARD: Operator withdraws control rods using the Rod Control switch (1-HS-85-5111) to establish a constant positive SUR of less than 1 DPM. This step is critical in order to increase reactor power using rods. COMMENTS:	___ SAT ___ UNSAT **Critical Step**

Evaluator NOTE: Candidate may determine that the reactor has a positive SUR, control rods will not move and may make the determination that either:

a. **the reactor is uncontrolled and manually trips the Reactor, which meets the critical step performance requirements of Step 14,**

OR

b. **continues, pursuing actions of ARP 1-AR-M4-B window A-6 and AOP-C.01 actions.**

STEP 3.: Responds to annunciator for Rod Control System Urgent Failure (A-6) **[1]** **PLACE** rod control in manual. STANDARD: Operator verifies that Rod control switch (1-HS-85-5110) is selected to MAN. COMMENTS:	___ SAT ___ UNSAT
Caution: Attempting to reset rod control urgent failure alarm using M-4 pushbutton, [1-RCAS], prior to determing and correcting cause could result in dropped rods.	
STEP 4.: **[2]** **DISPATCH** MIG personnel to MG Set Room to investigate cause.. ***CUE:*** **Report as US and state that you will contact MIG** STANDARD: Operator contacts MIG to investigate cause of alarm. COMMENTS:	___ SAT ___ UNSAT
STEP 5.: **[3]** **NOTIFY** MIG to document, in Work Order, the status of the lights on and in the affected power and logic cabinet(s). ***CUE:*** **Report as US and state that you will contact MIG** STANDARD: Operator contacts MIG to investigate cause of alarm. COMMENTS:	___ SAT ___ UNSAT

STEP 6.: **[4]** **WHEN** rod control urgent failure is in alarm, **THEN NOTE** the following: **[a]** If problem is in the Power cabinet – control rods in that cabinet will not move. **[b]** If problem is in the Logic cabinet – no rods will move. STANDARD: Operator determines that location of urgent failure is presently indeterminate and proceeds to step 5. COMMENTS:	___ SAT ___ UNSAT
STEP 7.: **[5]** **IF** alarm is unexpected, **THEN GO TO** AOP-C.01, Rod Control System Malfunctions. STANDARD: Operator recognizes alarm as unexpected and transitions to AOP-C.01. COMMENTS:	___ SAT ___ UNSAT
Evaluator Note: The following starts the steps of AOP-C.01	
STEP 8.: Implement AOP-C.01, Section 2.5 for Rod Control System Urgent Failure Alarm. STANDARD: Operator implements AOP-C.01. COMMENTS:	___ SAT ___ UNSAT

STEP 9.: [1] DIAGNOSE the failure: ROD CONTROL SYSTEM URGENT FAILURE alarm LIT [M-4B window A-6] STANDARD: Operator verifies M-4B, Window A-6 LIT and transitions to Sect 2.5, of AOP-C.01. COMMENTS:	___ SAT ___ UNSAT

Caution 1:	Control Rods should NOT be manually withdrawn during a transient
Caution 2:	Attempting to move control rods with ROD CONTROL SYSTEM URGENT FAILURE alarm could result in dropped or misaligned rods.
Caution 3:	Depressing ROD URGENT FAILURE RESET pushbutton on M-4 prior to determining and correcting cause could result in dropped rods.

STEP 10.: 2.5.1 **CHECK** ROD CONTROL SYSTEM URGENT FAILURE alarm LIT [M-4B window A-6]: STANDARD: Operator verifies M-4B, Window A-6 LIT. COMMENTS:	___ SAT ___ UNSAT
STEP 11.: 2.5.2 **DETERMINE** if rod control should be placed in MANUAL: STANDARD: Operator verifies Rods are still in Manual. COMMENTS:	___ SAT ___ UNSAT

STEP 12.: 2.5.3 **CONTROL** T-avg within 3°F of Tref by performing one of the following: • ADJUST turbine load • ADJUST RCS boron concentration USING 0-SO-62-7 STANDARD: Operator determines that Tavg is within 3°F of Tref. COMMENTS:	___ SAT ___ UNSAT
STEP 13.: 2.5.4 **MONITOR** the following parameters STABLE or CONTROLLED: • Reactor power • T-avg STANDARD: Operator determines that reactor power is increasing and is not controlled and goes to RNO column. COMMENTS:	___ SAT ___ UNSAT
STEP 14.: 2.5.4 **IF** uncontrolled transient is in progress AND control rods CANNOT be moved, THEN TRIP reactor and GO to E-0, Reactor Trip or Safety Injection. STANDARD: Operator determines that uncontrolled transient is in progress and manually trips Reactor. This step is critical to terminate the power increase and place the reactor in a safe shut down mode. COMMENTS: ***CUE:* This completes the JPM**	___ SAT ___ UNSAT **Critical Task** Stop time ____

End of JPM

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. I will provide initiating cues and reports on other actions when directed by you. All steps shall be performed for this task. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The plant is recovering from a reactor trip.
2. The cause of the trip has been identified.
3. The Reactor is now critical at 1.0E-3% Power. 0-GO-3, Power Ascension from Reactor Critical to less than 5 Percent Reactor Power is in affect.
4. All prerequisites, precautions and limitations are met.

INITIATING CUES:

1. You are the OATC.
2. The Unit Supervisor has ordered you to perform Section 5.2 Step 1 of 0-GO-3, Withdraw Rods to bring the reactor power to between 1 and 2%.
3. Other members of the control room team will address concurrent activities associated with Section 5.2.
4. You are to withdraw control rods per the procedure and inform the US when reactor power is stable at 1-2%.

TVA

Sequoyah Nuclear Plant

Unit 1 & 2

General Operating Instructions

0-GO-3

POWER ASCENSION FROM REACTOR CRITICAL TO LESS THAN 5 PERCENT REACTOR POWER

Revision 0023

Quality Related

Level of Use: Continuous Use

Effective Date: 03-29-2010

Responsible Organization: OPS, Operations

Prepared By: W. T. Leary

Approved By: A. S. Bergeron

Current Revision Description

Added Precaution in response to SOER 07-01 Low Power Operations (09000300, PER 164672). This is an administrative change in accordance with the guidance presented in SPP-2.2.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

This General Operating (GO) Instruction provides necessary instructions to raise reactor power to approximately 1% for main feed pump startup and to transition from auxiliary feedwater to main feedwater with the MFW Bypass valves in AUTO.

1.2 Scope

A. This GO contains the following sections:

1. 5.1 Actions To Be Performed Prior To Increasing Reactor Power
2. 5.2 Power Ascension To Approximately 1% RTP
3. 5.3 Transferring Feedwater From Auxiliary To Main Feedwater

2.0 REFERENCES

2.1 Performance References

A. 0-SO-1-2, *Steam Dump System*

B. 1,2-SO-15-1,2, *Steam Generator Blowdown*

C. 1,2-SO-5-1, *Feedwater Heaters and Moisture Separator Reheaters*

D. 1,2-SO-5-2, *No. 3 Heater Drain Tank and Pumps*

E. 1,2-SO-5-3, *No. 7 Heater Drain Tank and Pumps*

F. 1,2-SO-5-4, *Feedwater Turbine Condenser Drain Tank and Pumps*

G. 1,2-SO-5-5, *Atmospheric Condensate Drain Sump and Pumps*

H. 1,2-SO-2/3-1, *Condensate and Feedwater System*

I. 1,2-SO-3-2, *Auxiliary Feedwater System*

J. 1,2-SO-1-1, *Main Steam System*

K. MI-20.154 *Controller Tuning Instruction*

L. 1,2-SI-OPS-000-002.0, *Shift Log*

M. 0-RT-NUC-000-001.0, *Restart Test Program*

2.1 Performance References (continued)

N. 0-PI-OPS-000-001.0, *Initial Startup System Parameter Log*

O. 2-SO-98-1, *Distributed Control System (DCS)*

2.2 Developmental References

A. 0-GO-1, *Unit Startup from Cold Shutdown to Hot Standby*

B. 0-GO-4, *Power Ascension from Less Than 5% Reactor Power to 30% Reactor Power*

C. SPP-2.2

D. FSAR Section 13.5

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

A. Reactor Engineering should be contacted for guidance on core operating recommendations during unusual power maneuvers such as startup during end of core life. **[C.5]**

B. Reactor power should be monitored using the following indications:

1. Average loop ΔT (UO485). Considered to be the most accurate power indication when less than 15% power but greater than Point of Adding Heat.
2. Intermediate Range Indicators(used at or below Point of Adding Heat
3. NIS power range.
4. Steam dump demand. (**REFER TO** graph in 0-SO-1-2).

NOTE
Pressurizer heaters and sprays may be operated, as required, to maintain pressurizer and RCS boron concentration within 50 ppm.

C. The boron concentration in the pressurizer should be maintained within 50 ppm of the RCS by use of pressurizer heaters and spray.

D. Control rod bank D should be ≥ 165 steps at steady state power levels below 85% RTP. This guidance is to preclude long term operation at less than 165 steps to avoid potential impact on safety analysis assumptions. Short term operation at less than 165 steps is **NOT** a concern.

E. The AFW start function for trip of both MFW pumps (LCO 3.3.2.1 (3.3.2) functional unit 6.f) shall be considered INOPERABLE when any MFP trip bus is DE-ENERGIZED OR when any MFP is RESET but is NOT pumping forward. **[C.6]**

F. The AFW start function is required to be operable (both MFWP trip busses energized with non-running pump TRIPPED) <u>prior to pumping forward with the first MFW pump</u>. The only exception is if LCO 3.0.4 (b) can be invoked due to one MFW pump being unavailable. (Refer to 0-TI-OPS-000-911.0)

3.1 Precautions (continued)

G. Prolonged operation at low power levels (less than 5%) is highly discouraged since Xenon changes from any source may challenge reactivity control. Reactor Engineering and Plant Management should be consulted prior to maintaining the reactor critical at low power levels. Detailed, updated reactivity plans, management oversight, just-in-time training and a review of in progress WO for potential impact on the duration of operation in Mode 2 should be implemented prior to planned operation at low power levels. Expected Xenon changes must be clearly understood and preplanned guidance (including trip criteria) should be established for controlling reactivity with special consideration for EOL or when Xenon is not stable. Control Room distractions shall be minimized during low power operations. Reactor Protection System automatic actuations are impacted by low power operations. (INPO SOER 07-01)

3.2 Limitations

A. Do **NOT** exceed a steady startup rate of + 1 DPM.

B. After refueling operations, the NIS indications may be inaccurate until calibration at higher power levels. The NIS calibration procedures will adjust the PRM trip setpoints to ensure that the excore detectors do **NOT** contribute to an overpower condition. Prior to startup, the PRM high range flux trip setpoint will be adjusted from 109 to 60%, with the rod stop (C-2) remaining at 103%. **[C.2]**

C. If fuel defects are present, Preconditioned Power Levels and Maximum Allowable Rates of Power Increase specified in TI-40, *Determination of Preconditioned Reactor Power* shall apply.

Startup Number XXX **Unit** 1 **Date** today

4.0 PREREQUISITES

NOTES

1) Throughout this Instruction where an **IF/THEN** statement exists, the step should be N/A'd if condition does **NOT** exist.

2) Prerequisites may be completed in any order.

3) This instruction may be entered from a partial shutdown, **N/A** sections **NOT** applicable and annotate reason.

[1] **ENSURE** Instruction to be used is the latest copy of effective version. J.D.

[2] **ENSURE** Precautions and Limitations have been reviewed. ☑

[3] **ENSURE** main steam system aligned with MSIVs open in accordance with 1, 2-SO-1-1. ☑

[4] **ENSURE** the reactor is critical with power at approximately 1 X 10^{-3}%. ☑

[5] **MAINTAIN** pressurizer pressure within the normal operating band by use of the pressurizer heaters and spray valves. ☑

[6] **MAINTAIN** pressurizer level greater than or equal to 25%. ☑

NOTE

Due to instrument inaccuracies the steam dump or SG atmospheric relief valve setpoint of 84% or 1005 psig may be ± 1% or ± 12 psig off.

[7] **MAINTAIN** T_{AVG} stable with the steam dumps in pressure mode or with the SG atmospheric relief valves set at ~84% or 1005 psig. ☑

[8] **MAINTAIN** SG levels within the normal operating range using Auxiliary Feedwater. ☑

NOTE

During start up after a cold shutdown the Condensate DI normally will be aligned for full flow polishing until the MSRs are in service.

[9] **ENSURE** Condensate DI polishing operation in accordance with RCL recommendations. J.D.

Startup Number XXX Unit 1 Date today

4.0 PREREQUISITES (continued)

[10] **ENSURE** each performer documents their name and initials:

Print Name	Initials	Print Name	Initials
John Doe	J.D.		

End of Section

Startup Number XXX   Unit 1   Date today

5.0 INSTRUCTIONS

CAUTION

Steps of this procedure must be performed sequentially, unless specifically stated otherwise.

5.1 Actions To Be Performed Prior To Increasing Reactor Power

[1] **ENSURE** Section 4.0, Prerequisites complete. J. D.

NOTE

Steps 5.1[2] through 5.1[7] may be performed in any order.

[2] **ENSURE** two Hotwell pumps in service in accordance with 1, 2-SO-2/3-1. ☐

[3] **ENSURE** one condensate booster pump in service in accordance with 1, 2-SO-2/3-1. ☐

CAUTION

The potential exists for condensation formation in steam extraction lines when feedwater heaters are isolated.

NOTE

Step 5.1[4] may be performed out of sequence (later) due to plant conditions as approved by the SM.

[4] **ENSURE** secondary plant is aligned for startup in accordance with the following:

INSTRUCTIONS	INITIALS
1,2-SO-5-1, Feedwater Heaters and Moisture Separator Reheaters	J. D.
1,2-SO-5-2, No. 3 Heater Drain Tank and Pumps	J. D.
1,2-SO-5-3, No. 7 Heater Drain Tank and Pumps	J. D.
1,2-SO-5-4, Feedwater Turbine Condenser Drain Tank and Pumps	J. D.
1,2-SO-5-5, Atmospheric Condensate Drain Sump and Pumps	J. D.

Startup Number XXX **Unit** 1 **Date** Today

5.1 Actions To Be Performed Prior To Increasing Reactor Power (continued)

> **NOTE**
>
> Steps to prepare for MFPT startup may be performed in parallel with power ascension to 1-2%.

[5] **IF** any MFPT trip buss is **NOT** energized, **THEN**

[5.1] **REFER** to 0-TI-OPS-000-911.0, Instructions for using TS/TR 3.0.4 (b). J.D.

[5.2] **NOTIFY** US/SRO that no MFWP may be placed in service UNLESS LCO 3.0.4 (b) can be invoked. J.D.

[6] **WHEN** MFPT designated for startup is available, **THEN**

PERFORM 1, 2-SO-2/3-1, Preparation of Main Feedwater Pumps for Startup. (**N/A** if previously performed) ☐ N/A

[7] **IF** startup is on Unit 2, **AND**

Secondary System Boric Acid Injection has been in service, **THEN**

ENSURE System has been removed from service in accordance with 0-SO-36-3, *Secondary System Boric Acid Injection*. N/A

End of Section

Startup Number XXX Unit 1 Date today

5.2 Power Ascension To Approximately 1% RTP

NOTE

Average loop ΔT (UO485) is considered to be the most accurate power indication below 15% power but greater than the Point of Adding Heat. IRM should be used at or below Point of Adding Heat. NIS power range and steam dump demand should also be monitored. (Refer to 0-SO-1-2 for steam dump demand program.) **[C.3]**

[1] **WITHDRAW RODS OR DILUTE** to bring reactor power to between 1 and 2% RTP, while continuing with this instruction. ☐

NOTE

After refueling operations the "Initial Startup System Parameter Log" is performed during power escalations to provide the operator with alternate indications of power level (indications independent of calorimetric calculations). If significant differences occur (approx. 5%) between the alternate power indications then Engineering should be notified.

[2] **IF** startup is after a refueling or maintenance on NIS, **THEN**

INITIATE performance of 0-PI-OPS-000-001.0, *Initial Startup System Parameter Log.* **[C.3]** ☐

[3] **COMPARE** NIS power range instrumentation with loop ΔT indicators and steam dump demand to evaluate accuracy of PRMs. **[C.3]** ☐

[4] **SELECT** the highest reading IRM or ΔI and PRM channels to be recorded on NR 45. **[C.3]** ☐

[5] **REVIEW** plant parameters and indications to determine plant stability prior to startup of Main Feed Pump. ☐

[6] **MAINTAIN** reactor power approximately 1%. ☐

Startup Number________ Unit _____ Date ________

5.2 Power Ascension To Approximately 1% RTP (continued)

NOTE

Steps 5.2[7] and 5.2[8] may be performed in any order.

[7] **WHEN** total Aux FW flow to SGs 1 and 2 is constant and greater than or equal to 300 gpm, **THEN**

CLOSE [FCV-3-400], AFW PUMP A RECIRC ISOL VLV, and **PLACE** handswitch [HS-3-400A] in the PULL TO LOCK position.

_____ 1st

_____ IV

[8] **WHEN** total Aux FW flow to SGs 3 and 4 is constant and greater than or equal to 300 gpm, **THEN**

CLOSE [FCV-3-401], AFW PUMP B RECIRC ISOL VLV, and **PLACE** handswitch [HS-3-401A] in the PULL TO LOCK position.

_____ 1st

_____ IV

NOTE

Control rod bank D should be ≥ 165 steps at steady state power levels below 85% RTP. This guidance is to preclude long term operation at < 165 steps to avoid potential impact on safety analysis assumptions. Short term operation at < 165 steps is **NOT** a concern.

[9] **ENSURE** the plant is stabilized between 1 and 2% reactor power. **[C.1] [C.3]** ☐

[10] **COMPARE** NIS intermediate range instrumentation with loop ΔT indications to evaluate accuracy of IRM's. **[C.1]** ☐

[11] **RECORD** IRM readings: **[C.3]**

N35 __________ % RTP ☐

N36 __________ % RTP ☐

5.2 Power Ascension To Approximately 1% RTP (continued)

NOTE
Step 5.2[12] may be performed out of sequence or in parallel with subsequent steps.

[12] **OPEN** Turbine Exhaust Hood cooling valves [FSV-47-215A, -215B, -215C] by placing [HS-47-215], in ON position. [located on LP Htr Mezz] ________

[13] **WHEN** startup of the first MFPT is desired, **THEN**

PROCEED with step 5.2[14]. ________

NOTE
The following steps ensure MFPT trip busses energized and MFPTs reset if entering from 0-GO-2 with no MFPT available.

[14] **ENSURE** MFPT designated for startup has been tested and ready for start up per 1, 2-SO-2/3-1 **PRIOR** to proceeding with the next step.

________ Initials	________ Date	________ Time

5.2 Power Ascension To Approximately 1% RTP (continued)

NOTE

If both MFPT trip busses are de-energized, power should be placed on only **ONE** trip bus to prevent inadvertent AFWP start.

[15] **IF** both MFPT trip busses de-energized, **THEN**

RESTORE power to **ONLY ONE** MFPT trip bus on the applicable unit. (**N/A** breakers **NOT** applicable.) **[C.1]**

UNIT 1 PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS
MFPT 1A	1-BKRD-46-KA/523	250v DC Battery Bd I	CLOSED	______ 1st ______ CV
MFPT 1B	1-BKRD-46-KA/524	250v DC Battery Bd I	CLOSED	______ 1st ______ CV

UNIT 2 PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS
MFPT 2A	2-BKRD-46-KB/523	250v DC Battery Bd 2	CLOSED	______ 1st ______ CV
MFPT 2B	2-BKRD-46-KB/524	250v DC Battery Bd 2	CLOSED	______ 1st ______ CV

Startup Number________ Unit _____ Date ________

5.2 Power Ascension To Approximately 1% RTP (continued)

CAUTION
Failure to reset a MFPT prior to energizing the remaining MFPT trip buss will initiate an ESF actuation.

NOTE
If an SI signal or a Hi/Hi steam generator level has occurred, the Reactor Trip Breakers will have to be cycled.

[16] **ENSURE** at least one energized MFPT trip bus is RESET.

________	________	________
Initials	Date	Time
________	________	________
CV	Date	Time

[17] **IF** one MFW pump is NOT available,
THEN
PERFORM the following:

[17.1] **ENSURE** requirements of 0-TI-OPS-000-911.0 are met for using LCO 3.0.4 (b). ________ SM

[17.2] **MARK** steps 5.2[18] and 5.2[19] as N/A. ________

Startup Number________ Unit _____ Date _________

5.2 Power Ascension To Approximately 1% RTP (continued)

[18] **ENSURE** power to the remaining MFPT Trip Bus on the applicable unit. (**N/A** breakers **NOT** applicable)

UNIT 1 PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS
MFPT 1A	1-BKRD-46-KA/523	250v DC Battery Bd I	CLOSED	______ 1st ______ CV
MFPT 1B	1-BKRD-46-KA/524	250v DC Battery Bd I	CLOSED	______ 1st ______ CV

UNIT 2 PUMP	BREAKER NO.	ELECTRICAL BOARD	BREAKER POSITION	INITIALS
MFPT 2A	2-BKRD-46-KB/523	250v DC Battery Bd 2	CLOSED	______ 1st ______ CV
MFPT 2B	2-BKRD-46-KB/524	250v DC Battery Bd 2	CLOSED	______ 1st ______ CV

[19] **ENSURE** second MFPT is RESET.

______ Initials	______ Date	______ Time
______ CV	______ Date	______ Time

Startup Number________ Unit _____ Date ________

5.2 Power Ascension To Approximately 1% RTP (continued)

CAUTION

The first MFW pump shall NOT be placed in service to S/Gs (pumping forward) UNTIL second MFP is TRIPPED in Step 5.2[22]. (Ref: LCO 3.3.2.1 or 3.3.2) The only exception is if LCO 3.0.4 (b) is being invoked due to non-availability of the second MFP.

[20] **ENSURE** the MFW Bypass valves are in **MANUAL AND CLOSED. [C.4]**

DESCRIPTION	CONTROLLER	POSITION	√
SG-1 MFW Bypass Flow Control	LIC-3-35	MANUAL AND CLOSED	☐
SG-2 MFW Bypass Flow Control	LIC-3-48	MANUAL AND CLOSED	☐
SG-3 MFW Bypass Flow Control	LIC-3-90	MANUAL AND CLOSED	☐
SG-4 MFW Bypass Flow Control	LIC-3-103	MANUAL AND CLOSED	☐

[21] **START** the first MFPT in accordance with 1, 2-SO-2/3-1. ☐

Startup Number________ Unit _____ Date ________

5.2 Power Ascension To Approximately 1% RTP (continued)

> **NOTE**
>
> The following step will assure that a trip of the running MFP will initiate an AFW pump auto start. (Ref: TS LCO 3.3.2.1 and 3.3.2, PER 03-006930-000).

[22] **IF** the **NON**-running MFPT trip buss is energized,
THEN
TRIP the NON-running MFPT: (**N/A** the running MFPT)

MFPT	HANDSWITCH	INITIALS	CV
A	HS-46-9A		
B	HS-46-36A		

End of Section

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater

NOTE

UNIT 2 ONLY: S/G level swings will be minimized if S/G levels are near the middle of the band when starting transfer to MFW.

[1] **VERIFY** S/G levels between 34 and 44%. ☐

CAUTION

Anticipate a change in MFPT delta P when SG MFW Bypass valves are adjusted. [C.4]

NOTE

UNIT 1 ONLY: The MFW Bypass valve controllers must be in MANUAL when adjusting setpoint value to prevent controller gain input change. **[C.4]**

[2] **ENSURE** the MFW Bypass valve controller setpoints are set for a level of approximately 39%. **[C.4]** ☐

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

CAUTION

DO **NOT** increase reactor power above 2% until MFW Bypass valves are in control of SG level and Auxiliary Feedwater is shutdown.

NOTES

1) Review plant parameters and indications to verify plant stability prior to transfer of AFW LCV to its associated MFW Bypass valve.
2) Transfer to only one MFW Bypass valve at a time. Stable level control shall be achieved in each steam generator before placing another MFW Bypass valve in AUTO. Stable level control is defined as a stable oscillation of less than or equal to 5% or an oscillation that is decreasing.
3) The SG level operator is in control of unit startup until the MFW Reg. valves are in AUTO. **[C.4]**

[3] **PERFORM** the following to transfer the SG level control from the AFW LCVs to the MFW Bypass valves:

	SG-1	SG-2	SG-3	SG-4
[a] **PLACE** the MFW Bypass valve controller in the AUTO position.	☐	☐	☐	☐
[b] **SLOWLY DECREASE** AFW flow to the associated SG to ZERO gpm.	☐	☐	☐	☐
[c] **WHEN** total AFW flow to both SGs is less than 300 gpm, **THEN ENSURE** AFW PUMP RECIRC ISOL valves are OPEN	☐		☐	
[d] **ALLOW** SG level to stabilize.	☐	☐	☐	☐
[e] **WHEN** MFW Bypass valve is controlling SG level, **THEN PROCEED TO** another SG loop	☐	☐	☐	☐

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

[4] **IF** SG level oscillations occur, **THEN**

PERFORM the following to dampen the oscillations during SG level control with the MFW Bypass in AUTO, (N/A if **NOT** required):

		SG-1	SG-2	SG-3	SG-4
[a]	**PLACE** the MFW Bypass valve controller in MANUAL.	☐	☐	☐	☐
[b]	**ADJUST** valve output to less than 10% in the opposite direction of valve travel.	☐	☐	☐	☐
[c]	**PLACE** the MFW Bypass valve controller in AUTO.	☐	☐	☐	☐

NOTE

If MFW Bypass valves do NOT control properly in AUTO, then unit startup shall NOT continue until corrective actions have been taken to allow proper operation of the MFW Bypass controllers in AUTO unless waived by Plant Manager.

[5] **IF** the MFW Bypass is **NOT** operating properly in AUTO, **THEN**
STABILIZE plant conditions and **NOTIFY** the SM for corrective actions. **[C.4]**

__________ __________ __________
Initials Date Time

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

[6] **WHEN** #1 and 2 SG MFW Bypass valves are in AUTO and SG levels have stabilized,
THEN
PERFORM the following steps (Steps may be performed later if unstable conditions exist or if the SM prefers to maintain the MDAFW pump A-A on recirc):

[6.1] **ENSURE** AFW flow to SG #1 and 2 is **ZERO**. ________

[6.2] **ENSURE** #1 and 2 SG levels are stable. ☐

[6.3] **STOP** MDAFW pump A-A. ________

[6.4] **PLACE** MDAFW pump A-A in **A-P AUTO**. ________ 1st ________ IV

[6.5] **ENSURE** #1 and 2 SG levels remain stable. ________

[6.6] **PLACE** LCV-3-164 in AUTO. ________ 1st ________ IV

[6.7] **PLACE** LCV-3-156 in AUTO. ________ 1st ________ IV

[6.8] **CLOSE** [FCV-3-400], AFW PUMP A RECIRC ISOL VLV with [HS-3-400A]. ________ 1st ________ IV

[6.9] **PLACE** [HS-3-400A], AFW PUMP A RECIRC ISOL VLV handswitch to the PULL TO LOCK position. ________ 1st ________ IV

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

[7] **WHEN** #3 and 4 SG MFW Bypass valves are in AUTO and SG levels have stabilized,
THEN
PERFORM the following steps (Steps may be performed later if unstable conditions exist or if the SM prefers to maintain the MDAFW pump B-B on recirc):

[7.1] **ENSURE** AFW flow to SG #3 and 4 is **ZERO**. ________

[7.2] **ENSURE** #3 and 4 SG levels are stable. ☐

[7.3] **STOP** MDAFW pump B-B. ________

[7.4] **PLACE** MDAFW pump B-B in **A-P AUTO**. ________ 1st ________ IV

[7.5] **ENSURE** #3 and 4 SG levels remain stable. ________

[7.6] **PLACE** LCV-3-148 in AUTO. ________ 1st ________ IV

[7.7] **PLACE** LCV-3-171 in AUTO. ________ 1st ________ IV

[7.8] **CLOSE** [FCV-3-401], AFW PUMP B RECIRC ISOL VLV with [HS-3-401A]. ________ 1st ________ IV

[7.9] **PLACE** [HS-3-401A], AFW PUMP B RECIRC ISOL VLV handswitch to the PULL TO LOCK position. ________ 1st ________ IV

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

[8] **VERIFY** the following:

A. SG levels stabilized between 34 and 44%. ☐

B. Reactor power stabilized between 1 and 2%. ☐

C. Main Feed Pump in AUTO. ☐

D. MFW Bypass valves in AUTO (**N/A** if waived by plant manager or designee.). ☐

[9] **VERIFY** all motor driven AFW LCV controllers in AUTO.

________	________	________
Initials	Date	Time
IV	Date	Time

[10] **VERIFY** all turbine driven AFW LCV controllers in **NORMAL**.

________	________	________
Initials	Date	Time
IV	Date	Time

NOTE

Unit 1 Only - All four MFW Bypass valves shall be in AUTO and reactor power less than 2% prior to performing the next step.

[11] **Unit 1 Only:**

IF fine tune of MFW Bypass level controllers is required, **THEN REQUEST** I&C to perform MI-20.154 *Controller Tuning Instruction*. ☐

Startup Number________ Unit _____ Date ________

5.3 Transferring Feedwater From Auxiliary To Main Feedwater (continued)

CAUTION

After refueling operation, the NIS indications may be inaccurate until calibration at higher power levels has been performed. Reactor power shall **NOT** be allowed to exceed 4% prior to the verification of the proper (or conservative) IR and PR setpoints. **[C.2]**

[12] **MAINTAIN** reactor power greater than 1% and less than or equal to 4%. ☐

[13] **CONTACT** Reactor Engineering to determine if 0-PI-NUC-092-082 should be performed prior to exceeding 4% reactor power. ☐

[14] **IF** initial restart after refueling and a low power flux map is required, **THEN**

PERFORM applicable portions of the low power physics testing in accordance with 0-RT-NUC-000-001.0, *Restart Test Program*.

________	________	________
Reactor Engineering	Date	Time

[15] **IF** power escalation is desired, **THEN**

GO TO 0-GO-4, *Power Ascension From Less Than 5% Reactor Power To 30% Reactor Power.* ________

[16] **IF** Unit shutdown is desired, **THEN**

GO TO 0-GO-6, *Power Reduction From 30% Reactor Power To Hot Standby.* ________

End of Section

6.0 RECORDS

Completed copies shall be transmitted to the Operations Superintendent's Secretary.

Source Notes
(Page 1 of 1)

Requirements Statement	Source Document	Implementing Statement
Revise GOI-2 to require verification of IR status at approximately 20 and 25 percent, verify source range (SR) status and channel check at lower power, monitor core delta Ts at low-power levels and during power escalation and compare with NIS response and verify that the IR rod stop and trip bistables come in at the appropriate power level during power ascension.	NCO 890118002 LER 328/89006S53 890531 844JRB to NRC	C.1
Following refueling operations relocation of NIS or modifications affecting the NIS response, provide adequate reductions of trip setpoint and limitations of reactor power until accuracy of the NIS is verified. Also provide alternate indications of power independent of calorimetric calculations during power ascensions.	SOER-90-003 NCO 900107009 NER 1187001 LER 327/90011R1	C.2
INPO SER on miscalibration of NIS Power Range detectors	SER 89-009NER 890252	C.3
Revise GOI-2 prior to restarting Unit 2 to incorporate industry Feedwater startup experience, add guidelines for each crew member, control the use of manual bypass control, add cautionary statements prior to important feedwater evolutions, and add hardware operability requirements for important feedwater evolutions.	LER 328/89005 RIMS S53 890512 811 RIMS L44 890505 805	C.4
Consult Reactor Engineering for guidance during evolutions of unusual power maneuvers at end of core life.	NER 89 0794OER 89 3497	C.5
Ensure MFWP trip bus energized before entry into Mode 2. (This commitment transferred from -0-GO-2 and modified as a result of TSC 08-05.)	LER 328/88-014	C.6

ROD CONTROL SYSTEM URGENT FAILURE

Source

SER 306

Logic Cabinet:

1. Card removed.
2. Pulser did not pulse.
3. Slave cycler received go signal while in cycle.

Power Cabinet:

1. Phase failure.
2. Regulation failure.
3. Logic error.
4. Multiplexing error.
5. Card removed.
6. Reactor trip breaker open.
7. Loss of power to MG sets.

Probable Causes

1. Blown fuse or component failure.
2. Reactor trip breakers open.
3. Loss of power to MG sets.
4. Rod testing (e.g. 0-SI-OPS-085-011.0 or low power physics testing).
5. Misaligned / dropped rod recovery.

Corrective Actions

[1] **PLACE** rod control in manual.

CAUTION Attempting to reset rod control urgent failure alarm using M-4 pushbutton, [1-RCAS], prior to determining and correcting cause could result in dropped rods.

[2] **DISPATCH** MIG personnel to MG Set Room to investigate cause.

CORRECTIVE ACTIONS CONTINUED ON NEXT PAGE

ROD CONTROL SYSTEM URGENT FAILURE

NOTE The table below provides information on Control Rod Bank power supplies.

Bank	Group	Power Cabinet	# of Rods	Core Location
Cntrl A	1	1AC	2	H-6, H-10
	2	2AC	2	F-8, K-8
Cntrl B	1	1BD	4	F-2, P-6, B-10, K-14
	2	2BD	4	K-2, B-6, P-10, F-14
Cntrl C	1	1AC	4	H-2, P-8, B-8, H-14
	2	2AC	4	K-6, F-6, K-10, F-10
Cntrl D	1	1BD	4	M-4, D-4, M-12, D-12
	2	2BD	5	H-4, M-8, H-8, D-8, H-12
SD A	1	1AC	4	E-5, L-5, E-11, L-11
	2	2AC	4	M-2, B-4, P-12, D-14
SD B	1	1BD	4	G-3, C-9, J-13, N-7
	2	2BD	4	J-3, N-9, G-13, C-7
SD C	1	SCD	4	E-3, C-11, L-13, N-5
SD D	1	SCD	4	C-5, E-13, N-11, L-3

Corrective Actions (Continued)

[3] **NOTIFY** MIG to document, in Work Order, the status of the lights on and in the affected power and logic cabinet(s).

[4] **WHEN** rod control urgent failure is in alarm, **THEN** **NOTE** the following:

[a] If problem is in the Power cabinet - control rods in that cabinet will not move.

[b] If problem is in the Logic cabinet - no rods will move.

[5] **IF** alarm is unexpected, **THEN** **GO TO** AOP-C.01, *Rod Control System Malfunctions*.

[6] **MONITOR** Plant Computer "Rod Insertion Limit Display" for abnormalities.

[7] **EVALUATE** Technical Specifications (3.1.3.1).

References 45B655-04B-0

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-C.01

ROD CONTROL SYSTEM MALFUNCTIONS

Revision 20

QUALITY RELATED

PREPARED/PROOFREAD BY: D. A. PORTER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: J. K. WILKES

EFFECTIVE DATE: 4/2/2009

REVISION DESCRIPTION: Revised Section 2.4 to address dropped rods in Modes 3-5. Modified Sect. 2.2 (Dropped Rod) to address Mode 1 or 2 only. This is a corrective action for PER 156870.

THIS PROCEDURE IMPACTS REACTIVITY

1.0 PURPOSE

This procedure provides the actions necessary to mitigate the effects of the following:

- Failure of a control bank to move when required
- Uncontrolled rod bank movement
- Dropped rod(s)
- Misaligned control rod(s)
- Rod Position Indicator (RPI) Malfunction(s)

2.0 OPERATOR ACTIONS

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
Uncontrolled rod bank movement (rod movement NOT due to actual T-avg/T-ref mismatch or change in reactor/turbine power)	2.1	4
Dropped shutdown/control rod(s) with reactor initially in Mode 1 or 2	2.2	10
Misaligned shutdown/control rod(s) or bank in Mode 1 or 2	2.3	24
Dropped or Misaligned shutdown/control rod(s) in Modes 3, 4 or 5	2.4	43
Failure of control bank to move on demand (AUTO or MANUAL) **OR** ROD CONTROL SYSTEM URGENT FAILURE alarm LIT. [M-4B window A-6]	2.5	52
Rod Position Indicator (RPI) Malfunction - Modes 1 or 2	2.6	61

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move

CAUTION 1: Control Rods should **NOT** be manually withdrawn during a transient.

CAUTION 2: Attempting to move control rods with **ROD CONTROL SYSTEM URGENT FAILURE** alarm could result in dropped or misaligned rods.

CAUTION 3: Depressing **ROD URGENT FAILURE RESET** pushbutton on **M-4** prior to determining and correcting cause could result in dropped rods.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**CHECK** ROD CONTROL SYSTEM URGENT FAILURE alarm LIT. [M-4B, window A-6]	**IF** ROD CONTROL SYSTEM URGENT FAILURE alarm is NOT LIT, **THEN** **PERFORM** the following: a. **ENSURE** rod control in MAN. b. **GO TO** Step 17.
2.	**DETERMINE** if rod control should be placed in MANUAL:	
	a. **CHECK** rod control in AUTO.	a. **MAINTAIN** rod control mode selector switch in current position. **GO TO** Step 3.
	b. **PLACE** rod control in MAN.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
3.	**CONTROL** T-avg within 3°F of T-ref by performing one of the following: • **ADJUST** turbine load OR • **ADJUST** RCS boron concentration **USING** 0-SO-62-7.	
4.	**MONITOR** following parameters STABLE or CONTROLLED: • reactor power • T-avg	**IF** uncontrolled transient in progress **AND** control rods CANNOT be moved, **THEN** **TRIP** reactor and **GO TO** E-0, Reactor Trip or Safety Injection.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5.	**DETERMINE** source of urgent failure alarm:	
	a. **DISPATCH** MIG to determine source of urgent failure alarm (power cabinet or logic cabinet).	
	b. **CHECK** urgent failure light LIT in any power cabinet.	b. **IF** urgent failure alarm is in logic cabinet, **THEN** **GO TO** Step 9.
	c. **DETERMINE** affected rod group **USING** 1,2-AR-M4-B (window A-6).	

CAUTION: Applying DC latch and hold power to more than one group at a time could cause dropped rods.

NOTE: Regulator Failure light (in affected power cabinet) may illuminate when DC Hold Power is placed on affected rod group. This light should clear when the Rod Urgent Failure is reset.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
6.	**APPLY** DC hold power to affected rod group: [Aux Bldg, 759' elev, MG Set Room]	
	a. **CHECK** DC latch and hold power available **USING** lights on door panel.	a. **ENSURE** Switch S1 in DC Hold cabinet is ON.
	b. **PLACE** affected group's switch in LATCH for at least one second.	
	c. **PLACE** switch in HOLD.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
7.	**INITIATE** Maintenance to correct cause of urgent failure alarm.	

CAUTION: **If rod control urgent failure alarm is caused by Stationary Regulation failure or any logic cabinet failure, dropped rods could result from placing rod control in BANK SELECT.**

NOTE: If reactor is determined to be unaffected by failure and bank overlap requirements are maintained, reactor may be operated indefinitely with Control Bank D in BANK SELECT.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8.	**DETERMINE** if Control Bank D is available:	
	a. **VERIFY** NO Urgent Failure alarm in the following cabinets: • logic cabinet • power cabinet 1BD • power cabinet 2BD.	a. **GO TO** Step 9.
	b. **EVALUATE** use of Control Bank D in BANK SELECT as necessary to control T-avg and reactor power.	
9.	**CHECK** repairs completed.	**DO NOT CONTINUE** this section UNTIL repairs completed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.5	**Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)**	
10.	**VERIFY** movable gripper coil current NORMAL (measured by MIG, reduced current for Urgent Failure should read ~ 4.4 amps nominal).	**WHEN** movable gripper coil current is verified normal, **THEN** **CONTINUE** with Step 11.
11.	**ENSURE** DC hold power removed from affected group.	
12.	**VERIFY** stationary gripper coil NORMAL (measured by MIG, reduced current should read ~ 4.4 amps nominal).	
13.	**RESET** urgent failure alarm **USING** Rod Urgent Failure Alarm Reset pushbutton. [M-4].	
14.	**REMOVE** power from DC Hold Cabinet (GO to OFF with the S1 switch).	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.5	**Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)**	
15.	**CHECK** ROD CONTROL SYSTEM URGENT FAILURE alarm DARK [M-4B, A6].	**DO NOT CONTINUE** this section **UNTIL** alarm can be cleared.
16.	**GO TO** Step 22.	
17.	**CONTROL** T-avg within 3°F of T-ref by performing one of the following: • **POSITION** control rods OR • **ADJUST** turbine load OR • **ADJUST** RCS boron concentration **USING** 0-SO-62-7.	

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2.5	**Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)**	
18.	**MONITOR** following parameters STABLE or CONTROLLED: • reactor power • T-avg	**IF** uncontrolled transient in progress **AND** control rods CANNOT be moved, **THEN** **TRIP** reactor and **GO TO** E-0, Reactor Trip or Safety Injection.
19.	**CHECK** the following rod stop alarm windows DARK: • IRS INTERMED RANGE HI FLUX LVL ROD WITHDRAWAL STOP alarm [M-4B, B2] • NIS POWER RANGE OVERPOWER ROD WITHDRAWAL STOP alarm [M-4B, D3] • C-3 OVERTEMP ΔT ROD STOP AND TURB RUNBACK [M-4A, E1] • C-4 OVERPOWER ΔT ROD STOP AND TURB RUNBACK [M-4A, E2].	**REFER TO** ARP for lit window to determine setpoint. **IF** alarm is lit due to valid overpower condition, **THEN** **REDUCE** turbine load and reactor power as necessary to correct condition. **IF** any nuclear instrument channel has failed, **THEN** **GO TO** AOP-I.01, Nuclear Instrument Malfunction. **IF** any T-avg or ΔT channel has failed, **THEN** **GO TO** AOP-I.02, RCS Loop RTD Instrument Malfunction.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
20.	**CHECK** C-5 LOW TURB IMPULSE PRESS ROD WITHDRAWAL BLOCKED permissive DARK. [M-4A, E3]	**IF** PT-1-73 failed, **THEN** **GO TO** AOP-I.08, Turbine Impulse Pressure Instrument Malfunction. **IF** turbine load is less than 15% **AND** rods failed to move outward in AUTO, **THEN** **PERFORM** the following: a. **CONTINUE** operation of control rods in MANUAL. b. **GO TO** appropriate plant procedure.
21.	**CHECK** BANK D AUTO ROD WITHDRAWAL BLOCKED permissive DARK. [M-4B, C7].	**IF** control rods failed to move inward **OR** Bank D rods are at less than 217 steps, **THEN** **INITIATE** repairs on rod control. **IF** Bank D rods failed to withdraw in AUTO **AND** Bank D step counter at 218 steps or greater, **THEN** **GO TO** appropriate plant procedure.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.5 Rod Control Urgent Failure Alarm or Failure of Control Bank to Move (cont'd)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
22.	**RESTORE** T-avg and Delta flux (ΔI) to normal **USING** any of the following: • Manual rod control • RCS boration or dilution • Turbine load reduction.	
23.	**CHECK** rod control repairs COMPLETE.	**PERFORM** the following: a. **WHEN** rod control repairs COMPLETE **AND** T-avg is within 1°F of T-ref, **THEN** **RESTORE** rod control to AUTO as required **USING** 0-SO-85-1, Rod Control System. b. **GO TO** appropriate plant procedure.
24.	**WHEN** T-avg is within 1°F of T-ref **AND** auto rod control is desired, **THEN** **PLACE** rod control in AUTO **USING** 0-SO-85-1, Rod Control System.	
25.	**GO TO** appropriate plant procedure.	

END OF SECTION

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

SIM ALT D (RO\SRO)

Start #1 RCP in Mode 3

RO/SRO
JOB PERFORMANCE MEASURE

Task: Start a Reactor Coolant Pump
Monitor the operation of the reactor coolant pumps

JA/TA task # : 0030010101
0030020101

Task Standard: Determine RCP meets trip criteria and trip RCP #1

Time Critical Task: **YES:** ____ **NO:** ____X____

K/A Ratings: 003 A1.02 2.9/2.9
015/017 AA1.03 3.7/3.8

Method of Testing:

Simulated Performance: ____ **Actual Performance:** __X__

Evaluation Method:

Simulator __X__ **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **13 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'
2. Initialize the simulator in **IC-186**. If not available, initialize to IC#7, Stop the #1 RCP.
   - Have RCP data screen on ICS.
   - Set NR-45 to display one SRM and one IRM
   - Freeze the simulator.
   - Hand the marked up procedure 1-SO-68-2, Section 5.1 through step 10 to the candidate.
3. Place the Simulator in RUN when the operator assumes the task.
4. Booth operator will be required to **Insert the SCN File RCPHEATUP.scn (from exams folder) during the JPM**
5. Insure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

1-SO-68-2, AOP-R.04, 1-AR-M5-B

References:

	Reference	Title	Rev No.
1.	1-SO-68-2	Reactor Coolant Pumps	32
2.	AOP- R.04	Reactor Coolant Pump Malfunctions	24
3.	1-AR-M5-B	CVCS Seal Water and RCP	36

==

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in Mode 3.
2. Preparations are being made to start #1 RCP.
3. All precautions and prerequisites are complete.
4. 1-SO-68-2 Section 5.1, steps 1 through 10 are complete.
5. Loop 2, 3 and 4 RCP's are in service

INITIATING CUES:

1. You have been directed to start the Loop 1 RCP in accordance with 1-SO-68-2, Reactor Coolant Pumps.
2. Notify the US when the procedure is complete.

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
NOTE: REAC COOL PMPS OIL LIFT PRESS LOW *annunciation will come in and clear during performance of the next step*	
STEP 1.: [11] **PLACE [1-HS-68-84A]** No. 1 RCP Lift Oil Pump in the **START** position. STANDARD: Places 1-HS-68-84A in start. This step is critical to make up a start interlock for the #1 RCP. COMMENTS:	___ SAT ___ UNSAT **Critical Step** Start Time_______
STEP 2.: [12] **WHEN** Lift Oil Pump for No. 1 RCP has run ≈2 minutes, **THEN ANNOUNCE** No. 1 RCP start on the P/A system. STANDARD: After two minutes has elapsed, makes announcement over PA system. COMMENTS:	___ SAT ___ UNSAT
STEP 3.: [13] **IF** no RCPs are running **AND** RCP No. 1 is the first RCP to be started, **THEN MONITOR** the SRMs during startup of the RCP. STANDARD: Operator determines other 3 RCPs are running and N/As this step COMMENTS:	___ SAT ___ UNSAT
NOTE: VIBRATION & LOOSE PARTS MONITORING ALM, *alarm will come in when RCP is Started,* **Operator may dispatch AUO and Predictive Maintenance personnel to check. If so, acknowledge the direction.**	

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 4.: [14] **PLACE [1-HS-68-8A]** No. 1 RCP in the **START** position. STANDARD: Places 1-HS-68-8A in start, observes Red light On, Amps increasing. This step is critical to start the RCP per the JPM assignment. COMMENTS:	___ SAT ___ UNSAT **Critical Step**
Booth Instructor Note: Insert the SCN File RCPHEATUP.scn while the operator is performing the next step.	
Evaluator Note: The motor will start heating up and result in the REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH alarm on 1-M-5, Window E-1 on 1-XA-55-5B coming in during the performance of the next steps (JPM steps 5-7; procedure steps 15-17). When alarm comes in, the operator may not complete performing procedure step 15, 16 or 17. N/A those steps if applicable and move on to JPM step 8 if candidate transitions to alarm procedure.	
STEP 5.: [15] **ENSURE** No. 1 RCP motor and pump are operating within the parameters listed in Appendix D. STANDARD: References Appendix D and observes parameters COMMENTS:	___ SAT ___ UNSAT
STEP 6.: [16] **ENSURE [1-TCV-67-86]** RCP Motor Cooler 1A is **OPEN** (1-HS-67-86 red light illuminated). STANDARD: Verifies 1-TCV-67-86 is open on Panel M-27A COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 7.: [17] **WHEN** Lift Oil Pump has run greater than 1 minute after RCP start, **THEN PLACE [1-HS-68-84A]** No. 1 RCP Lift Oil Pump in the **STOP** position. STANDARD: Places 1-HS-68-84A in STOP position. COMMENTS:	___ SAT ___ UNSAT
The following step applies after the REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH alarms on Window E-1 on 1-XA-55-5B.	
STEP 8.: Responds to the alarm and/or observes rise in RCP motor stator temperatures. STANDARD: Determines that RCP operating parameters are not normal. May determine the 1-SO-68-5 Appendix D limit is exceeded and stopping the RCP is necessary or may implement the annunciator respond procedure. COMMENTS:	___ SAT ___ UNSAT

NOTE: *If the actions contained in the Annunciator Response Procedure (ARP) are implemented, JPM steps 10-20 cover the actions directed by the ARP and AOP to stop the RCP. If RCP is stopped without implementing the ARP, JPM 9 step will end the JPM.*

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 9.: **STOP Loop 1 RCP** STANDARD: Places 1-HS-68-8A to the STOP position. ***Cue: If the RCP is stopped, State "This completes the JPM"*** This step is critical to remove the RCP from service to prevent damage to the motor. COMMENTS:	___ SAT ___ UNSAT **Critical Step** (unless JPM step 20 is performed)
NOTE: *The following steps are from the Annunciator Response Procedure.*	
STEP 10.: [1] **DETERMINE** which pump is in alarm by monitoring computer points. Pump 1: Point T0409A, 411A or 412A (A,B, & C Ø) Pump 2: Point T0429A, 431A or 432A (A,B, & C Ø) Pump 3: Point T0449A, 451A or 452A (A,B, & C Ø) Pump 4: Point T0469A, 471A or 472A (A,B, & C Ø) STANDARD: Determines RCP #1 is in alarm from the ICS display. COMMENTS:	___ SAT ___ UNSAT
STEP 11.: [2] **CONTACT** Tech Support to obtain engineering assistance in determining the validity of the alarm. STANDARD: Contacts Tech support for assistance. ***Cue: If Tech Support contacted, Acknowledge the request.*** COMMENTS:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 12.: [3] **MONITOR** the following parameters for increasing trends: a. Motor Current b. Bearing Temperatures c. Pump/Motor Vibration d. Containment Air Temperatures STANDARD: Monitors the listed parameters and determines each is normal. COMMENTS:	___ SAT ___ UNSAT
STEP 13.: [4] **ENSURE** ERCW aligned to pump cooler. STANDARD: Determines ERCW aligned to pump cooler. Checks Red light lit 1-HS-67-86 on 0-M-27A. COMMENTS:	___ SAT ___ UNSAT
STEP 14.: [5] **VERIFY** ERCW system temperature and pressure normal. STANDARD: Determines ERCW system normal using indications on 0-M-27A. COMMENTS:	___ SAT ___ UNSAT
STEP 15.: [6] **VERIFY** lower compartment air temperature normal. STANDARD: Determines lower compartment air temperature normal using indications on ICS. COMMENTS:	___ SAT ___ UNSAT

NOTE: If the RCP is stopped after determining the 311°F motor winding temperature limit exceeded using Appendix D, then go back to JPM step 9

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 16.: [7] REFER TO 1-SO-68-2 for RCP operating limits. STANDARD: Refers to 1-SO-68-2 Appendix D for the operating limits. COMMENTS:	___ SAT ___ UNSAT
STEP 17.: [8] IF Ops/Engineering determines alarm is valid, **THEN** **PERFORM** the following: [a] **CHECK** pump motor amps. (normal 415 amps with 608 amps maximum.) [b] **IF** RCP motor amps approach 608 amps, **THEN** **GO TO** AOP-R.04, *Reactor Coolant Pump Malfunctions.* STANDARD: Determines motor amps are normal. ***Cue: If Ops or Engineering contacted, state, "The alarm is valid".*** COMMENTS:	___ SAT ___ UNSAT
STEP 18.: [9] **IF** Ops/Engineering determines alarm is valid and pump motor stator temperature approaches 311°F (329°F for RCS temperature less than 540°F), **THEN** **GO TO** AOP-R.04, *Reactor Coolant Pump Malfunctions.* STANDARD: Determines the motor winding temperature is greater than 311°F using the ICS and Goes to AOP-R.04. ***Cue: If Ops or Engineering contacted, state, "The alarm is valid".*** COMMENTS:	___ SAT ___ UNSAT

NOTE: *The following 2 steps are AOP-R.04, Section 2.6 Step 1 and Section 2.1 Step 1-3 respectively*

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 19.: **CAUTION:** **Operating the RCP with excess winding temperature will reduce the expected life of the motor insulation.** **NOTE:** RCP motor winding temperature limits are as follows: • 329°F if RCS temperature is less than 540°F. • 311°F if RCS temperature is greater than or equal to 540°F. 1. **MONITOR** RCP Motor Stator temperature less than applicable limit by monitoring the following computer points: • Pump 1: T0409A, 411A or 412A • Pump 2: T0429A, 431A or 432A • Pump 3: T0449A, 451A or 452A • Pump 4: T0469A, 471A or 472A a. **IF** RCP Motor Stator temperature reaches applicable limit **AND** indication is verified valid, **THEN** **PERFORM** the following: 1) **IF** reactor power less than 20%, **THEN** **GO TO** Section 2.1, RCP Tripped or Shutdown Required. **[C.1]** STANDARD: Determines the motor winding temperature is greater than 311°F using the ICS and Goes to AOP-R.04, Section 2.1. COMMENTS:	___ SAT ___ UNSAT
STEP 20.: Section 2.1 Any RCP Tripped or RCP Shutdown Required [1] Check unit in Mode 1 or 2 STANDARD: Determines plant not in Mode 1 or 2, continues procedure in the RNO for Step [1] COMMENTS:	___ SAT ___ UNSAT
STEP 21. [1 RNO] STOP affected RCP STANDARD: Operator stops RCP #1 and records time. This step is critical to remove the RCP from service to prevent damage to the motor. ***CUE: When operator trips RCP tell them This completes the JPM.***	___ SAT ___ UNSAT **Critical Step** unless RCP stopped in JPM Step 9. End Time ___________

END of JPM

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 is in Mode 3.
2. Preparations are being made to start #1 RCP.
3. All precautions and prerequisites are complete.
4. 1-SO-68-2 Section 5.1, steps 1 through 10 are complete.

INITIATING CUES:

1. You have been directed to start the Loop 1 RCP in accordance with 1-SO-68-2, Reactor Coolant Pumps.
2. Notify the US when the procedure is complete.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

1-SO-68-2

REACTOR COOLANT PUMPS

Revision 32

QUALITY RELATED

PREPARED/PROOFREAD BY: LOYD HODGES

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 02/11/10

LEVEL OF USE: **CONTINUOUS USE**

VFU Today JD

REVISION
DESCRIPTION:
PCR 09000626 - Incorporated PCF-012 (Added NOTE in Sections 8.4, 8.5, and Appendix D.
PCR 09001510 - Corrected numbering error at step 8 in sections 5.1, 5.2, 5.3, and 5.4.

PERFORMANCE OF THIS PROCEDURE COULD IMPACT REACTIVITY

3.0 PRECAUTIONS AND LIMITATIONS

A. Failure to observe all posted radiation control requirements may lead to unnecessary radiation absorbed doses.

B. Seal injection flow to RCP's must be maintained when RCS loops are being filled and anytime thereafter.

C. RCS must be filled and vented in accordance with 0-GO-13 prior to running RCP's continuously.

D. Limit number of attempted RCP starts to three within any two hour period. A one hour cooldown period will be observed before a fourth attempt is made. Thirty minutes must be allowed between RCP starts.

E. Operation of Reactor Coolant Pumps for greater than 2 minutes without CCS cooling to oil coolers will result in bearing temperatures greater than 200°F.

F. When starting an RCP, the following guidelines apply:

   a. If all RCPs have been stopped for more than five minutes AND the RCS temperature is greater than the charging and seal injection water temperature, a RCP can not be started until a steam bubble has been formed in the pressurizer. This will minimize a pressure transient when the first RCP is started due to the expansion of the previously injected cold water. This recommendation is not applicable to RCP operation in Mode 5 when steam generator temperatures are no more than 25°F warmer than the RCS temperature.

   b. If the RCS temperature is >200°F but <300°F, and FCV-74-1 and 2 are open do not attempt to restart a RCP unless the pressurizer level is <60% (indicated) to prevent RHR overpressurization.

G. When RCS is being cooled down by RHR, a non-uniform temperature distribution may occur with no RCP's running.

H. Do not start the first RCP in mode 5 with the Steam Generator secondary side temperature above 200°F. This is to prevent a possible inadvertent mode change and to prevent the possibility of exceeding RCS heat up limitations. **[C.6]**

I. When in Mode 4, a reactor coolant pump shall not be restarted unless a steam bubble exists in the Pressurizer..

3.0 PRECAUTIONS AND LIMITATIONS

J. The following restrictions for RCP operation apply, when RHR is connected to the RCS for shutdown cooling, to prevent RHR over pressurization: (FCV-74-1 and 2 open)

- At least one RCP should remain in operation whenever RCS is greater than or equal to 160°F.
- When RCS temperature is greater than 200°F and less than 300°F, and no RCPs are running, a RCP can not be started unless pressurizer level is less than 60%.
- When RCS temperature is greater than 300°F AND no RCPs are running, a RCP can ***not*** be started regardless of pressurizer level.

K. The Source Range Monitor instrumentation must be monitored during startup of the first RCP. This precaution is necessary in order to detect rapid boron dilution from unborated water that could be flushed into the core.

L. If all RCP's are shutdown, do not start the first RCP if it is known that any volume of dilute water has been introduced into any reactor coolant loop until an action plan for recovery is developed as described in Appendix F Prevention of Rapid Boron Dilution. **[C.5]**

M. RCS pressure may increase when starting the first RCP.

N. IF secondary temperature of any S/G is greater than 25°F above RCS cold leg, do NOT start an RCP.

O. IF S/G secondary temperatures are greater than RCS cold leg, an inadvertent heatup and pressurization of the RCS can occur when initially running RCPs.

P. IF S/G secondary temperatures are less than RCS cold leg, an inadvertent cooldown and depressurization of the RCS can occur when initially running RCPs.

Q. **To avoid uncontrolled reactivity changes, RCP(s) shall NOT be restarted with the unit in Mode 1 or 2.**

Date Today

4.0 PREREQUISITE ACTIONS

NOTE 1 Throughout this Instruction where an **IF/THEN** statement exists, the step should be **N/A** if the condition does not exist.

NOTE 2 Guidance on motor rotation checks (bump test) and/or uncoupled RCP runs are contained in 0-MI-EMM-068-002.3, Removal and Replacement of Reactor Coolant Pump Motor Appendix G.

[1] **ENSURE** Precautions and Limitations, Section 3.0, have been reviewed. JD

[2] **ENSURE** the Instruction to be used is a copy of the effective version. JD

[3] **IF** performing RCP Startup **OR** Shutdown (Sections 5.1, 5.2, 5.3, 5.4, 7.1, 7.2, 7.3, 7.4, 8.4 or 8.5), **THEN**

NOTIFY Predictive Maintenance Group. JD

CAUTION **Starting first RCP could result in a positive reactivity addition if a pocket of low boron concentration reactor coolant may have been introduced into the reactor coolant system. (See Appendix F for guidelines)**

NOTE Prerequisite Step **[4]** may be marked N/A if performing sweeps and vents (Section 8.4 and 8.5) as directed in 0-GO-1.

[4] **VERIFY** RCS is filled in accordance with 0-GO-13 and 0-GO-1. JD

[5] **VERIFY** RCP seal flow is established in accordance with 1-SO-62-1. JD

[6] **IF** in Mode 4, **THEN**

ENSURE a steam bubble exists in the pressurizer. N/A

[7] **VERIFY** **[1-PI-62-122]** Volume Control Tank pressure ≥ 17 psi. JD

Date Today

4.0 PREREQUISITE ACTIONS (Continued)

[8] **ENSURE** the following:

[a] Power Checklist 1-68-2.01 complete. JD

[b] Valve Checklist 1-68-2.02 complete. JD

[c] Power Checklist 1-70-1.01 complete. JD

[d] Power Checklist 1-70-1.02 complete. JD

[e] Valve Checklist 1-70-1.04 complete. JD

[f] Valve Checklist 1-70-1.05 complete. JD

[9] **IF** no RCPs are in service and RCS or S/G pressure is greater than 200 psig. **THEN**

ENSURE 0-SI-0PS-000-004.0 is in progress. **[C.6]** JD

[10] **VERIFY** RCS pressure is ≥ 325 psig. JD

CAUTION **Starting an RCP when D/G is parallel to the grid may cause the D/G to trip on overcurrent.**

[11] **VERIFY** D/G is not tied to 6.9kV Shutdown Board paralleling the Unit Board, which feeds the RCP to be started. JD

[12] **IF** adequate cooling water flow cannot be maintained according to Appendix D, **THEN**

GO TO 1-SO-70-1, **AND**

START another CCS pump, **THEN**

RETURN to Section 5.0 for individual RCP starting instructions. N/A

Date Today

4.0 PREREQUISITE ACTIONS (Continued)

[13] **ENSURE** each performer documents their name and initials:

Print Name	Initials
John Doe	JD

[14] **INDICATE** below which performance section of this Instruction will be used and reason for this performance. JD

☑ 5.0 STARTUP/STANDBY READINESS.

☐ 7.0 SHUTDOWN.

☐ 8.0 INFREQUENT OPERATION.

REASON: Starting RCP

Date Today

5.0 STARTUP STANDBY READINESS

5.1 #1 Reactor Coolant Pump Start

CAUTION 1 **RHR over pressurization restrictions prohibit starting a RCP, when RCS temperature is greater than or equal to 300°F, AND no RCP's are running, AND RHR is aligned to the RCS for shutdown cooling.**

CAUTION 2 **RCS pressure may increase when starting the first RCP.**

CAUTION 3 **Computer point 1P0499A, which inputs to 0-SI-SXX-068-127.0, should be monitored along with compliance instrumentation to ensure all pressure /temperature requirements are met.**

NOTE If starting RCP for troubleshooting of vibration problems, after maintenance activities that affect pump vibration or for balance shot activities then refer to Appendix E for vibration monitoring requirements.

[1] **IF** *no* RCP's are running **AND [FCV-74-1]** and **[FCV-74-2]** are OPEN, **THEN**

[a] **RECORD** RCS temperature. ________ °F N/A

[b] **IF** RCS temperature is >200°F and <300°F, **THEN** **ENSURE** pressurizer level is <60%. N/A

[2] **WHEN** ≥ 30 minutes have elapsed since last #1 RCP run/attempted start, **THEN**

PROCEED to step 3. JD

[3] **IF** access into containment is permitted, **THEN**

PERFORM Appendix A RCP Local Inspection Check Sheet. ☑

[4] **VERIFY [1-TR-70-161]** CCS Hx 1A1/1A2 Outlet Temperature ≤ 105°F. JD

[5] **ENSURE [1-HS-67-86]** RCP Motor Cooler 1A is in the **P-AUTO** position. JD

Date Today

5.1 # 1 Reactor Coolant Pump Start (Continued)

[6] **IF** RCS pressure is > 100 psig, **THEN**

ENSURE [1-FCV-62-9], RCP #1 Seal Leak-off and [1-FCV-62-63], Seal Return Isolation are **OPEN**. JD

NOTE 1 Appendix B should be used to diagnose RCP seal abnormalities.

NOTE 2 Step **[7]** may be marked N/A if leakoff is less than 0.2 gpm and Step **[8]** will be performed.

[7] **DETERMINE** #1 RCP seal No. 1 leakoff ≥ 0.2 gpm by using any of the following:

INSTRUMENT	√
1–FR–62–23 (red pen scale range 0.0-1.0)	☐
1–FR–62–24 (red pen scale range 0.0-10.0)	☐
ICS	☑
Ultrasonic (requires a SR to be installed)	☐
Differential Pressure (requires a SR to be installed)	☐

NOTE The Bucket Test is NO longer performed. Less than 0.2 gpm flow rate is acceptable for a short period of time after RCP seal maintenance has been performed, provided flow verification has been performed by ultrasonics or differential pressure.

[8] **IF** #1 RCP seal No. 1 leakoff is < 0.2 gpm
AND RCP seal maintenance has been performed,
THEN

[a] **ENSURE** SR initiated to have either an ultrasonic or differential pressure instrument installed). N/A

[b] **DETERMINE** #1 RCP seal No. 1 leakoff flow rate from the installed ultrasonic or differential pressure instrument. N/A

[c] **EVALUATE** leak-off rate, continuation of RCP start-up, and duration of RCP run time. N/A
Engineering

Date Today

5.1 #1 Reactor Coolant Pump Start (Continued)

[9] **VERIFY** [1-PDI-62-8A] #1 RCP Seal No. 1 differential pressure greater than or equal to 220 psid. JD ______

[10] **IF** Reactor Coolant Pump is being started after major maintenance, troubleshooting or for balance shot activities, **THEN**

PERFORM Appendix E for modified RCP vibration monitoring requirements and limitations. JD ______

[11] **PLACE** [1-HS-68-84A] #1 RCP Lift Oil Pump in the **START** position. ______

[12] **WHEN** Lift Oil Pump for #1 RCP has run ≥ 2 minutes, **THEN**

ANNOUNCE #1 RCP start on the P/A system. ☐

[13] **IF** no RCPs are running **AND** RCP #1 is the first RCP to be started, **THEN**

MONITOR the SRMs during startup of the RCP. **[C.3]** ☐

[14] **PLACE** [1-HS-68-8A] #1 RCP in the **START** position. ☐

NOTE Motor and Pump Operating Parameters are listed in Appendix D. Appendix E provides vibration limits if pump is started after maintenance activities.

[15] **ENSURE** #1 RCP motor and pump are operating within the parameters listed in Appendix D. ______

Date__________

5.1 **#1 Reactor Coolant Pump Start** (Continued)

[16] **ENSURE** [1-TCV-67-86] RCP Motor Cooler 1A is **OPEN** (1-HS-67-86 red light illuminated). __________

[17] **WHEN** Lift Oil Pump has run greater than 1 minute after RCP start, **THEN**

PLACE [1-HS-68-84A] #1 RCP Lift Oil Pump in the **STOP** position. ☐

[18] **IF** RHR is removed from service, **THEN**

DETERMINE if both CCS pumps are needed inservice. __________

[19] **IF** the second running CCS pump is to be removed from service, **THEN**

GO TO 1–SO–70–1 and **STOP** the second running CCS pump. __________

END OF TEXT

APPENDIX D
Page 1 of 3

RCP OPERATION PARAMETERS
TABLE #1

This table will be used for monitoring RCP parameters during operation.

		NORMAL	MINIMUM	MAXIMUM
1.	RCS Pressure	2250 psig	325 psig (1)	2485 psig
2.	RCS Temperature	550°F	(2)	650°F
3.	No. 1 Seal Leakoff	1-5 gpm	0.8 gpm (3)	6 gpm
4.	No. 1 Seal ΔP	2250 psid	220 psid	2300 psid
5.	No. 1 Seal Water Temperature	100-170°F	60°F	180°F
6.	Seal Water Supply Flow	8-13 gpm	6 gpm	15 gpm
7.	Therm Barrier Outlet Flow	40 gpm	35 gpm	60 gpm
8.	Therm Barrier Return Temp	< 115	-----	-----
9.	Lower Brg Water Temp	160°F	Ambient	225°F
10.	Upper Oil Cooler Outlet Flow	150 gpm	90 gpm	-----
11.	Lower Oil Cooler Outlet Flow	5-10 gpm	5 gpm	10 gpm
12.	Oil Cooler Return Temp	80°F	60°F	125°F
13.	Lower Motor Brg. Temp	125°F	-----	200°F
14.	Motor Winding Temp	200°F	-----	≤ 311°F (5)
15.	Motor Winding Voltage	6600V	5940V	7260V
16.	Motor Winding Amps (4)	415A	-----	608A

(1) RCS pressure must be ≥ 325 psig to start a RCP. 325 psig will support the #1 seal minimum ΔP requirements of 220 psid.

(2) During startup a RCP must be in operation when RCS temperature is greater than 160°F.

(3) The 0.8 gpm minimum applies when RCS pressure greater than or equal to 2000 psig. If RCS pressure is less than 2000 psig, then refer to the graph on Appendix D page 3.

(4) RCP amps may be higher than 415 amps during cold water starts and operation, but the 608 amps shall NOT be exceeded.

(5) The maximum allowable RCP motor winding temperature is 329°F when RCS temperature is less than 540°F. RCP motor winding temperatures are expected to go to 280 - 290°F during cold water operations.

APPENDIX D
Page 2 of 3

RCP OPERATION PARAMETERS
TABLE #2

This table has additional information that may be used for monitoring RCP parameters. This information may be obtained at a later time.

		NORMAL	MINIMUM	MAXIMUM
1.	Air Cooler Water Flow (7)	150 gpm	132 gpm	-----
2.	Air Cooler Water Inlet Press	-----	-----	150 psig
3.	Air Cooler Water Inlet Temp (7)	80°F	35°F	84.5°F
4.	Upper Motor Brg Temp	150°F	-----	200°F
5.	Oil Lift Pump Press	1250 psig	600 psig	2250 psig
6.	Seal Injection. Water Temp.	60-130°F	60°F	130°F
7.	Therm Barrier ΔP (6)	42-58" H_2O	-----	-----
8.	Upper Oil Cooler Water Press	-----	-----	150 psi
9.	Upper Oil Cooler Water Temp.	80°F	60°F	125°F
10.	Lower Oil Cooler Press	-----	-----	150 psi

(6) Closed per corrective action of SCAR NO SQSCA910003. **[C.2]**

(7) Air cooler not required for short-term RCP operation for RCS sweeps and vents (Sect. 8.4 and 8.5).

APPENDIX D
Page 3 of 3

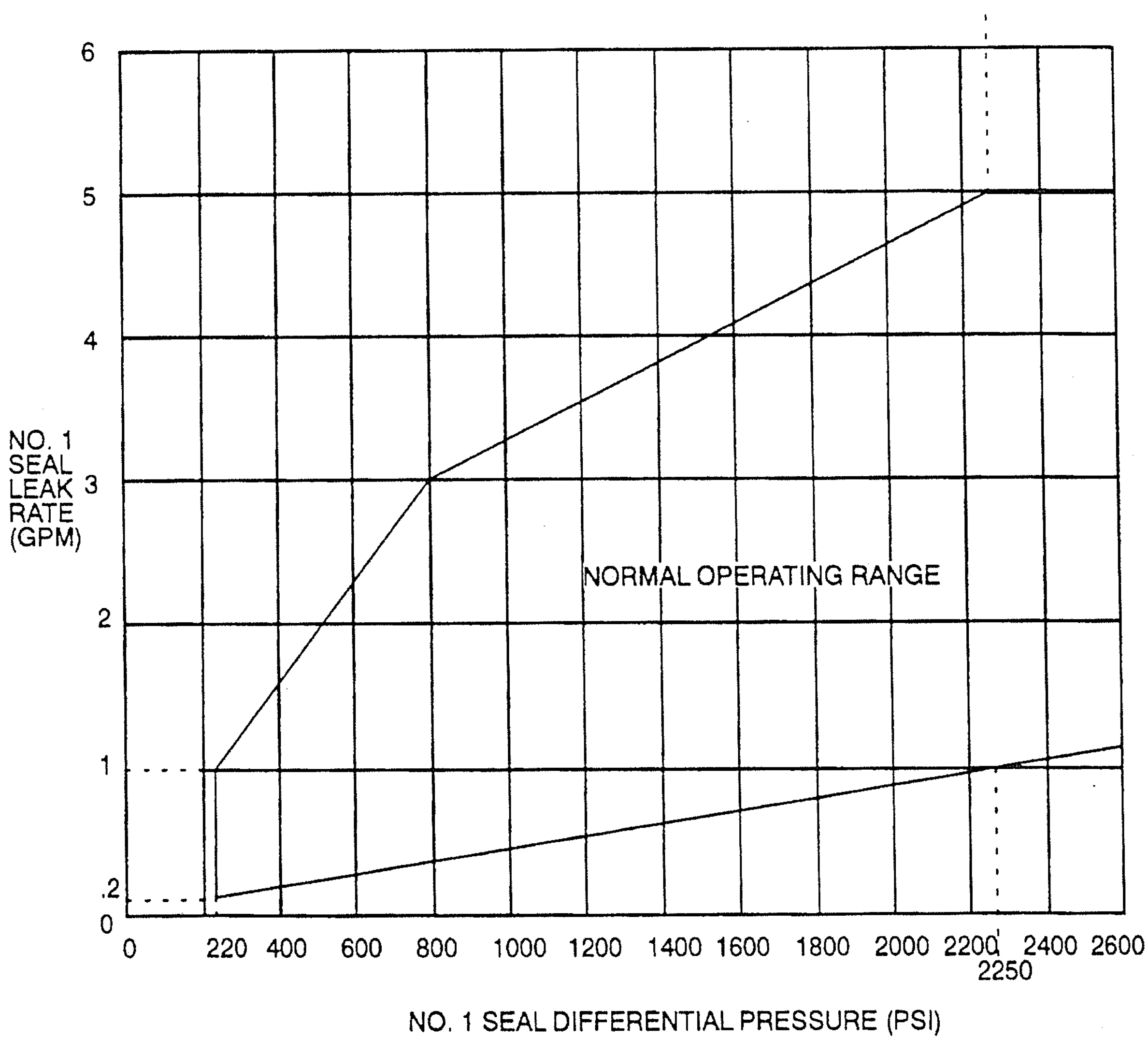
NOTE 1 If No. 1 Seal D/P is greater than 500 psid (above the top of the MCR indication), then RCS pressure should be used as the No. 1 Seal D/P.

NOTE 2 The lower limit of the normal operating range is the minimum allowable leakoff when RCS pressure is< 2000 psig.

NOTE 3 If seal leakoff is > normal operating range but < seal leakoff high flow alarm setpoint, then monitor pump parameters and contact Engineering for assistance.

NOTE 4 During startup, RCP leak-off may be < 0.2 gpm if Engineering approval is obtained per applicable step in Section 5.1, 5.2, 5.3, 5.4, 8.4, or 8.5.

No.1 Seal Leak Rate vs. No. 1 Seal Delta P with RCS Pressure <2000 Psig



TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

ANNUNCIATOR RESPONSE

1-AR-M5-B

CVCS SEAL WATER AND RCP

1-XA-55-5B

Revision 36

Quality Related

PREPARED/PROOFREAD BY: OLIVIA HEAD

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 11/30/07

LEVEL OF USE: **REFERENCE USE**

REVISION DESCRIPTION: Reformatted window A-5 to correct inconsistencies between Units ARs. Inserted note pertaining to oil levels and temperatures. Reworded step 1 in window A-7, editorial change (0700534). Corrected windows C-7 SER point identification. Added parenthetical reference for clarification of FS relationship on windows C-7 and D-7. Corrected procedure reference in window D-3 should have referenced SO instead of AOP. Changed contact information in window D-4 should have been MSS. Deleted reference to PER in window E-3, PER was previously resolved. Removed reference to AOP-R.04 in window E-4, redundant step. Minor editorial issues corrected throughout. No revision bars were used for editorial changes.

REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH

Source	**Setpoint**
SER 404	Computer alarm at
1. TE-68-12D, G, J Pump 1	293°F
2. TE-68-35E, F, H Pump 2	293°F
3. TE-68-54E, G, J Pump 3	293°F
4. TE-68-77E, G, J Pump 4	293°F

Probable Causes

1. Excessive load on pump motor.
2. Air restriction to pump motor coolers.
3. Insufficient ERCW to pump motor coolers.
4. Boron buildup on Reactor Coolant Pump Motor heat exchanger.

Corrective Actions

[1] **DETERMINE** which pump is in alarm by monitoring computer points.

Pump 1: Point T0409A, 411A or 412A (A,B, & C ∅)
Pump 2: Point T0429A, 431A or 432A (A,B, & C ∅)
Pump 3: Point T0449A, 451A or 452A (A,B, & C ∅)
Pump 4: Point T0469A, 471A or 472A (A,B, & C ∅)

[2] **CONTACT** Tech Support to obtain engineering assistance in determining the validity of the alarm.

[3] **MONITOR** the following parameters for increasing trends:

a. Motor Current
b. Bearing Temperatures
c. Pump/Motor Vibration
d. Containment Air Temperatures

[4] **ENSURE** ERCW aligned to pump cooler.

[5] **VERIFY** ERCW system temperature and pressure normal.

[6] **VERIFY** lower compartment air temperature normal.

[7] **REFER TO** 1-SO-68-2 for RCP operating limits.

[8] **IF** Ops/Engineering determines alarm is valid, **THEN** **PERFORM** the following:

[a] **CHECK** pump motor amps. (normal 415 amps with 608 amps maximum.)

[b] **IF** RCP motor amps approach 608 amps, **THEN** **GO TO** AOP-R.04, *Reactor Coolant Pump Malfunctions.*

CONTINUED ON NEXT PAGE

CORRECTIVE ACTIONS (CONT'D)

REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH

[9] **IF** Ops/Engineering determines alarm is valid and pump motor stator temperature approaches 311°F (329°F for RCS temperature less than 540°F), **THEN**

GO TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[10] **IF** Ops/Engineering determines alarm is valid and other plant parameters indicate RCP motor problem, **THEN**

REFER TO AOP-R.04, *Reactor Coolant Pump Malfunctions.*

[11] **IF** Ops/Engineering determines alarm is valid and is due to boron buildup on Reactor Coolant Pump Motor Heat Exchanger, **THEN** **OBTAIN** Engineering recommendation to **PERFORM**

1–SO–68–2, Section 8.3 "At Power RCP Motor Cooler ERCW Isolation"

References 45B655-05B-0, 47A615-0, 47W610-67-2

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-R.04

REACTOR COOLANT PUMP MALFUNCTIONS

Revision **24**

QUALITY RELATED

PREPARED/PROOFREAD BY: CECIL DYER

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: D. A. PORTER

EFFECTIVE DATE: 3/5/2009

REVISION DESCRIPTION: Changed wording of section titles to avoid confusion. (PCR# 07000278) Changed appendix A to allow use of computer point to determine #2 seal leakage. (PCR# 07000229) Changed section 2.3 step 8 to a continuous action step to monitor RCDT to determine seal leakage. (PCR# 08000914) Added FR-S.1, to the notes/cautions pertaining to leaving RCPs running during events requiring RCP operation. (PCR# 08000836) Updated procedural guidance to conform to most recent Westinghouse recommendations on RCP shutdown with No.1 seal leakage outside the operating limits. Clarified guidance pertaining to stopping RCPs after reactor trip (PER 148792)

1.0 PURPOSE

This procedure provides the actions necessary to mitigate the effects of a Reactor Coolant Pump (RCP) trip below P-8 (35% power), excessive RCP seal leakage, and various RCP malfunctions.

If RCP seal injection flow is lost, AOP-M.09 (Loss of Charging) takes precedence over this AOP.

2.0 OPERATOR ACTIONS

CAUTION 1 **RCP should NOT be tripped when reactor power is greater than 5% (FR-S.1) or when RCP operation is required by FR-C.1 (Inadequate Core Cooling) or FR-C.2 (Degraded Core Cooling).**

CAUTION 2 **Exceeding any of the following limits requires tripping the affected RCP, except as described in Caution 1:**

- **RCP #1 Seal ΔP less than 220 psid**
- **RCP #1 Seal Temperature greater than 225°F**
- **RCP Lower Bearing Temperature greater than 225°F**
- **RCP Upper Motor Bearing Temperature greater than 200°F**
- **RCP Lower Motor Bearing Temperature greater than 200°F**
- **RCP Motor Voltage less than 5940V or greater than 7260V**
- **RCP Motor Amps greater than 608 amps**
- **RCP Vibration greater than 20 mils on any axis (x and/or y) [C.3]**

NOTE: RCP trip criteria is also located in Appendix B.

1. **DIAGNOSE** the failure:

IF...	GO TO SECTION	PAGE
ANY RCP tripped or RCP shutdown required	2.1	4
NOTE During plant startup following seal maintenance, the seal package should seat and operate normally following 24 hours of run time.		
#1 Seal Leakoff high flow (high flow Alarm) on ANY RCP	2.2	7
#1 Seal Leakoff low flow (low flow Alarm) on ANY RCP	2.3	13
#2 Seal Leakoff high flow (high RCP standpipe level) on ANY RCP	2.4	18
#3 Seal Leakoff high flow (low RCP standpipe level) on ANY RCP	2.5	21
Motor Stator Temperature High on ANY RCP	2.6	24

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ANY RCP Tripped or RCP Shutdown Required

CAUTION: A rapid drop in level and steam flow on the affected loop S/G may occur when RCP is stopped.

1.	**CHECK** unit in Mode 1 or 2.	**STOP** affected RCP(s). Time: ___________ **GO TO** Caution prior to Step 3.

CAUTION: If #1 seal leakoff flow is HIGH on any RCP, Step 3 requires closing seal return valve <u>within 5 minutes</u> after stopping affected RCP(s). Step 3 should be continued after E-0 immediate actions. [C.2]

2. **PERFORM** the following:

   a. **TRIP** the reactor.

   b. **WHEN** reactor is tripped,
   THEN
   STOP affected RCP(s).

   Time: ____________

   c. **GO TO** E-0, Reactor Trip or Safety Injection, WHILE continuing in this procedure.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ANY RCP Tripped or RCP Shutdown Required (cont'd)

CAUTION: If RCP seal leakoff is HIGH, seal return valve must be closed within 5 minutes after stopping the affected RCP(s). [C.2]

3. **MONITOR** #1 seal leakoff on affected RCP:

   a. **CHECK** for any of the following:

   - RCP Seal Leakoff greater than 8 gpm

     OR

   - RCP Seal leakoff greater than 6 gpm AND Lower bearing or seal temperature rising uncontrolled.

   RNO: a. **GO TO** Step 4.

   b. **WHEN** between 3 and 5 minutes have elapsed since RCP stop,
   THEN
   CLOSE affected RCP seal return FCV:

   - FCV-62-9 [RCP 1]
   - FCV-62-22 [RCP 2]
   - FCV-62-35 [RCP 3]
   - FCV-62-48 [RCP 4]

4. **PULL TO DEFEAT** affected loop ΔT and T-avg:

   - XS-68-2D (ΔT)
   - XS-68-2M (T-avg)

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.1 ANY RCP Tripped or RCP Shutdown Required (cont'd)

5.	**CHECK** RCPs 1 and 2 RUNNING.	**CLOSE** affected loop's pressurizer spray valve.
6.	**EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.	
7.	**EVALUATE** the following Tech Specs for applicability: • 3.2.5, DNB Parameters • 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation • 3.4.1.2, Reactor Coolant System - Hot Standby • 3.4.1.3, Reactor Coolant System - Shutdown • 3.4.6.2, RCS Operational Leakage	
8.	**GO TO** appropriate plant procedure.	

END OF SECTION

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.6 RCP Motor Stator Temperature High

CAUTION: Operating the RCP with excess winding temperature will reduce the expected life of the motor insulation.

NOTE: RCP motor winding temperature limits are as follows:

- 329°F if RCS temperature is less than 540°F.
- 311°F if RCS temperature is greater than or equal to 540°F.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1.	**MONITOR** RCP Motor Stator temperature less than applicable limit by monitoring the following computer points: • Pump 1: T0409A, 411A or 412A • Pump 2: T0429A, 431A or 432A • Pump 3: T0449A, 451A or 452A • Pump 4: T0469A, 471A or 472A	a. **IF** RCP Motor Stator temperature reaches applicable limit **AND** indication is verified valid, **THEN** **PERFORM** the following: 1) **IF** reactor power less than 20%, **THEN** **GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** 2) **IF** reactor power greater than 20%, **THEN** **INITIATE** plant shutdown at 2–4% per minute **USING** AOP-C.03, Rapid Shutdown or Load Reduction. 3) **WHEN** reactor is tripped, **THEN** **GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]**

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2.6 RCP Motor Stator Temperature High (continued)

2. **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix.

3. **EVALUATE** the following Tech Specs for applicability:

   - 3.2.5, DNB Parameters
   - 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation
   - 3.4.1.2, Reactor Coolant System - Hot Standby
   - 3.4.1.3, Reactor Coolant System - Shutdown
   - 3.4.6.2, RCS Operational Leakage

4. **GO TO** appropriate plant procedure.

END OF SECTION

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

ALT SIM E (RO/SRO)

Isolate Cold Leg Accumulator
[Alternate Path]

RO/SRO

JOB PERFORMANCE MEASURE

Task: Vent the Unisolable Cold Leg Accumulator

Task #: 3110030601 0060060101 (**RO**)

Task Standard: #1 Cold Leg Accumulator is vented following injection.

Time Critical Task: **YES:** ______ **NO:** X

K/A Reference/Ratings: 011EA1.09(4.3/4.3)

Method of Testing:

Simulated Performance: ______ **Actual Performance:** X

Evaluation Method:

Simulator X **In-Plant** ______ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **8 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Initialize in IC #62. (Note: Use same simulator set up as JPM 057-AP1 for initial conditions)
4. If IC #62 is not available, initialize in IC #16 and perform the following setup;
   - Activate MF #TH01A at 25%;
   - Activate RF #SIR01 to ON, places power on CLA isolation valves;
   - Activate override #ZDIHS63118A to OPEN (prevents #1 CLA isolation valve from closing)
5. When RCS pressure is much less than 1870 psig and a phase B has been received, acknowledge alarms and freeze the simulator until ready to perform JPM.
6. An extra operator will be required to acknowledge alarms.
7. At step 6 the console operator will need to open air to CNMT with MRF IAR06, 07, 08.
8. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

E-1, Step 18
EA-63-1

References:

	Reference	Title	Rev No.
1.	E-1	Loss of Reactor or Secondary Coolant	24
2.	EA-63-1	Venting Unisolated Cold Leg Accumulator	0

==

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The unit has experienced a LOCA and ALL ECCS pumps have responded as designed.
2. E-1 has been implemented.
3. Transfer to CNMT Sump Recirculation has been completed.

INITIATING CUES:

1. You are the OATC and the SRO directs you to isolate the CLA per step #18 of E-1.
2. Power to the CLA isolation valves has been restored using EA-201-1.
3. Inform the SRO when step 18 is completed.

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 1.: **18 MONITOR** if CLAs should be isolated. a. **CHECK** RCS pressure less than 100 psig. ***Cue:*** ***RCS pressure is 90 psig.*** STANDARD: Operator checks RCS pressure using PAM indicator and determines that RCS pressure is less than 100 psig. COMMENT:	______ SAT ______ UNSAT Start time_____
STEP 2.: b. **CHECK** Power to CLA isolation valves AVAILABLE. STANDARD: Based on initiating cues, Operator determines power available. ***Cue:*** ***If requested, inform operator that power is available.*** COMMENT:	______ SAT ______ UNSAT
Step 3. c. **ENSURE** SI signal RESET STANDARD: Operator verifies permissive lights; AUTO SI BLOCKED permissive lit and SI ACTUATED permissive dark. COMMENT:	______ SAT ______ UNSAT
Evaluator Note: This commences the Alternate Path of the JPM	
STEP 4. d. CLOSE CLA isolation valves. **NOTE: FCV-63-118 (#1 CLA) will NOT go CLOSED the red light will stay ON.** STANDARD: Operator places HSs for FCV-63-118*, 98, 80, 67 in the CLOSED position and verifies green lights LIT. (ONLY on 98, 80 & 67). Recognizes FCV-63-118 fails open and goes to RNO to vent the unisolated (#1) CLA. This is a critical step due to isolating the CLAs after injection to preclude N2 injection into the RCS COMMENT:	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 5. d. (RNO) If power available to affected valve(s), THEN CLOSE affected valve(s) USING EA-201-3, "Operation of Motor-Operated Valves from Outside the Control Room". ***Cue:*** ***When AUO contacted to perform EA-201-3, report back that EA-201-3 sect 4.3 has been performed and FCV-63-118 did not close.*** STANDARD: Operator contacts AUO to perform EA-201-3. After receiving report from AUO, candidate will continue with RNO actions. Comments:	______ SAT ______ UNSAT
STEP 6.: If any CLA valve CANNOT be closed, THEN PERFORM the following: ENSURE Phase B is RESET STANDARD: Operator depresses 1-HS-63-64D and 64E (on M6), verifies window A-5 and A-6 on 1-XA-55-6C are reset. COMMENT:	______ SAT ______ UNSAT
Simulator Operator Note: **When AUO is contacted, console operator must open FCV-32-110 (and 102 and 80) with remote functions IAR06, IAR07, and IAR08 to OPEN.**	
STEP 7.: ESTABLISH control air to containment USING EA-32-1,"Establishing Control Air to Containment." ***Cue:*** ***EA-32-1 is in progress. Status of EA is unknown. When AUO contacted, state: I am in the process of opening the valves at this time.*** STANDARD: Operator ensures air is available to containment by observing red lights LIT on FCV-32-110 (may also verify FCV-32-102 and 80) on XX-55-6K. COMMENT: .	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 8. VENT the unisolated CLA USING EA-63-1, "Venting Unisolated Cold Leg Accumulator." STANDARD: Operator transitions to EA-63-1, to attempt to vent the nitrogen overpressure from the accumulator. COMMENT:	______ SAT ______ UNSAT
Evaluators Note: The following is from EA-63-1	
STEP 9.: 1. ENSURE Phase B is RESET STANDARD: Operator verifies windows A-5 and A-6 on 1-XA-55-6C are reset. COMMENT:	______ SAT ______ UNSAT
STEP 10.: 2. ENSURE control air to containment ESTABLISHED USING EA-32-1,"Establishing Control Air to Containment." ***Cue:*** ***IF AUO contacted, state EA-32-1 is complete.*** STANDARD: Operator ensures air is available to containment by observing red lights LIT on FCV-32-110 (may also verify FCV-32-102 and 80) on XX-55-6K. COMMENT: .	______ SAT ______ UNSAT
STEP 11. 3. ENSURE the following closed: FCV-63-64 – Nitrogen Supply FCV-63-127 – Accumulator 1 Nitrogen Supply FCV-63-107 – Accumulator 2 Nitrogen Supply FCV-63-87 – Accumulator 3 Nitrogen Supply FCV-63-63 – Accumulator 4 Nitrogen Supply STANDARD: Operator verifies the above valves are closed by Green lights LIT on the respective handswitches. COMMENT:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 12.: 4. ADJUST nitrogen supply header vent controller HIC-63-65A output to 100% (OPEN). STANDARD: Operator adjusts HIC-63-65A to 100% by turning adjustment counter clockwise until it stops turning and indicator reads 100%. This is a critical step to provide a vent path for accumulator. COMMENT:	______ SAT ______ UNSAT **Critical Step**
STEP 13.: 5. OPEN FCV-63-127 Accumulator 1 Nitrogen Supply. STANDARD: Operator places HS for FCV-63-127 in the OPEN position and verifies Red light ON. This is a critical to step to align accumulator vent path. COMMENT:	______ SAT ______ UNSAT **Critical Step**
STEP 14. 6. WHEN affected CLA depressurized THEN CLOSE valve FCV-63-127. STANDARD: When CLA #1 pressure is approximately zero, Operator closes FCV-63-127 and verifies closed by Green light on HS LIT. COMMENT:	______ SAT ______ UNSAT
STEP 15. 7. ADJUST nitrogen supply header vent controller HIC-63-65A output to 0% (CLOSE). STANDARD: Operator dials HIC-63-65A to 0% output by turning control clockwise. COMMENT:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 16.: Return to procedure and step in effect. STANDARD: Operator returns to E-1, Step 18.	_____ SAT _____ UNSAT
STEP 17.: Inform the US that the #2, 3, & 4 CLAs have been isolated and that the #1 CLA would NOT isolate and that it has been vented. STANDARD: Operator informs the US that the #2, 3, & 4 CLAs have been isolated and that the #1 CLA would NOT isolate and that it has been vented. ***Cue:*** **This completes the JPM.**	_____ SAT _____ UNSAT Stop Time____

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. The unit has experienced a LOCA and ALL ECCS pumps have responded as designed.
2. E-1 has been implemented.
3. Transfer to CNMT Sump Recirculation has been completed.

INITIATING CUES:

1. You are the OATC and the SRO directs you to isolate the CLA per step #18 of E-1.
2. Power to CLA isolation valves has been restored using EA-201-1.
3. Inform the SRO when step 18 is completed.

STEP	ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
18.	**MONITOR** if CLAs should be isolated:	
	a. **CHECK** RCS pressure less than 100 psig.	a. **GO TO** Step 19.
	b. **CHECK** power to CLA isolation valves AVAILABLE.	b. **DISPATCH** personnel to restore power to CLA isolation valves **USING** EA-201-1, 480v Board Room Breaker Alignments.
	c. **ENSURE** SI signal RESET.	
	d. **CLOSE** CLA isolation valves.	d. **IF** power available to affected valve(s), **THEN** **CLOSE** affected valve(s) **USING** EA-201-3, Operation of Motor-Operated Valves from Outside MCR. **IF** any CLA valve CANNOT be closed, **THEN** **PERFORM** the following: 1) **ENSURE** Phase B reset. 2) **ESTABLISH** air to containment **USING** EA-32-1, Establishing Control Air to Containment. 3) **VENT** any unisolated CLA **USING** EA-63-1, Venting Unisolated Cold Leg Accumulator.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

EMERGENCY ABNORMAL PROCEDURE

EA-63-1

VENTING UNISOLATED COLD LEG ACCUMULATOR

Revision **0**

QUALITY RELATED

PREPARED/PROOFREAD BY: RILEY WRIGHT DATE: 7/27/95

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: ORIGINAL SIGNED BY W. R. LAGERGREN DATE: 8/24/95

EFFECTIVE DATE: 9/6/95

VERIFICATION DATE: 7/27/95

VALIDATION DATE: 7/30/95

REVISION DESCRIPTION: This is a new procedure created as part of upgrading the EOP set to WOG ERG Revision 1B.

1.0 PURPOSE

To provide instructions for venting nitrogen from unisolated cold leg accumulators (CLAs) to prevent nitrogen injection into the RCS.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 Entry Conditions

A. E-1, Loss of Reactor or Secondary Coolant.

B. ECA-1.1, Loss of RHR Sump Recirculation.

C. ECA-2.1, Uncontrolled Depressurization of All Steam Generators.

D. ECA-3.1, SGTR and LOCA - Subcooled Recovery.

E. ECA-3.2, SGTR and LOCA - Saturated Recovery.

F. ECA-3.3, SGTR Without Pressurizer Pressure Control.

G. ES-1.2, Post LOCA Cooldown and Depressurization.

H. ES-3.1, Post-SGTR Cooldown Using Backfill.

I. ES-3.2, Post-SGTR Cooldown Using Blowdown.

J. ES-3.3, Post-SGTR Cooldown Using Steam Dump.

K. FR-C.1, Inadequate Core Cooling.

L. FR-C.2, Degraded Core Cooling.

M. FR-P.1, Pressurized Thermal Shock.

3.0 PRECAUTIONS AND LIMITATIONS

None.

4.0 OPERATOR ACTIONS

4.1 Section Applicability

1. **PERFORM** Section 4.2. ☐

4.2 Venting Nitrogen from Cold Leg Accumulators

1. **ENSURE** Phase B RESET. ☐

2. **ENSURE** control air to containment ESTABLISHED **USING** EA-32-1, Establishing Control Air to Containment. ☐

3. **ENSURE** the following valves CLOSED:

VALVE	DESCRIPTION	CLOSED √
FCV-63-64	Nitrogen Supply	☐
FCV-63-127	Accumulator 1 Nitrogen Supply	☐
FCV-63-107	Accumulator 2 Nitrogen Supply	☐
FCV-63-87	Accumulator 3 Nitrogen Supply	☐
FCV-63-63	Accumulator 4 Nitrogen Supply	☐

4. **ADJUST** nitrogen supply header vent controller **[HIC-63-65A]** output to 100% (OPEN). ☐

4.2 Venting Nitrogen from Cold Leg Accumulators (Continued)

5. **OPEN** desired valve(s) to vent nitrogen from affected CLA(s):

VALVE	DESCRIPTION	OPEN √
FCV-63-127	Accumulator 1 Nitrogen Supply	☐
FCV-63-107	Accumulator 2 Nitrogen Supply	☐
FCV-63-87	Accumulator 3 Nitrogen Supply	☐
FCV-63-63	Accumulator 4 Nitrogen Supply	☐

6. **WHEN** affected CLA(s) depressurized,
   THEN
   CLOSE valve(s) opened in Step 4.2. 5.:

VALVE	DESCRIPTION	CLOSED √
FCV-63-127	Accumulator 1 Nitrogen Supply	☐
FCV-63-107	Accumulator 2 Nitrogen Supply	☐
FCV-63-87	Accumulator 3 Nitrogen Supply	☐
FCV-63-63	Accumulator 4 Nitrogen Supply	☐

7. **ADJUST** nitrogen supply header vent controller [HIC-63-65A] output to 0% (CLOSE). ☐

8. **RETURN TO** procedure and step in effect. ☐

END OF TEXT

5.0 REFERENCES

5.1 Drawings

A. 1-47W811-1, Safety Injection System.

B. 2-47W811-1, Safety Injection System.

C. 1 (2) 47W830-6, Nitrogen.

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Plant I
Spare Out a Vital Battery Charger

JOB PERFORMANCE MEASURE

Task: Spare Out a Vital Battery Charger
Task #: 0630030104 **(AUO)**

Task Standard: Vital Battery Board # I being supplied via spare charger and the normal charger is de-energized.

Time Critical Task: **YES:** ______ **NO:** X

K/A Reference/Ratings: 063A4.01 (2.7/3.0)
063K4.02 (2.9/3.2)

Method of Testing:

Simulated Performance: X **Actual Performance:** ______

Evaluation Method:

Simulator ______ **In-Plant** X **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________
Trainee Name

Evaluator: ____________ / ____________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **15 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. Do **NOT** allow the operator to open any compartment door which has relays mounted which could cause inadvertent tripping of equipment.
4. **SM approval will be required to enter the "Trip Hazard Zone" in the Vital Battery Rm.**
5. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

0-SO-250-1 Section 8.1.1

References:

	Reference	Title	Rev No.
A.	0-SO-250-1	125V DC Vital Power System	43

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All steps **shall be simulated** for this JPM. **WHEN ENTERING A UNIT TRIP HAZARD ZONE ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.** I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you. Do **NOT** open any compartment door which may have relays mounted on them.

INITIAL CONDITIONS:

1. Unit 1 is at 100% RTP.
2. All systems/components are OPERABLE.
3. All Technical Specification LCOs satisfied.
4. Electrical Maintenance has scheduled a PM on 125V Vital Battery Charger # I which requires unloading the charger.
5. All prerequisites of 0-SO-250-1 are complete.

INITIATING CUES:

1. The CRO directs you, the Unit 1 Control Room AUO, to place the spare charger in service for Vital Battery Board I, and remove Vital Charger I from service per 0-SO-250-1. (Maintenance requests that we do not tag the charger at this time).
2. Inform the Unit 1 SRO when the # 1 charger is out of service.

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 1.: Operator obtains appropriate procedure to spare out VB charger # I. STANDARD: Operator obtains 0-SO-250-1, section 8.1.1 to place Spare Charger 1-S in service in place of charger 1.	___ SAT ___ UNSAT Start Time____
STEP 2.: Ensure Power Checklist 0-250-1.09 has been performed (Spare Charger Fuses). ***Cue:*** ***Power Checklist 0-250-1.09 is complete with NO deviations.*** STANDARD: Operator explains how to, or checks configuration log to ensure checklist has been performed and no deviations exist which would potentially affect this operation.	___ SAT ___ UNSAT
STEP 3.: Ensure Power Checklist 0-250-1.10 has been performed. ***Cue:*** ***Power Checklist 0-250-1.10 is complete with NO deviations.*** STANDARD: Operator explains how to, or checks configuration log to ensure checklist has been performed and no deviations exist which would potentially affect this operation.	___ SAT ___ UNSAT
STEP 4.: ENSURE Spare Vital Battery Charger 1-S breakers are in OFF position. A. 0-BKRC-250-QF/02-S, OUTPUT DC BKR is OFF B. 0-BKRC-250-QF/01-S, INPUT AC BKR is OFF ***Cue:*** ***a. The DC Power breaker is in the DOWN, OFF position.*** ***b. The AC Power breaker is in the DOWN, OFF position.*** STANDARD: Operator locates the 1-S Spare Charger (El. 749 AB outside the VB rooms) and verifies both the DC and AC breakers are in the OFF (down) position.	___ SAT ___ UNSAT
STEP 5.: Ensure timer for equalizing voltage on 1-S spare charger is set to Zero. ***Cue:*** ***Timer is set on zero.*** STANDARD: Operator verifies timer is on zero.	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 6.: IF 1-S Spare 125V Vital Battery Charger 480V AC transfer Switch is to be aligned to 480V Shutdown Board 1A2-A THEN VERIFY ac potential light is LIT. ***Cue:*** ***The potential light for the A train board is LIT.*** STANDARD: Operator locates the transfer switch and VERIFIES that the potential light from 480 V SD Bd 1A2-A (A train) is LIT.	___ SAT ___ UNSAT
STEP 7.: ENSURE 0-BKRA-250-KV/1-S, Bkr From 480V SD/BD 1A2-A To Spare 480V AC Vital XSW 1-S, breaker is in the **ON** position. ***Cue:*** ***The breaker is in the ON, UP, position.*** STANDARD: Operator locates the A train feeder (orange placard), on the Spare 480V Vital Trans Switch box and ensures it is in the closed, UP position. **This step is critical to ensure the spare charger will be aligned from the proper train to maintain operability of the battery board once aligned.**	___ SAT ___ UNSAT **Critical Step**
STEP 8.: If 1-S Spare 125V Vital Battery Charger transfer switch is to be aligned to 480V SD Bd 1B1-B (alternate supply) THEN STANDARD: Operator N/A's this step.	___ SAT ___ UNSAT
STEP 9.: PLACE 0-BKRC-250-QF/02-S, OUTPUT DC breaker on 1-S spare charger cabinet in ON position. ***Cue:*** ***DC power breaker is in the UP (ON) position*** STANDARD: Operator locates DC POWER breaker and places it in the UP, ON position. **This step is critical for spare charger breaker alignment.**	___ SAT ___ UNSAT **Critical Step**
STEP 10.: Place 0-BKRC-250-QF/01-S, INPUT AC breaker on 1-S spare charger cabinet in ON position. ***Cue:*** ***AC power breaker is in the UP (ON) position*** STANDARD: Operator locates AC POWER breaker and places it in the UP, ON position. **This step is critical for spare charger breaker alignment.**	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist:

STEP/STANDARD		SAT/UNSAT
STEP 11.:	VERIFY spare charger is energized with output voltage between 131 and 138 volts indicated on 1-S charger voltmeter.	___ SAT ___ UNSAT
Cue:	***Volts are at ~134 volts.***	
STANDARD:	Operator checks voltmeter to ensure voltage between 131 and 138 volts.	
STEP 12.:	PLACE ALARM DISABLE switch on 1-S spare charger cabinet in ON position.	___ SAT ___ UNSAT
Cue:	***Switch is pointing to the ON position.***	
STANDARD:	Operator rotates the ALARM DISABLE switch to the ON position [placing the alarm in service].	
STEP 13.:	ENSURE 0-BKRC-250-KW/1-S, breaker to Vital Battery Bd I from Spare Charger 1-S XSW is in the ON position. (DC trans. Switch is next to the 1S (spare) charger El. 749)	___ SAT ___ UNSAT
Cue:	***Breaker is in the UP, ON position***	
STANDARD:	Operator locates DC transfer switch and verifies the breaker to the #I VBB (Feeder to #I Vital Battery Board "Red Placard") is in the UP, closed position.	
STEP 14.:	PLACE 0-BKRC-250-KE/225-D in ON position on Vital Battery Board I.	___ SAT ___ UNSAT
Cue:	***Breaker is in the UP, ON position.***	
STANDARD:	Operator locates breaker 225 (near bottom of board) and places it in the UP, ON position.	**Critical Step**
This step is critical to tie the spare charger onto the Vital Battery Board I.		
STEP 15.:	PLACE 0-BKRC-250-KE/226-D, 125V VITAL BATT CHGR I NOR SUPPLY, in OFF position on Vital Battery Board I.	___ SAT ___ UNSAT
Cue:	***Breaker is in the DOWN, OFF position.***	
STANDARD:	Operator locates breaker 226 (near bottom of board) and places it in the DOWN, OFF position.	**Critical Step**
This step is critical to ensure normal charger not parallel to spare charger.		

Job Performance Checklist:

STEP/STANDARD		SAT/UNSAT
STEP 16.:	VERIFY on Battery Board I 0-EI-250-KE1-D, Spare Charger output voltage, stabilizes at 131.5 to 137.5 volts	___ SAT ___ UNSAT
Cue:	***Voltage stabilized at 134 volts,***	
STANDARD:	Operator checks Spare Charger Volt meter on Battery Board I to ensure **charger** voltage stabilizes between 131.5 and 137.5 volts.	
STEP 17.:	VERIFY 0-EI-250-KE3-D Battery Board 1 Voltmeter is within 5 volts of 0-EI-250-KE1-D spare charger voltage.	___ SAT ___ UNSAT
Cue:	***Battery Board voltage at 134 volts,*** ***Battery Charger voltage at 134 Volts.***	
STANDARD:	Operator checks Battery Board Volt meters to Battery Board Voltage within 5 volts of charger voltage.	
STEP 18.:	PLACE the following breakers in OFF position on Charger I to shutdown charger. A) 0-BKRC-250-QE/01-D, 125V DC BATT CHGR I INPUT AC BKR in OFF position B) 0-BKRC-250-QE/02-D, 125V DC BATT CHGR I OUTPUT DC BKR in OFF position	___ SAT ___ UNSAT **Critical Step**
NOTE:	**The following step should cause annunciation in the control room. If the operator fails to notify the Unit Operator prior to opening the following breakers make an annotation in the JPM remarks section.**	
Cue:	***Respond as Unit Operator if called and acknowledge report of incoming alarm.***	
Cue:	***a) AC POWER breaker is in the DOWN, OFF position*** ***b) DC POWER breaker is in the DOWN, OFF position.***	
STANDARD:	Operator locates the #1 VB Charger and places the AC and DC power breakers in the down, OFF position.	
This step is critical to shut down the charger and place in condition requested by Maintenance.		

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 19.: INFORM the Unit 1 SRO that the #1 VB charger is out of service. STANDARD: Operator informs the Unit 1 SRO that the #l VB charger is out of service. ***Cue:*** **This completes the JPM** **Comments:**	___ SAT ___ UNSAT Stop Time____

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All steps **shall be simulated** for this JPM. **WHEN ENTERING A UNIT TRIP HAZARD ZONE ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.** I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you. Do **NOT** open any compartment door which may have relays mounted on them.

INITIAL CONDITIONS:

1. Unit 1 is at 100% RTP.
2. All systems/components are OPERABLE.
3. All Technical Specification LCOs satisfied.
4. Electrical Maintenance has scheduled a PM on 125V Vital Battery Charger # I which requires unloading the charger.
5. All prerequisites of 0-SO-250-1 are complete.

INITIATING CUES:

1. The CRO directs you, the Unit 1 Control Room AUO, to place the spare charger in service for Vital Battery Board I, and remove Vital Charger I from service per 0-SO-250-1. (Maintenance requests that we do not tag the charger at this time).
2. Inform the Unit 1 SRO when the # 1 charger is out of service.

TVA

Sequoyah Nuclear Plant

Unit 0

System Operating Instruction

0-SO-250-1

125 VOLT DC VITAL POWER SYSTEM

Revision 0043

Quality Related

Level of Use: Continuous Use

VFU
Today
aB

Effective Date: 04-20-2009

Responsible Organization: OPS, Operations

Prepared By: Judy R. Varner

Approved By: J. K. Wilkes

Current Revision Description

Deleted references to TACF 0-07-009-250 which was removed U1C15 RFO with no Rev Bars at deletions. Removed references to TACF 0-07-009-250 in Attachment 11.Revision to incorporate PCF 028

3.0 PRECAUTIONS AND LIMITATIONS

A. Failure to observe all posted radiation control requirements may result in unnecessary radiation absorbed dose.

B. Use exact replacement or acceptable substitute fuses in accordance with OPDP-7.

C. Each battery room shall have an exhaust fan in service at all times to prevent explosive mixtures of hydrogen and oxygen from accumulating in the room.

D. The battery room personnel eyewash should be operable.

E. Opening both ac supply breakers to 480V vital transfer switches will result in a loss of normal potential to vital battery charger.

F. When replacing annunciator type fuses in fuse columns A, B, C, or D, place the fuse in the clip so that the "blown fuse extension" is toward the alarm bus.

G. Observe requirements of Sequoyah Safety and Health Manual, Part IV, when working around batteries.

H. Excessive grounds on dc system may cause spurious actuation of components during accident conditions. If ground voltage exceeds ± 80 volts, request Maintenance Support to locate and clear ground. Submit work order for grounds exceeding ± 25 volts.

I. The design operating limits for the 125v dc Vital Power System are ≥ 129V dc and ≤ 140V dc (Reference 45N703-1 and 45W703-9).

J. When the 125 V Vital Battery Charger is transferred to its alternate 480 V supply (480 V Vital AC transfer switch), the load for the 480 V Shutdown Board Transformer supplying that transfer switch must be reduced by 137kW (Approximately 184 HP) if the applicable unit is in Modes 1-4. This will ensure operability of the (125V) channel equipment, for that (480 V) train.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

K. Various breakers associated with the 125V Vital Battery System have similar breaker numbers. Caution must be used to ensure the intended component is being manipulated.

L. Due to vendor recommendations and calibration tolerances between the battery boards and battery chargers, voltage ranges will differ. This difference is due to instrument accuracy (TSIR 98-ICE-250-957). Voltage ranges specified by Electrical Maint. PMs should **NOT** be used by operations as guidelines for voltage ranges.

M. Identification and isolation of system grounds will be performed per 0-GO-10 and 0-PI-EBT-250-001.0

Date Today

4.0 PREREQUISITE ACTIONS

> **NOTE**
>
> Throughout this Instruction where an **IF/THEN** statement exists, the step should be **N/A'd** if the stated condition does not exist.

[1] **ENSURE** Instruction to be used is a copy of the effective version. aB

[2] **ENSURE** Precautions and Limitations Section 3.0, has been reviewed. aB

[3] **IF** a clearance was issued on equipment, **THEN**

ENSURE all safety grounds are removed before energizing equipment. N/A

[4] **IF** 125V Vital Battery is being placed in service, **OR**

IF equalizing charge is being applied, **THEN**

ENSURE battery cell electrolyte level is in normal range as marked on the cells. N/A

[5] **IF** work has been performed on Vital Battery Bank, **OR**

IF inside Vital Battery Room, **THEN**

ENSURE battery rooms are clean and free of obstruction to safe operations. N/A

[6] **IF** work has been performed inside Vital Battery Board Room, **THEN**

ENSURE battery board rooms are clean and free of obstructions to safe operations. N/A

Date Today

4.0 PREREQUISITE ACTIONS (continued)

[7] **ENSURE** each performer documents their name and initials:

Print Name	Initials
Aye Bee	AB

[8] **INDICATE** below which performance section of this Instruction will be used. AB

- ☐ 5.0 STARTUP/STANDBY READINESS
- ☐ 6.0 NORMAL OPERATION
- ☐ 7.0 SHUTDOWN
- ☑ 8.0 INFREQUENT OPERATION

REASON: Remove Charger #1 from service for maintenance IAW section 8.1.1.

Date ________

8.0 INFREQUENT OPERATION

8.1 Spare Charger Supplying Vital Battery Boards

8.1.1 Placing Spare Charger in Service to Vital Battery Board I

NOTE

1-S Spare Vital Battery Charger is used to replace I or II Vital Charger.

[1] **ENSURE** Power Checklist **0-250-1.09** has been performed (Spare Charger Fuses). ________

[2] **ENSURE** Power Checklist **0-250-1.10** has been performed. ________

[3] **ENSURE** [0-CHGB-250-QF-S], SPARE 125V VITAL BATTERY CHARGER 1-S breakers are in **OFF** position (el 749' AB outside 125V Vital Batt Rm II) on spare charger):

A. [0-BKRC-250-QF/02-S], SPARE 125 DC BATT CHGR 1-S OUTPUT DC BKR, breaker. **OFF**

________ 1st

________ CV

B. [0-BKRC-250-QF/01-S], SPARE 125 DC BATT CHGR 1-S INPUT AC BKR, breaker. **OFF**

________ 1st

________ CV

[4] **ENSURE** timer for equalizing voltage on 1-S spare charger is set to **ZERO**. ________

Date ________

8.1.1 Placing Spare Charger in Service to Vital Battery Board I (continued)

NOTE

Equipment referenced in the following two steps is located on the 480V AC Vital Transfer Switch 1-S.

[5] **IF [0-XSW-250-KV-S]**, Spare 480V AC Vital Transfer Switch 1-S, is to be aligned to 480V Shutdown Board 1A2-A, **THEN**

[5.1] **VERIFY** ac potential light is **LIT**. □

[5.2] **ENSURE [0-BKRA-250-KV/1-S]**, Bkr From 480V SD/BD 1A2-A To Spare 480V AC Vital XSW 1-S, breaker is in the **ON** position.

________ 1st

________ CV

[6] **IF [0-XSW-250-KV-S]**, Spare 480V AC Vital Transfer Switch 1-S,is to be aligned to 480V Shutdown Board 1B1-B, **THEN**

[6.1] **CONSULT** Engineering for concurrence and applicability of Tech Specs. □

[6.2] **IF** Unit 1 is in Modes 1-4, **THEN**

REMOVE 137kW of load from the 1B1-B 480 V Shutdown Board Transformer.

________ US/SRO

[6.3] **VERIFY** ac potential light is **LIT**. □

[6.4] **ENSURE [0-BKRA-250-KV/2-S]**, Bkr From 480V SD/BD 1B1-B To Spare 480V AC Vital XSW 1-S, is in the **ON** position.

____

________ CV

Date ________

8.1.1 Placing Spare Charger in Service to Vital Battery Board I (continued)

[7] **PLACE** [0-BKRC-250-QF/02-S], SPARE 125 DC BATT CHGR 1-S OUTPUT DC BKR, spare charger cabinet in **ON** position.

________ 1st

________ CV

[8] **PLACE** [0-BKRC-250-QF/01-S], SPARE 125 DC BATT CHGR 1-S INPUT AC BKR, spare charger cabinet in **ON** position.

________ 1st

________ CV

[9] **VERIFY** spare charger is energized with output voltage between 131 and 138 volts and stable as indicated on 1-S charger voltmeter. □

[10] **PLACE** [ALARM DISABLE] switch on 1-S spare charger cabinet in **ON** position. ________

NOTE
Located on 1-S Spare 125V Vital Battery Charger 125V DC Transfer Switch on el 749' AB outside 125V Vital Batt Rm II.

[11] **ENSURE** [0-BKRC-250-KW/1-S], To Vital Bat Bd I From Spare 125V DC Chgr 1-S XSW, is in the **ON** position.

________ 1st

________ CV

Date ________

8.1.1 Placing Spare Charger in Service to Vital Battery Board I (continued)

NOTE

When the normal and spare chargers are in parallel on the battery board one will normally back the voltage of the other down to less than 90 volts, unless their output voltages are perfectly matched.

[12] **PLACE [0-BKRC-250-KE/225-D]**, SPARE 125V BATT CHGR 1-S ALT SUPPLY in **ON** position on Vital Battery Board I.

________ 1st

________ CV

[13] **PLACE [0-SW-250-KE/226-D]**, 125V VITAL BATT CHGR I NOR SUPPLY, in **OFF** position on Vital Battery Board I.

________ 1st

________ CV

NOTE

Due to differences in calibration and instrument scaling charger voltmeter ranges will be slightly different than the ranges for the charger voltmeters located on the battery boards.

[14] **VERIFY** on Battery Board I **[0-EI-250-KE1-D]** Spare Charger output voltage stabilizes at 131.5 to 137.5 volts. ☐

[15] **VERIFY [0-EI-250-KE3-D]** Battery Board I voltmeter is within 5 volts of **[0-EI-250-KE1-D]** spare charger voltage. ☐

Date ________

8.1.1 Placing Spare Charger in Service to Vital Battery Board I (continued)

NOTE

Placing either of the following breakers in the OFF position will result in annunciator window 1, 2-XA-55-1C (A4) actuation.

[16] **PLACE** the following breakers in **OFF** position on **[125V VITAL BATT CHGR I]** to shutdown the charger (located el. 749 A.B., outside 125V Vital Batt Rm I):

A. **[0-BKRC-250-QE/01-D]**, 125V DC BATT CHGR I INPUT AC BKR. **OFF**

________ 1st

________ CV

B. **[0-BKRC-250-QE/02-D]**, 125V DC BATT CHGR I OUTPUT DC BKR. **OFF**

________ 1st

________ CV

END OF TEXT

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Plant J
Local Control of MDAFW Pump Flow

RO/SRO
JOB PERFORMANCE MEASURE

Task: Local Control of MDAFW Pump Flow

Task #: 3110060601 (RO)
0610020204 (AUO)

Task Standard: Locally control flow through one motor-driven AFW pump LCV.

Time Critical Task: **YES:** ____ **NO:** X

K/A Reference/Ratings: 061K3.02 (4.2/4.4) E05EK1.1 (3.8/4.1) 061A3.01 (4.2/4.2) 191K1.08 (3.4/3.4) 061A2.07 (3.4/3.5) 061A1.01 (3.9/4.4) 061A2.05 (3.1/3.4)

Method of Testing:

Simulated Performance: X **Actual Performance:** ____

Evaluation Method:

Simulator ____ **In-Plant** X **Classroom** ____

Main Control Room ____ **Mock-up** ____

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ____ **UNSAT** ____

Validation Time: 14 minutes **Total Time:** ____

Performance Time: **Start Time:** ____ **Finish Time:** ____

COMMENTS

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. **SM approval will be required to enter the "Trip Hazard Zone" in the Back up Cntrl Rm.**
4. Insure operator performs the following required actions for **SELF-CHECKING;**
    a. Identifies the correct unit, train, component, etc.
    b. Reviews the intended action and expected response.
    c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

EA-3-10, Section 4.1 & 4.3

References:

	Reference	Title	Rev No.
1.	EA-3-10	Establishing Motor Driven AFW Flow	1

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All steps **shall be simulated** for this JPM. **WHEN ENTERING A UNIT TRIP HAZARD ZONE ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.** I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 has experienced a Rx trip from 100% power.
2. The Unit 1 turbine-driven AFW pump has tripped off for unknown reasons.
3. During recovery from the Rx trip, the control room operator was unable to control AFW flow to S/G 3.
4 The level control valve to loop 3 S/G will NOT close from the MCR.
5 All narrow range S/G levels are $\approx$ 15%.

INITIATING CUES:

1. The Unit 1 US has directed you, the control room AUO to establish control of the 1B-B motor-driven AFW pump LCV for S/G # 3, using EA-3-10.
2. Inform the Unit 1 US when control of flow to S/G # 3 has been established.

Job Performance Checklist:

STEP/STANDARD		SAT/UNSAT
STEP 1.:	Obtain a copy of the appropriate procedure.	___ SAT ___ UNSAT Start Time____
STANDARD:	Operator obtains a copy of EA-3-10.	
STEP 2.:	SELECT applicable unit and pump.	___ SAT ___ UNSAT
STANDARD:	Operator checks Unit 1 and MD AFW Pump B-B.	
STEP 3.:	If starting MD AFW pump locally....	___ SAT ___ UNSAT
Cue:	***IF asked: Pump is running.***	
STANDARD:	Operator N/As this step.	
STEP 4.:	IF MD AFW LCV valve or controller failure has occurred, THEN GO TO Section 4.3.	___ SAT ___ UNSAT
STANDARD:	Operator goes to section 4.3.	

Job Performance Checklist:

STEP/STANDARD		SAT/UNSAT
STEP 5.:	ATTEMPT to control AFW LCVs from the Auxiliary Control Room [panels L-11A and L-11B].	
NOTE:	**ENSURE THE SM HAS GIVEN PERMISSION FOR YOU AND THE OPERATOR TO ENTER THE "UNIT TRIP HAZARD" AREA. ENSURE YOU AND THE OPERATOR REMAIN AWAY FROM ALL SWITCHES.**	
NOTE:	**This step is considered part of operator knowledge and the specific actions are not addressed by the procedure.**	___ SAT
Cue:	**Inform the operator that the "as found" indication is that the auto green light is illuminated and the controller output needle is to the far right.**	___ UNSAT
NOTE:	**LCV-3-148 controller is located on panel L-11B.**	
Cue:	***1. If the manual button is depressed, inform the operator that the amber light illuminates and the auto green light goes out.*** ***2. Controller output needle is to the far right.*** ***3. When the operator looks at 1-FI-3-147C (1-L-10 panel) or calls, MCR: Flow is still at 200 gpm to the # 3 S/G.***	
STANDARD:	The operator presses the manual button on 1-LIC-3-148 (Loop 3) and increases the output (pushes button on the bottom of the controller to the right) to cause the valve to Close (or verifies output is full right). Looks at FI-3-147C or Checks with the MCR to see if flow is reduced to the #3 S/G. (The operator may elect not to manipulate the controller by stating that the controller output is already indicating fully closed.)	
NOTE: This starts the alternate path		
STEP 6.:	If Step 4.3.1 has restored MD AFW flow, THEN:	___ SAT ___ UNSAT
STANDARD:	Operator should N/A this step.	
STEP 7.:	Establish communications with U-1 MCR UO.	___ SAT ___ UNSAT
Cue:	***If guidance is requested, direct AUO to locally isolate AFW flow to # 3 S/G per EA-3-10.***	
STANDARD:	Operator establishes communications with U-1 MCR UO.	

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 8.: Close upstream or downstream AFW LCV isolation valve for # 3 S/G. ***Cue:*** ***Valve handwheel moves several turns in the clockwise direction. IF operator calls MCR: Give AFW flow to # 3 S/G as zero gpm.*** **NOTE:** **VLV-3-826 is at Aux Bldg, elev 714, AFW mezzanine** **VLV-3-834 is above WVVR entrance.** STANDARD: Operator unlocks and closes VLV-3-826, or VLV-3-834 for # 3 S/G. **This step is critical to isolate the flowpath of the failed open valve.**	___ SAT ___ UNSAT **Critical Step**
STEP 9.: NOTIFY UO to ensure MD AFW pumps running. ***Cue:*** ***Both MDADW pumps are running.*** STANDARD: Operator checks with Unit 1 UO to ensure pumps running.	___ SAT ___ UNSAT
STEP 10.: CONTROL S/G level as directed by UO by throttling AFW LCV isolation valve. ***Cue:*** ***Roll play as UO and have the operator throttle open the valve previously closed, 3 turns open. After the adjustment is simulated, state flow is now approx 20 gpm and no further manipulations will be needed.*** STANDARD: Operator simulates turning valve handwheel 3 turns to the right to make adjustments as necessary to 3-826 or 3-834. **This step is critical to set the required flow to maintain adequate heat sink.**	___ SAT ___ UNSAT **Critical Step**
STEP 11.: Notify UO to operate pump recirculation valves FCV-3-400, 401. ***Cue:*** ***Role play as UO and report that recirculation valves have been operated*** STANDARD: Operator informs the UO to operate valves.	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 12.: Inform the Unit 1 US that AFW flow to # 3 S/G is being controlled. STANDARD: Operator informs the Unit 1 US that AFW flow to #3 S/G is being controlled. ***CUE:* This completes the JPM** Comments:	___ SAT ___ UNSAT Stop Time____

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All steps **shall be simulated** for this JPM. **WHEN ENTERING A UNIT TRIP HAZARD ZONE ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.** I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Unit 1 has experienced a Rx trip from 100% power.
2. The Unit 1 turbine-driven AFW pump has tripped off for unknown reasons.
3. During recovery from the Rx trip, the control room operator was unable to control AFW flow to S/G 3.
4. The level control valve to loop 3 S/G will <u>NOT</u> close from the MCR.
5. All narrow range S/G levels are ≈ 15%.

INITIATING CUES:

1. The Unit 1 US has directed you, the control room AUO to establish control of the 1B-B motor-driven AFW pump LCV for S/G # 3, using EA-3-10.
2. Inform the Unit 1 US when control of flow to S/G # 3 has been established.

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

EOI PROGRAM MANUAL

EMERGENCY ABNORMAL PROCEDURE

EA-3-10

ESTABLISHING MOTOR DRIVEN AFW FLOW

Revision 1

VFU
Today
ab

QUALITY RELATED

PREPARED/PROOFREAD BY: W. T. LEARY

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: F. Soens DATE: 06/08/10

EFFECTIVE DATE: 06/09/10

VERIFICATION DATE: N/A

VALIDATION DATE: N/A

REVISION
DESCRIPTION: Removed the local handswitches [HS-3-118B & -128B] option for starting MD AFW pump A-A and B-B respectively. Handswitches are/or will be deleted per DCN D222367A Stages 1 and 6 (09000177, 09000185, 09000187 & 09000189).

1.0 PURPOSE

To provide instructions for establishing MD AFW flow by performing one or more of the following contingency actions:

- Starting MD AFW pumps locally from 6900 V shutdown boards.
- Controlling AFW flow from Aux CR or by throttling LCV isolation valves (LCV failure).
- Verifying proper AFW valve alignment.
- Isolating pump recirculation lines.
- Aligning pump suction to ERCW.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 Entry Conditions

A. E-0, Reactor Trip or Safety Injection.

B. FR-H.1, Loss of Secondary Heat Sink.

C. FR-S.1, Nuclear Power Generation/ATWS.

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Precautions

A. If the accountability siren sounds, the operator should continue performing this procedure. The SOS will remain aware of procedure progress and location of performing personnel.

4.0 OPERATOR ACTIONS

4.1 Section Applicability

1. **SELECT** applicable unit:

   - Unit 1_____
   - Unit 2_____.

2. **SELECT** applicable pump:

   - MD AFW Pump A-A _____
   - MD AFW Pump B-B _____.

3. **IF** starting MD AFW pump locally at 6900 V shutdown boards,
   THEN
   GO TO Section 4.2. ☐

4. **IF** MD AFW LCV valve or controller failure has occurred,
   THEN
   GO TO Section 4.3. ☐

5. **IF** verifying MD AFW valve alignment,
   THEN
   GO TO Section 4.4. ☐

4.1 Section Applicability (Continued)

6. **IF** isolating MD AFW pump recirculation line,
   THEN
   GO TO Section 4.5. ☐

7. **IF** aligning MD AFW pump suction to ERCW,
   THEN
   GO TO Section 4.6. ☐

8. **RETURN TO** procedure and step in effect. ☐

4.2 Starting MD AFW Pumps Locally From 6900 V Shutdown Boards

1. **IF** manual control of AFW flow to the S/Gs desired **OR** S/G pressure less than 300 psig,
   THEN
   NOTIFY UO to close applicable MD AFW LCVs **USING** MANUAL BYPASS:

MD AFW PUMP	MD AFW LCV	VALVE CLOSED ✓
A-A	LCV-3-164A	☐
	LCV-3-156A	☐
B-B	LCV-3-148A	☐
	LCV-3-171A	☐

2. **IF** starting MD AFW Pump A-A,
   THEN
   PERFORM the following:

   a. **PLACE** transfer switch **[XS-3-118]** in AUXILIARY. [6900 V Shutdown Board 1(2)A-A, Compartment 10] ☐

   b. **START** MD AFW pump A-A **USING** **[HS-3-118C]**. ☐

   c. **IF** AFW Train A flow less than 300 gpm,
      THEN
      NOTIFY UO to ensure recirculation valve **[FCV-3-400]** open. ☐

4.2 Starting MD AFW Pumps Locally From 6900 V Shutdown Boards (Continued)

3. **IF** starting MD AFW Pump B-B,
   THEN
   PERFORM the following:

   a. **PLACE** transfer switch [XS-3-128] in AUXILIARY.
   [6900 V Shutdown Board 1(2)B-B, Compartment 10] ☐

   b. **START** MD AFW Pump B-B **USING** [HS-3-128C]. ☐

   c. **IF** AFW Train B flow less than 300 gpm,
   THEN
   NOTIFY UO to ensure recirculation valve [FCV-3-401] open. ☐

4. **GO TO** Section 4.1, step in effect.

END OF SECTION

4.3 MD AFW LCV Valve or Controller Failure

1. **ATTEMPT** to control AFW LCVs from Auxiliary Control Room. [Panels L-11A and L-11B] ☐

2. **IF** Step 4.3. 1. has restored MD AFW flow,
   THEN
   GO TO Section 4.1, step in effect. ☐

NOTE On loss of power or air, the MD AFW main LCVs fail <u>open</u> and the bypass LCVs fail <u>closed</u>.

3. **ESTABLISH** communications between local operator and MCR UO. ☐

4. **CLOSE** upstream or downstream AFW LCV isolation valve as necessary:

S/G	VALVE NUMBER	DESCRIPTION	LOCATION	AT LEAST ONE PER S/G CLOSED ✓
1	VLV-3-828	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-836	Downstream isolation	In WVVR	☐
2	VLV-3-827	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-835	Downstream isolation	Above WVVR entrance	☐
3	VLV-3-826	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-834	Downstream isolation	Above WVVR entrance	☐
4	VLV-3-829	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-837	Downstream isolation	In WVVR	☐

4.3 MD AFW LCV Valve or Controller Failure (Continued)

5. **NOTIFY** UO to ensure MD AFW pumps running.

6. **CONTROL** S/G level as directed by UO by throttling AFW LCV isolation valve(s) closed in Step 4.3. 4.:

S/G	VALVE NUMBER	DESCRIPTION	LOCATION	THROTTLED ✓
1	VLV-3-828	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-836	Downstream isolation	In WVVR	☐
2	VLV-3-827	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-835	Downstream isolation	Above WVVR entrance	☐
3	VLV-3-826	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-834	Downstream isolation	Above WVVR entrance	☐
4	VLV-3-829	Upstream isolation	Aux Bldg, elev 714, AFW mezzanine	☐
	VLV-3-837	Downstream isolation	In WVVR	☐

7. **NOTIFY** UO to operate pump recirculation valves as follows:

MD AFW PUMP	VALVE NUMBER	OPEN IF PUMP FLOW LESS THAN 300 GPM	CLOSED IF PUMP FLOW GREATER THAN 300 GPM
A-A	FCV-3-400	☐	☐
B-B	FCV-3-401	☐	☐

8. **GO TO** Section 4.1, step in effect. ☐

END OF SECTION

4.4 Verifying MD AFW Valve Alignment

1. **COORDINATE** with UO and
ENSURE the following valves in required condition as applicable:

DESCRIPTION	VALVE	LOCATION	REQUIRED CONDITION ✓
MD AFW Pump A-A recirc isolation	FCV-3-400	Aux Bldg, elev 690, at SA3 (SA12)	OPERABLE ☐
MD AFW Pump A-A recirc isolation	VLV-3-936	Aux Bldg, elev 690, at SA3 (SA12), 5 ft off floor	OPEN ☐
MD AFW Pump A-A recirc isolation	VLV-3-938	Aux Bldg, elev 690, at SA3 (SA12), 5 ft off floor	OPEN ☐
MD AFW Pump A-A suction isolation	VLV-3-803	Aux Bldg, elev 690, by AFW Pump A-A	OPEN ☐
MD AFW Pump B-B recirc isolation	FCV-3-401	Aux Bldg, elev 690, at SA4 (SA13)	OPERABLE ☐
MD AFW Pump B-B recirc isolation	VLV-3-940	Aux Bldg, elev 690, at SA4 (between SA13 & SA14), 5 ft off floor	OPEN ☐
MD AFW Pump B-B recirc isolation	VLV-3-942	Aux Bldg, elev 690, at SA4 (between SA13 & SA14), 5 ft off floor	OPEN ☐
MD AFW Pump B-B suction isolation	VLV-3-804	Aux Bldg, elev 690, by AFW Pump B-B	OPEN ☐
Condensate supply isolation	0-VLV-3-800	Aux Bldg, elev 690, southwest corner, 15 ft off floor	OPEN ☐
CST "A" supply to AFW isolation	0-VLV-2-504	Turbine Bldg, elev 685, above centrifuge	OPEN ☐
CST "B" supply to AFW isolation	0-VLV-2-505	Turbine Bldg, elev 685, above centrifuge	OPEN ☐

2. **IF** any valve **NOT** in required condition,
THEN
CONSULT TSC for contingency action. ☐

4.4 Verifying MD AFW Valve Alignment (Continued)

3. **GO TO** Section 4.1, step in effect. ☐

END OF SECTION

4.5 Isolating MD AFW Pump Recirculation Lines

1. **PLACE** applicable pump transfer switch in AUX position:

MD AFW PUMP RECIRCULATION VALVE	TRANSFER SWITCH	SWITCH LOCATION	AUX ✓
FCV-3-400	XS-3-400	Auxiliary Control Room, L-11A	☐
FCV-3-401	XS-3-401	Auxiliary Control Room, L-11B	☐

2. **IF** Step 4.5. 1. **NOT** effective **OR** manual isolation preferred,
THEN
CLOSE applicable MD AFW pump recirculation isolation valve:

VALVE	DESCRIPTION	LOCATION	CLOSED ✓
VLV-3-938	MD AFW Pump A-A recirculation isolation	Aux Bldg, elev 690, at SA3 (SA12), 5 ft off floor	☐
VLV-3-942	MD AFW Pump B-B recirculation isolation	Aux Bldg, elev 690, at SA4 (between SA12 and SA13), 5 ft off floor	☐

3. **GO TO** Section 4.1, step in effect. ☐

END OF SECTION

4.6 Aligning MD AFW Pump Suction to ERCW

1. **IF** aligning MD AFW Pump A-A suction to ERCW,
   THEN
   PERFORM the following:

   a. **CLOSE** ERCW tell tale drain valve [FCV-3-807]. ☐
   [Aux Bldg, elev 690, by MD AFW pump]

   b. **NOTIFY** UO to ensure ERCW to MD AFW Pump A-A suction valves [FCV-3-116A] and [FCV-3-116B] are open. ☐

2. **IF** aligning MD AFW Pump B-B suction to ERCW,
   THEN
   PERFORM the following:

   a. **CLOSE** ERCW tell tale drain valve [FCV-3-808]. ☐
   [Aux Bldg, elev 690, by MD AFW pump]

   b. **NOTIFY** UO to ensure ERCW to MD AFW Pump B-B suction valves [FCV-3-126A] and [FCV-3-126B] are open. ☐

3. **GO TO** Section 4.1, step in effect. ☐

END OF TEXT

5.0 REFERENCES

5.1 Drawings

A. 1, 2-47W803-2, Auxiliary Feedwater.

SEQUOYAH NUCLEAR PLANT
JOB PERFORMANCE MEASURE

INPLANT K (RO/SRO)

Local Alignment of 2-RM-90-112 to Lower Containment

RO/SRO
JOB PERFORMANCE MEASURE

Task: Local Alignment of 2-RM-90-112 to Lower Containment

Task #: 0730990101 **(RO);** 0730020104 **(AUO)**

Task Standard: Manually align 2-RM-90-112 (locally) to LOWER containment.

Time Critical Task: **YES:** ______ **NO:** __X__

K/A Reference/Ratings: 002A3.01 (3.7/3.9)

Method of Testing:

Simulated Performance: __X__ **Actual Performance:** ______

Evaluation Method:

Simulator ______ **In-Plant** __X__ **Classroom** ______

Main Control Room ______ **Mock-up** ______

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **20 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

COMMENTS

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments.
3. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

2-SO-90-2, Sections 5.1 and 8.3

References:

	Reference	Title	Rev No.
1.	2-SO-90-2	Gaseous Process Radiation Monitoring System	31

===

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. 2-RM-90-112 had been isolated and tagged electrically for maintenance. The Hold Order has been picked up from the breaker, the valve checklist (Attachment 3) is complete, but the pumps are off.
2. 2-RM-90-106 has just tripped and neither of its associated pumps can be started.
3. Precautions, Limitation and 2-SO-90-2 Section 4, Prerequisite Actions, are current, complete and signed off.

INITIATING CUES:

1. The Unit 2 CRO has directed you, the Unit 2 Aux. Bldg AUO, to align rad. monitor 2-RM-90-112 to sample lower containment per 2-SO-90-2, Section 8.3 steps 1 through 4 (along with any other applicable sections).

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 1.: Obtain copy of procedure. STANDARD: 2-SO-90-2 Section 8.3 is identified as appropriate procedure. COMMENT:	___ SAT ___ UNSAT Start Time_____
STEP 2.: [1] ENSURE 2-RM-90-112 Upper Containment Rad Monitor in service per the following: [a] Valve checklist 2-90-2.03 (Attachment 3) complete. ***Cue:*** ***If asked Valve checklist is complete.*** STANDARD: Candidate notes that valve checklist is signed-off COMMENT:	______ SAT ______ UNSAT
STEP 3.: [b] Pump running (Section 5.1). **NOTE:** **The rad monitor flow alarms will not reset until the operator manually resets the alarms as indicated in the cues.** STANDARD: Operator determines that pump is NOT running and goes to Section 5.1. COMMENT:	
Evaluator Note: The following steps are from 2-SO-90-2, Section 5.1	
STEP 4.: [1] INDICATE below which rad monitor will be placed in service: STANDARD: Operator checks 2-RM-90-112. Comment:	______ SAT ______ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 5.: [2] ENSURE the following valve checklist has been completed for rad monitors to be placed in service. STANDARD: Operator indicates that 2-RM-90-112 valve checklist 2-90-2.03 Attachment 3 is complete. Comment:	______ SAT ______ UNSAT
STEP 6.: [3] IF placing 2-RM-90-106 in service THEN........ STANDARD: Operator N/As this step COMMENT:	______ SAT ______ UNSAT
STEP 7.: [4] ENSURE radiation monitor heat trace is in service for monitor being placed in service (N/A monitor not required) STANDARD: Operator N/As 2-RM-90-106 portion of step. Operator places 2-HS-90-112 to the ON position. COMMENT:	______ SAT ______ UNSAT
STEP 8.: [5] IF testing heat trace circuit, THEN PERFORM Section 8.4 AND RETURN TO step [6] ***Cue:*** ***Testing heat tracing IS complete.*** STANDARD: Operator acknowledges that heat trace circuit testing is complete and continues with next step. COMMENT:	
STEP 9.: [6] COORDINATE with MIG to place 2-RM-90-106 or 112 sample pumps In Service. ***Cue:*** ***Unit 2 CRO will coordinate with MIG.*** STANDARD: Coordination set up with MIG. COMMENT:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 10.: [7] ESTABLISH flow through radiation monitor by performing the following steps: [a] IF starting 2-RM-90-112 sample pump, THEN DEPRESS one of the following local start buttons ***CUE:*** **MIG has aligned the #1 sample pump for service.** STANDARD: Operator locates and indicates that HS-90-112A has been depressed. This step is critical because it is required to start sample pump. COMMENT:	___ SAT ___ UNSAT **Critical Step**
STEP 11.: [b] IF starting 2-RM-90-106 sample pump, THEN .. STANDARD: Operator N/As this step COMMENT:	___ SAT ___ UNSAT
STEP 12.: [c] NOTIFY MIG to adjust flow as required. ***Cue:*** ***MIG has been contacted and will monitor flow.*** STANDARD: Operator contacts MIG for support. COMMENT:	___ SAT ___ UNSAT
STEP 13.: [d] IF flow cannot be established through the Rad Monitor THEN......... ***Cue:*** ***Flow has been established through 2-RM-90-112.*** STANDARD: Operator N/As this step COMMENT:	___ SAT ___ UNSAT

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 14.: [e] IF placing [2-RM-90-112] in service , THEN RESET [2-HS-90-112F] local low flow seal-in. STANDARD: Operator resets local low flow seal-in by turning [2-HS-90-112F] to the left to reset. COMMENT:	___ SAT ___ UNSAT
STEP 15.: [f] ENSURE MCR malfunction alarms are RESET: ***Cue:*** ***Role play as Unit 2 CRO and state that alarms 2-RA-90-112B and 112C are RESET*** STANDARD: Operator contacts MCR to ensure alarms 2-RA-90-112B, Window A-2 and 2-RA-90-112C, Window A-3 on M12D are DARK. Operator N/As alarms associated with 2-RM-90-106. COMMENT:	___ SAT ___ UNSAT
STEP 16.: [g] IF placing RM-90-106 in service THEN......... STANDARD: Operator N/As step. COMMENT:	___ SAT ___ UNSAT
STEP 17.: [8] IF performing source check of rad monitor, THEN...... ***Cue:*** ***Source check will not be performed at this time.*** STANDARD: Operator returns to Section 8.3, Step [1] [c] COMMENT:	___ SAT ___ UNSAT
Evaluator Note: The following steps are from 2-SO-90-2, Section 8.3:	

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 18.: [c] 2-HS-90-112 Heat trace is in the ON position. ***Cue:*** ***HS is in the ON position, based on performance of Section 8.4*** STANDARD: Operator determines 2-HS-90-112 heat trace is on based on prior performance of Section 8.4 steps. COMMENT:	___ SAT ___ UNSAT
STEP 19.: [2] If testing the heat trace circuit, THEN…… STANDARD: Operator N/As step, since heat trace was tested previously. COMMENT:	___ SAT ___ UNSAT
STEP 20.: [3] If 2-RE-90-112 background count rate is less than 9000 cpm THEN…… ***Cue:*** ***Source check is not required.*** STANDARD: Operator N/As step. COMMENT:	___ SAT ___ UNSAT
STEP 21.: [4] OPEN 2-ISIV-90-283G Crosstie Valve Between Upper and Lower Compartment Rad Monitors. ***Cue:*** ***Valve turns CCW several turns then stops.*** STANDARD: Valve 2-ISIV-90-283G located & opened, handwheel turned as far left (counter-clockwise) as possible. This is a critical task to place the rad monitor in service COMMENT:	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist:

STEP / STANDARD	SAT / UNSAT
STEP 22.: Unit 2 CRO informed that 2-SO-90-2, Section 8.3, Steps 1 through 4 are complete. ***Cue:*** ***Acknowledge report from operator.*** STANDARD: Operator contacts MCR and reports procedure steps are completed COMMENT: *Cue:* **This completes the JPM.**	______ SAT ______ UNSAT Stop Time____

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All control room steps shall be performed for this JPM. I will provide initiating cues and reports on other actions when directed by you. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. 2-RM-90-112 had been isolated and tagged electrically for maintenance. The Hold Order has been picked up from the breaker, the valve checklist (Attachment 3) is complete, but the pumps are off.
2. 2-RM-90-106 has just tripped and neither of its associated pumps can be started.
3. Precautions, Limitation and 2-SO-90-2 Section 4, Prerequisite Actions, are current, complete and signed off.

INITIATING CUES:

1. The Unit 2 CRO has directed you, the Unit 2 Aux. Bldg AUO, to align rad. monitor 2-RM-90-112 to sample lower containment per 2-SO-90-2, Section 8.3 steps 1 through 4 (along with any other applicable sections).

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

SYSTEM OPERATING INSTRUCTION

2-SO-90-2

GASEOUS PROCESS RADIATION MONITORING SYSTEM

Revision 37

VFU
Today
AB

QUALITY RELATED

PREPARED/PROOFREAD BY: CWMATHES

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 11/23/09

LEVEL OF USE: **CONTINUOUS USE**

REVISION DESCRIPTION: Revised to add RM-90-400 disconnect switch to the Power Checklist (PCR 08000520). Deleted IV column from checklist per management expectations Added reference to 0-PI-OPS-301-001.0 in section 5 and 7(PCR 07000296). Corrected UNID for 2-RE-90-400 monitor in section 8.9 (PCR 09001013). Added section 8.11 and revised 5.3 for the primary sampling pumps alignments(PCR 09000155 & 09001215). Added step in section 8.9 to return sampling to automatic mode. Added LCO reference to section 8.1 & 8.8 (07000469). Replaced "MIG" with "I & C" throughout document to reflect organization name change.

3.0 PRECAUTIONS AND LIMITATIONS

A. Failure to observe all posted radiation control requirements may lead to unnecessary radiation absorbed doses.

B. Pump damage may occur from excessive heat if pumps are isolated, either manually or automatically, with the pump running.

C. Rad monitors which can initiate an Engineered Safety Feature (ESF) Actuation shall be blocked before any maintenance activity, functional test, or return to service is performed. **[C.1]**

D. Do not block any rad monitor that has a redundant monitor unless that redundant monitor is operable.

E. To prevent unmonitored releases, with one unit in Mode 1, 2, or 3 and the other in Mode 4, 5, or 6, Shield Building Vent Monitor for shutdown unit is required to be operable to satisfy NUREG-0737 and FSAR Post Accident Sampling requirements for the operating unit. **[C.4]**

F. Action 28 of LCO 3.3.3.1 and action 19 of LCO 3.3.2, Table 3.3-3 must be complied with before blocking 2-RM-90-130 and 2-RM-90-131 simultaneously during Modes 1, 2, 3, 4, or 6.

G. Moisture accumulation in the 2-RM-90-106 and 112 rad monitors pump supply lines will occur if the heat trace circuit is turned **OFF** or has a break in the wiring circuit. The heat trace thermostat will maintain approximately 110°F on the monitors pump supply lines. This temperature will keep the warm, sometimes humid, containment sample air which passes through the cool Aux. Bldg to the rad monitors above its dew point.

H. Either 2-RM-90-99 or 2-RM-90-119 must be in service to monitor the low range of the Condenser Vacuum Exhaust. Both monitors should not be in service at the same time for extended periods, due to flow limitations.

I. 2-RM-90-106/2-RM-90-400 local sample pump handswitches have AUTO-OFF-HAND positions. Normally 'AUTO' position is used if starting/stopping pumps from the MCR (2-RI-90-106A/2-RI-90-400A). Using 'HAND' position bypasses MCR start/stop capability.

Date Today

4.0 PREREQUISITE ACTIONS

NOTE Throughout this Instruction, where an **IF/THEN** statement exists, the step should be **N/A** if the condition does not exist.

[1] **ENSURE** the Instruction to be used is a copy of the effective version. aB

[2] **ENSURE** Precautions and Limitations, Section **3.0**, has been reviewed. aB

[3] **ENSURE** Power Checklist 2-90-2.01 complete (Attachment 1). aB

[4] **INDICATE** below which performance section of this Instruction will be used and the reason for this performance:

☐ 5.0 STARTUP/STANDBY READINESS

☐ 7.0 SHUTDOWN

☑ 8.0 INFREQUENT OPERATION

REASON: Align 2-RM-90-112 to lower containment using section 8.3

Date ________

8.3 Aligning Containment Upper Compartment Monitor to Lower Compartment

NOTE 1 2-RM-90-106 and 2-RM-90-112 do not initiate CVI.

NOTE 2 I & C support is required when placing RM-90-106 sample pumps in service, shutting them down or swapping sample pumps. Configuration control for sample pump suction and discharge valves and flow adjustments through the RM are performed by I & C.

NOTE 3 I & C support is required to adjust flow for 2-RM-90-112 sample pumps when placing in service or swapping pumps due to vacuum switches.

NOTE 4 Heat Trace handswitches are located at the Heat Trace Control Panel **[2-JBOX-90-3919]**, east wall adjacent to 2-RM-90-106.

[1] **ENSURE** 2-RM-90-112 Upper Compartment Rad Monitor in service per the following:

[a] Valve Checklist 2-90-2.03 (Attachment 3) complete. ________

[b] Pump running (Section 5.1). ________

[c] **[2-HS-90-112]**, heat trace is in the **ON** position. ________

[2] **IF** testing the heat trace circuit,
THEN
PERFORM Section 8.4
AND
RETURN TO step **[3]**. ☐

NOTE High background count rate may mask the source and prevent an upward deflection when source check is performed. Source check of RE-90-112 is not required for TS operability.

[3] **IF** 2-RE-90-112 background count rate is less than 9,000 cpm,
THEN
PERFORM Section **8.1** of this Instruction to source check 2-RM-90-112. ________

Date ___________

8.3 Aligning Containment Upper Compartment Monitor to Lower Compartment (Continued)

[4] **OPEN** [2-ISIV-90-283G] Crosstie Valve Between Upper and Lower Compartment Rad Monitors.

______ 1st ______ IV

[5] **ENSURE** the following FCVs are **OPEN**:

VALVE NO.	INITIALS
2-FCV-90-108	____ 1st ____ IV
2-FCV-90-109	____ 1st ____ IV
2-FCV-90-107	____ 1st ____ IV
2-FCV-90-117	____ 1st ____ IV
2-FCV-90-116	____ 1st ____ IV

[6] **ENSURE** [2-RM-90-112] is operable by verifying the following:

- Power "ON" light illuminated. ☐
- Instrument malfunction alarms clear. ☐
- CPM reading of at least background level. ☐

Date ________

5.0 STARTUP/STANDBY READINESS

5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service

NOTE Containment Building Lower and Upper Compartment Air Monitors 2-RM-90-106 and 2-RM-90-112 do not initiate CVI.

[1] **INDICATE** below which rad monitor will be placed in service:

RAD MONITOR	FUNCTION	☑
2-RM-90-106	Containment Bldg Lower Compartment Air Monitor	☐
2-RM-90-112	Containment Bldg Upper Compartment Air Monitor	☐

[2] **ENSURE** the following valve checklist has been completed for rad monitors to be placed in service (N/A any others):

RAD MONITOR	FUNCTION	VALVE CHECKLIST	ATTACH NUMBER	INITIALS
2-RM-90-106	Containment Bldg Lower Compartment Air Monitor	2-90-2.02	2	________
2-RM-90-112	Containment Bldg Upper Compartment Air Monitor	2-90-2.03	3	________

Date ________

5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

[3] **IF** placing 2-RM-90-106 in service,
THEN
ENSURE **[2-ISIV-90-283G]** Crosstie Valve Between Upper and Lower Compartment Rad Monitors is **CLOSED** (Valve Checklist 2-90-2.03). ________

NOTE 1 Heat Trace handswitches 2-HS-90-106 and 112 are located at the Heat Trace Control Panel **[2-JBOX-90-3919]**, east wall adjacent to 2-RM-90-106.

NOTE 2 Amber lights may or may not be illuminated. With the handswitch in the ON position the amber indicating lights will be **ON** if the thermostat senses temperature less than 110°F.

[4] **ENSURE** radiation monitor heat trace is in service for monitor being placed in service (NA monitor not required):

HANDSWITCH	DESCRIPTION	POSITION	INITIALS
2-HS-90-106	Heat Trace for 2-RM-90-106 activated	ON	________
2-HS-90-112	Heat Trace for 2-RM-90-112 activated	ON	________

[5] **IF** testing heat trace circuit,
THEN
PERFORM Section 8.4
AND
RETURN TO step **[6]**. ☐

Date ________

5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

NOTE 1 I & C support is required when placing RM-90-106 sample pumps in service, shutting them down or when swapping pumps. Configuration control for sample pump suction and discharge valves and flow adjustments through RM is performed by I & C.

NOTE 2 I & C support is required to adjust flow for 2-RM-90-112 sample pumps when placing in service or swapping pumps due to vacuum switches.

[6] **COORDINATE** with I & C to place 2-RM-90-106 or 112 sample pumps In Service. ________

[7] **ESTABLISH** flow through radiation monitor by performing the following steps:

[a] **IF** starting [2-RM-90-112] sample pump, **THEN DEPRESS** one of the following local START buttons:

HS-90-112A	Pump 1	START	________
HS-90-112B	Pump 2	START	________

[b] **IF** starting [2-RM-90-106] sample pump, **THEN**

1. **ENSURE** [HS-90-106B] local (AUTO-OFF-HAND) handswitch in **AUTO** position for sample pumps. ________

2. **ENSURE** I & C has completed valve alignments for pump to be placed In Service USING 2-PI-IPM-90-106.0. ________

3. **DEPRESS** one of the following pushbuttons, **AND CHECK** PB illuminated: (N/A other)

LOCATION	UNID	PUSHBUTTON	PB ILLUMINATED √	INITIALS
Local	2-RI-90-106B	FLOW	☐	________
MCR	2-RI-90-106A	FLOW	☐	________

Date ________

5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

[c] **NOTIFY** I & C to adjust flow as required using 2-SI-IFT-090-112.0, *Functional Test of Containment Building Upper Compartment Air Monitor 2-R-90-112.* ☐

[d] **IF** flow cannot be established through the Rad Monitor,
THEN
NOTIFY Unit Operator. ________

[e] **IF** placing **[2-RM-90-112]** in service,
THEN RESET [2-HS-90-112F] local low flow seal-in. ________

[f] **ENSURE** MCR malfunction alarms are **RESET** (N/A any monitor not being placed in service):

MONITOR	ALARM PANEL	WINDOW	INITIALS
2-RA-90-106B	0-XA-55-12D	A-5	________
2-RA-90-106C	0-XA-55-12D	A-6	________
2-RA-90-112B	0-XA-55-12D	A-2	________
2-RA-90-112C	0-XA-55-12D	A-3	________

[g] **IF** placing **[2-RM-90-106]** in service,
THEN
VERIFY acceptable flow by verifying green 'OPER' LED indicators **ILLUMINATED** either 2-RI-90-106B (local) or 2-RI-90-106A (MCR). ________

Date ________

5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

NOTE If placing 2-RM-90-106 or 112 in service and background count rate is greater than 9,000 cpm, then step **[8]** source check performance may be NA'd.

[8] **IF** performing source check of rad monitor,
THEN
GO TO Section **8.1**. ☐

END OF SECTION

SEQUOYAH NUCLEAR PLANT
September 2010 NRC Exam

Plant K (Alt) (RO/SRO)

Respond to Decreasing RCS Pressure and Level From the Aux. Control Room

RO/SRO
JOB PERFORMANCE MEASURE

Task: Respond to Decreasing RCS Pressure and Level From the Aux. Control Room

TASK #: 0000680501 (**RO**)

Task Standard: The operator terminates the pressure and level reduction in the RCS (PZR) per AOP-C.04.

Time Critical Task: **YES:** ______ **NO:** __X__

K/A Ratings: 068AA1.12 (44/4.4) 068AA1.21 (3.9/4.1)
068AA2.06 (4.1/4.3) 068AK 2.01 (3.9/4.0)

Method of Testing:

Simulated Performance: __X__ **Actual Performance:** ______

Evaluation Method: **Simulator** ______ **In-Plant** __X__ **Classroom** ______

Main Control Room ______ **Mock-up** ______

===

Performer: ______________________________
Trainee Name

Evaluator: ______________ / ______________ ______________
Name / Signature DATE

Performance Rating: **SAT:** ______ **UNSAT:** ______

Validation Time: **20 minutes** **Total Time:** ______

Performance Time: **Start Time:** ______ **Finish Time:** ______

===

COMMENTS

____

____

____

____

____

____

____

SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. Any UNSAT requires comments
3. **SM approval will be required to enter the "Trip Hazard Zone" in backup control room.**
4. Ensure operator performs the following required actions for **SELF-CHECKING;**
   a. Identifies the correct unit, train, component, etc.
   b. Reviews the intended action and expected response.
   c. Compares the actual response to the expected response.

Tools/Equipment/Procedures Needed:

Most current revision of AOP-C.04 Appendix C.
Simulate having Fuse pullers

References:

	Reference	Title	Rev No.
A.	AOP-C.04	Control Room Inaccessibility	20

==

READ TO OPERATOR

Directions to Trainee:

I will explain the initial conditions, and state the task to be performed. All steps shall be simulated for this JPM. **WHEN ENTERING A UNIT TRIP HAZARD ZONE, ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.** I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

1. Both units were manually tripped and the control room has been abandoned.
2. Operation's personnel are performing checklists for abandoning MCR and are in the process of transferring controls to the auxiliary position.
3. RCS pressure on U1 is currently 2200 psi, Pzr level is ≈ 25%.
4. RCS pressure on U2 is currently 2200 psi, Pzr level is ≈ 25%.

INITIATING CUES:

1. You have observed pressurizer pressure and level decreasing abnormally on UNIT One.
2. You have been directed to perform AOP-C.04 Appendix C to take the appropriate actions relative to the U1 RCS pressure and level decrease.
3. Inform the SM when the AOP-C.04 Appendix C actions have been completed to address the U1 RCS pressure and level decrease.

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 1.: Obtain copy of the appropriate procedure. STANDARD: Operator obtains a copy of AOP-C.04, Appendix C. COMMENTS:	___ SAT ___ UNSAT Start Time____
STEP 2.: IF RCS pressure is dropping uncontrolled, ensure the following transfer switches are in the AUX position • 1-XS-68-340C Pressurizer PORV Located on 1-L-11A • 1-XS-68-334C Pressurizer PORV Located on 1-L-11B ***Cue:*** ***As each switch is located and addressed: The transfer switch is in the AUX position.*** STANDARD: Operator locates the listed transfer switches and simulates placing each switch in the Aux. position. **This step is critical to transfer controls to the Aux. CR panel.** COMMENTS:	___ SAT ___ UNSAT **Critical Step**
STEP 3.: **ENSURE** pressurizer PORVs CLOSED [1-L-10]: ***Cue:*** ***PCV-68-334 and 340 have GREEN light only.*** ***Cue:*** ***If RCS pressure is checked THEN state, "Pressure is still decreasing".*** STANDARD: Operator locates switches 1-HS-68-334C and 340C and verifies green lamps ON.	___ SAT ___ UNSAT
STEP 4.: **IF** Unit 1 RCS T-Cold is less than 540°F **AND** dropping uncontrolled, **THEN** **ENSURE** transfer switches for MSIVs and S\G atmospheric reliefs have been placed in AUX position and S\G atmospheric relief valves closed. **Cue:** **RCS temperature is 542° and stable.** STANDARD: Operator N\As this step based on S\G pressure indicators and corresponding Tsat temperatures. (1-PI-1-1C, 8C, 19C and 26C)	___ SAT ___ UNSAT

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 5.: **IF** Unit 1 pressurizer level is dropping uncontrolled, **THEN** **ENSURE** transfer switches for normal and excess letdown valves (on Checklist 1) have been placed in the AUX position. [1-L-11A and 11B] ***Cue:*** ***Another UO has transferred these switches to the AUX position per Checklist 1.*** STANDARD: Operator verifies the listed transfer switches have been placed in the AUX position.	___ SAT ___ UNSAT
STEP 6.: **ENSURE** normal and excess letdown isolated: [1-L-10] • 1-FCV-62-72 CLOSED • 1-FCV-62-73 CLOSED • 1-FCV-62-74 CLOSED • 1-FCV-62-54 CLOSED • 1-FCV-62-55 CLOSED • 1-FCV-62-56 CLOSED (1-HIC-62-56C) ***Cue 1:*** ***When operator verifies valve position, cue him that 62- 72 and 62-74 have RED lights dark and GREEN lights lit. FCV-62-73 has a RED light lit and GREEN light dark.*** ***Cue 2:*** ***When operator places valve HS to CLOSE position, cue him that 62-73 has a RED light dark and GREEN light lit.*** ***Cue 3:*** ***When operator verifies valve position, cue him that 62-54, 55 have RED lights dark and GREEN lights lit; 1-HIC-62-56C indicates 0.*** STANDARD: Operator verifies 1-FCV-62-72, 74 are closed and closes 1-FCV-62-73. Operator verifies 1-FCV-62-54, 55, and 56 are closed. **This step is critical to isolate the letdown flowpath by closing FCV-62-73.** COMMENTS:	___ SAT ___ UNSAT **Critical Step**

Job Performance Checklist:

STEP/STANDARD	SAT/UNSAT
STEP 7.: **ENSURE** the following fuses for Unit 1 head vent valves REMOVED: **NOTE: Do not allow operator to open any panel doors in the Vital Battery Board rooms.** **NOTE: There is no means of verifying valve position outside the main control room.** ***CUE: Inform the UO that the pressure and level drop have stopped and have now stabilized.*** STANDARD: Locates fuses for 1-FCV-68-394 & 397 and 1-FCV-68-395 & 396. Simulates pulling fuses. 1-FSV-68-394, 397 — 125 Battery Bd. I, CKT B14 (0-FU2-250KEB14-D) 1-FSV-68-395, 396 — 125 Battery Bd. II, CKT A30 (0-FU2-250-KFA30-E) **This step is critical to remove power from the head vent valves which will fail them closed.** COMMENTS:	___ SAT ___ UNSAT
STEP 8.: Inform the SM that the RCS (PZR) pressure and level drops have been stopped and those parameters are now stable. STANDARD: Operator informs SM that AOP-C.04 Appendix C actions have been completed to address the U1 RCS pressure and level decrease. ***CUE:* This completes the JPM** COMMENTS:	___ SAT ___ UNSAT _______ **Stop Time**

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All steps **shall be simulated** for this JPM. I will provide initiating cues and indicate any steps to be discussed. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you. Do **NOT** open any compartment door that may have relays mounted on them.

WHEN ENTERING A UNIT TRIP HAZARD ZONE ENSURE YOU DO NOT TOUCH ANY SWITCHES WITHIN THAT ZONE.

INITIAL CONDITIONS:

1. **Both units were manually tripped and the control room has been abandoned.**
2. **Operation's personnel are performing checklists for abandoning MCR and are in the process of transferring controls to the auxiliary position.**
3. **RCS pressure on U1 is currently 2200 psi, Pzr level is ≈ 25% and stable.**
4. **RCS pressure on U2 is currently 2200 psi, Pzr level is ≈ 25% and stable.**

INITIATING CUES:

1. **You have observed pressurizer pressure and level decreasing abnormally on UNIT One.**
2. **You have been directed to perform AOP-C.04 Appendix C to take the appropriate actions relative to the U1 RCS pressure and level decrease.**
3. **Inform the SM when the AOP-C.04 Appendix C actions have been completed to address the U1 RCS pressure and level decrease.**

TENNESSEE VALLEY AUTHORITY

SEQUOYAH NUCLEAR PLANT

AOI PROGRAM MANUAL

ABNORMAL OPERATING PROCEDURES

AOP-C.04

SHUTDOWN FROM AUXILIARY CONTROL ROOM

Revision **20**

QUALITY RELATED

VFU Today
AB

PREPARED/PROOFREAD BY: D. A. Porter

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: A. S. Bergeron

EFFECTIVE DATE: 1/15/2010

REVISION DESCRIPTION: Revised to change time limit for isolating VCT from 24 hours to 70 minutes. This is an interim action for SR 112172.

ANY INTENT CHANGE TO THIS PROCEDURE WHICH IS NOT DIRECTLY RELATED TO A DCN REQUIRES EVALUATION OF FIRE PROTECTION LICENSE CONDITION USING FPDP-3.

THIS PROCEDURE CONTAINS TIME CRITICAL ACTIONS

APPENDIX C

STABILIZING UNIT 1 RCS PARAMETERS

1. **IF** Unit 1 RCS pressure dropping uncontrolled,
   THEN
   PERFORM the following:

   a. **ENSURE** the following transfer switches in AUX position:

SWITCH	EQUIPMENT NAME	LOCATION	AUX POSITION √
1-XS-68-340C	Pressurizer PORV	1-L-11A	☐
1-XS-68-334C	Pressurizer PORV	1-L-11B	☐

   b. **ENSURE** pressurizer PORVs CLOSED [1-L-10]:

   - 1-PCV-68-334 ☐
   - 1-PCV-68-340 ☐

2. **IF** Unit 1 RCS T-cold is less than 540°F **AND** dropping uncontrolled,
   THEN
   PERFORM the following:

   a. **ENSURE** transfer switches for MSIVs and S/G atmospheric reliefs (on Checklist 1) have been placed in AUX position. [1-L-11A and 11B] ☐

   b. **ENSURE** Unit 1 S/G atmospheric relief valves CLOSED. [1-L-10] ☐

APPENDIX C

3. **IF** Unit 1 pressurizer level is dropping uncontrolled,
THEN
PERFORM the following to isolate letdown paths:

   a. **ENSURE** transfer switches for normal and excess letdown valves (on Checklist 1) have been placed in AUX position. [1-L-11A and 11B] ☐

   b. **ENSURE** normal and excess letdown isolated: [1-L-10]

   - 1-FCV-62-72 CLOSED ☐
   - 1-FCV-62-73 CLOSED ☐
   - 1-FCV-62-74 CLOSED ☐
   - 1-FCV-62-54 CLOSED ☐
   - 1-FCV-62-55 CLOSED ☐
   - 1-FCV-62-56 CLOSED (1-HIC-62-56C) ☐

   c. **ENSURE** the following fuses for Unit 1 head vent valves REMOVED:

VALVES	FUSE LOCATION	FUSE ID	REMOVED
1-FSV-68-394 1-FSV-68-397	125V Vital Battery Board I, Ckt B14	0-FU2-250-KEB14-D	☐
1-FSV-68-395 1-FSV-68-396	125V Vital Battery Board II, Ckt A30	0-FU2-250-KFA30-E	☐

END OF TEXT