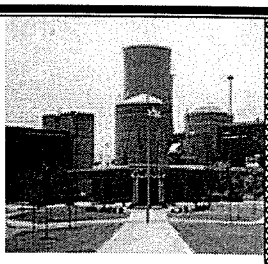
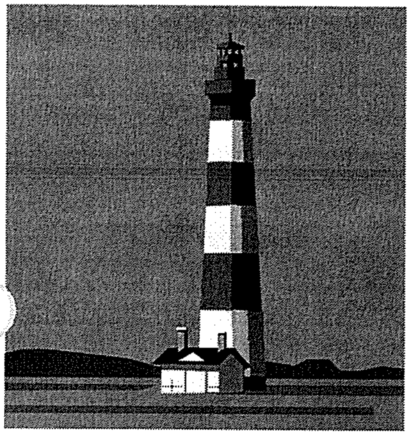
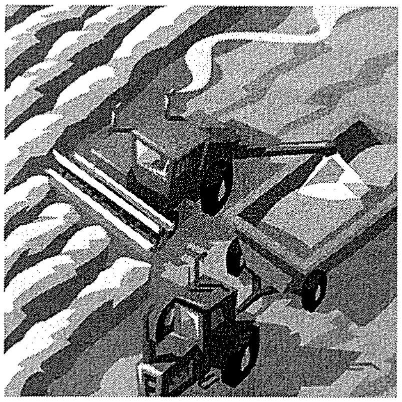


Sequoyah Nuclear Plant

# SEPT 2010 NRC INITIAL LICENSE SIMULATOR AND INPLANT JPMs





# 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**Task Standard:** Withdraw Shutdown Control Rods to the fully withdrawn position. Stop Rod Withdrawal when SD 'A' Group 1 control rods drop into core from a partially withdrawn position.

**Alternate Path:** **YES:** X **NO:** ______

**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** ______ **Mockup** ______

---

**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:
   - M-2 – RD07M2 k:1
   - L-5 – RD07L5 k:1
   - Monitor Rod Withdrawal; @ ~35 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:<br>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**.<br>STANDARD: Operator locates and obtains a copy of 0-SO-85-1 section 6.3 or is provided with appropriate procedure and section<br>COMMENTS: | _______ SAT<br>_______ UNSAT<br>_______<br>**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.<br>STANDARD: Applicant acknowledges continuous action (**'MONITOR'**) step and locates/displays ICS ROD POSITION INDICATORS screen using the mouse to position the curser on the specified action field and click the left mouse button.<br>COMMENTS: | _______ SAT<br>_______ 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**<br>**[a] STOP** rod withdrawal<br>**[b] ENSURE** subcriticality<br>**[c] CONTACT** MIG<br>**AND**<br>**INITIATE** troubleshooting<br>**[d] IF** troubleshooting does not resolve the problem,<br>**OR**<br>subcriticality can NOT be verified,<br>**THEN**<br>**INITIATE** Reactor **TRIP**.<br>STANDARD: Applicant acknowledges conditional action step and continues.<br>COMMENTS: | ________ SAT<br>________ 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.<br>STANDARD: Applicant acknowledges conditional action step,<br>COMMENTS: | ________ SAT<br>________ 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.<br>STANDARD: Applicant locates/places **1-HS-85-5110** to the 'SBA' position<br>**Shaded portion is critical because correct shutdown rod bank selection for withdrawal is assured.**<br>COMMENTS: | ________ SAT<br>________ UNSAT<br>**Critical Step (shaded portion)** |
| STEP 6.: **[15] VERIFY** Rod Speed Indicator **[SI-412]**, indicates 64 Steps/minute.<br>STANDARD: Applicant locates Rod Speed Indicator SI-412 (on the central upright portion of M-4) and verifies 64 Steps/minute indicated.<br>COMMENTS: | ________ SAT<br>________ 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]**<br>**[a] BUMP [HS-85-5111]**, Rod Control Switch to withdraw Shutdown Bank A one-half step at a time, for one full step.<br>**[b] CHECK** group demand position counters advance properly.<br>**[c] BUMP [HS-85-5111]** to withdraw Shutdown Bank A one-half step at a time, for the second full step.<br>**[d] VERIFY** group demand position counters advance properly.<br>STANDARD: Applicant places 1-HS-85-5111 to the "OUT" position to move rods one step in half step increments<br>**AND**<br>checks that both step counters count up one step.<br>Applicant places 1-HS-85-5111 to the "OUT" position to move rods one step in half step increments a second time<br>**AND**<br>checks that both step counters count up one additional step.<br>COMMENTS: | ________ SAT<br>________ UNSAT |
| STEP 8.: **[16] [e] IF** group demand position counters do **NOT** advance properly, **THEN:**<br>A. **STOP** rod withdrawal.<br>B. **INITIATE** WO to have counter repaired.<br>C. **WHEN** counter is repaired, **THEN:**<br>1. **ENSURE** Shutdown Bank A fully **INSERTED.**<br>2. **RETURN** to beginning of this step.<br>STANDARD: Operator observes/verifies that both counters are responding correctly and **N/As** this step.<br>COMMENTS: | ________ SAT<br>________ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| **NOTE:**<br>The fully withdrawn position for shutdown and control rods is defined by TI-28, Att. 6. | |
| **Simulator Operator: As directed by the Examiner, at ~35 steps, insert dropped rod malfunctions. (key 1)** | |

**ALTERNATE Path:**

STEP 9.: **[17] WITHDRAW** Shutdown Bank A to the **FULLY WITHDRAWN** position using **[HS-85-5111]**.

________ SAT

________ UNSAT

STANDARD: Operator continues withdrawing SB 'A' control rods using handswitch 1-HS-85-5111

At ~100 steps, the Applicant recognizes identifies SB 'A' Group 1 Control Rods have dropped by using:

**Critical Step**
**(shaded portion)**

- 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.**

________
**Stop Time**

COMMENTS:

***CUE:*** **This completes this 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 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.

# 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.

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**

VFY Today
JD

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 <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 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 <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 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 <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 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

| SQN<br>Unit 0 | CONTROL ROD FULLY WITHDRAWN POSITIONS | TI-28 Att.6<br>Effective Date: 11-20-2009<br>Page 1 of 2 |
|---|---|---|

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. This resulted in #3 CLA inventory draining to the current condition.
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.

**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.**<br>STANDARD: Operator obtains a copy of 1-SO-63-1 section 8.1 and reviews the following CAUTIONS and NOTES prior to Step 1<br>COMMENTS: | ______ SAT<br>______ 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<br>STANDARD: Operator ensures power and valve checklists, SI pumps' configuration and RWST boron concentration from initial conditions<br>COMMENTS: | ______ SAT<br>______ 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.<br>***CUE:*** IF necessary, as US, venting is not required at this time.<br>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.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 4.: **[7] ENSURE [1-FCV-63-84]** SIS Test Line to HUT is **CLOSED**<br>STANDARD: Operator ensures 1-FCV-63-84 is closed via green light ON.<br>COMMENTS: | ______ SAT<br>______ 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:<br>STANDARD: Operator will verify unit is mode 1 and N/A this step.<br>COMMENTS: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 6.: **[9] ENSURE** the following valves are **OPEN:** (**l**ocated on 1-M-6)<br>1-FCV-63-71, SIS Test Line to HUT<br>1-FCV-63-23 CL Accum Makeup From SI Pumps<br><br>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.<br><br>**CRITICAL Step:** to establish fill flowpath to the CLA common fill line<br><br>COMMENTS: | ______ SAT<br>______ UNSAT<br><br>**Critical Step** |
| Operator reviews CAUTIONS prior to Step 10:<br>**CAUTION 1:** To prevent premature bearing wear, SI pumps should be operated for a minimum of 20 minutes each time a pump is started.<br>**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:<br><br>STANDARD: Operator identifies 1A-A SI Pump tagged and marks step N/A; AND<br>Proceeds to CAUTIONS prior to step 11<br><br>COMMENTS: | ______ SAT<br>______ 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).<br>**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:<br>**[a] IF** Unit 1 is in Mode 3, **THEN…**<br>**[b] IF** in Mode 4, 5, or 6 (with the vessel head on), **THEN**<br>STANDARD: Operator will verify unit is mode 1 and N/A subsequent substeps through 11.b.2; proceeds to step 11.c<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 9.: **[11.c] ENSURE** the following valves are **OPEN**:<br>1-FCV-63-3 SI Pump Recirc to RWST – Common<br>1-FCV-63-175 SI Pump 1B Recirc to RWST<br>1-FCV-63-152 SI Pump 1A CL Injection Isolation<br>1-FCV-63-153 SI Pump 1B CL Injection Isolation<br>1-FCV-63-48 SI Pump 1B Suction Isolation<br>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.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 10.: **[d] START** 1B-B SI pump using **[1-HS-63-15A]**.<br>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<br>**CRITICAL Step:** this will provide the motive force for CLA fill.<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**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.<br>***CUE:*** Five minutes has elapsed<br>STANDARD: Operator ensures pump has run 5 minutes prior to continuing adhering to **CAUTION** prior to step 11<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 12.: **[12] & [13] Filling #s 1 & 2 CLAs;**<br>STANDARD: Operator acknowledges and marks N/A; proceeds to CAUTIONS & NOTE prior to step 14<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| Operator reviews CAUTIONS & NOTE prior to Step 14:<br>**CAUTION 1:** Do not cross connect the Cold Leg Accumulators<br>**CAUTION 2** Reducing level in the RWST to <370,000 gallons while in mode 1-4 will result in RWST being inoperable.<br>**NOTE:** Operability band for CLA level is 7615-7955 gal. | |
| STEP 13.: **[14]** **IF** adding makeup water to Accumulator 3, **THEN PERFORM** the following:<br>**[a] Ensure** the following valves are CLOSED:<br>1-FCV-63-115 No.1 CL Accum Water Makeup<br>1-FCV-63-95 No.2 CL Accum Water Makeup<br>1-FCV-63-70 No.4 CL Accum Water Makeup<br>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.<br>COMMENTS: | ______ SAT<br>______ 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.<br>1-FCV-63-70 No. 4 CL Accum Water Makeup<br>STANDARD: Operator positions 1-M-6 handswitch 1-HS-63-77A to OPEN position and verifies valve opens indicated by RED light LIT.<br>**CRITICAL Step:** to establish fill flowpath to #3 CLA<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step** |
| Operator reviews CAUTION & NOTE prior to proceeding:<br>**CAUTION:** Excessive opening of FCV-63-65 will cause accumulator pressure to decrease rapidly to below the operability limit.<br>**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. | |
| STEP 15. **[c]** **IF** desired to vent accumulator to maintain pressure within limits, **THEN...**<br>STANDARD: Operator acknowledges step and continues while continuing to monitor Accumulator gas pressure during fill.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| Operator reviews CAUTION prior to proceeding:<br>**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:<br>**[1] [1-FCV-63-77]**.<br>**[2] [1-FCV-63-87]**<br>**[3] [1-FCV-63-65]**<br>**[4] INDEPENDENTLY VERIFY** the following:<br>1. **[1-FCV-63-77]** CLOSED<br>2. **[1-FCV-63-87]** CLOSED<br>3. **[1-FCV-63-65]** CLOSED<br>***CUE:*** Another operator will perform independent verification, prompt operator to continue, if necessary.<br>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.<br>**CRITICAL Step:** to stop #3 CLA fill<br>COMMENTS: | _____ SAT<br>_____ UNSAT<br>**Critical Step** |
| Operator reviews NOTE prior to proceeding:<br>**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.<br>STANDARD: Operator should mark step N/A.<br>COMMENTS: | _____ SAT<br>_____ UNSAT |
| Operator reviews CAUTION prior to proceeding:<br>**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.<br>STANDARD: Operator verifies level and pressure within limits by observing readings:<br>– 1-PIS-63-88 & 86 (>624 psig but<668 psig);<br>– 1-LIS-63-89 & 81 (>7615 gal but<7955 gal).<br>**CRITICAL Step:** verifies Tech Spec compliance<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**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)<br>STANDARD: Operator verifies alarm windows are DARK (or will reset).<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 20.: **[15] Filling # 4 CLA…**<br>STANDARD: Operator acknowledges and marks N/A; proceeds to CAUTIONS & NOTE prior to step 16<br>COMMENTS: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 21.: **[16] CLOSE** the following valves:<br>1-FCV-63-71 SIS Test Line to HUT<br>1-FCV-63-23 CL Accum Makeup From SI Pumps<br>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.<br>COMMENTS: | ______ SAT<br>______ 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].**<br>***Cue:*** CRO will perform SI Pump discharge piping depressurization.<br>STANDARD: Operator checks RHR Discharge Header pressure on LT-74-13 & 26 and verifies pressure is low and N/As this step.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 23.: **[18] ENSURE** SI pump has run for a minimum of 20 minutes.<br>***Cue:*** Pump has been running 20 minutes.<br>STANDARD: Operator ensures SI pump 1B-B has run 20 minutes prior to stopping pump. (to prevent premature bearing wear)<br>COMMENTS: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 24.: **[19] STOP** 1B-B SI pump with 1-HS-63-15A.<br>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).<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 25.: **[20] IF** Unit 1 is in Modes 1-3, **THEN ENSURE** SI Pump in A-AUTO<br>1-HS-63-15A 1B-B SI pump 1-HS-63-15A.<br>STANDARD: Operator places 1-HS-63-15A to the A-AUTO, (center pull-out) position.<br>**CRITICAL Step:** step ensures pump is placed in normal standby state and ensures shutdown and termination of the fill process.<br>***Cue:*** **This completes the JPM.**<br>STANDARD: End of JPM | ______ SAT<br>______ UNSAT<br>**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 the completion of sampling. This resulted in #3 CLA inventory draining to the current condition.
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.

# 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:

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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.

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 | ______/______<br>1st IV |
| 1-FCV-63-23 | CL Accum Makeup From SI Pumps | ______/______<br>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 | _____ _____<br>1st IV |
| 1-HS-63-15A | 1B-B SI Pump | _____ _____<br>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 | _____ _____<br>1st IV |
| 1-HS-63-15A | 1B-B SI Pump | _____ _____<br>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 (≤ 155$^{O}$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 or IC #16.
5. ACTIVATE MFRC05 at 5% to cause PCV-68-334 to leak through.
6. Allow PORV Tailpipe temperature to increase and bring in the alarm, then close FCV-68-333.
7. **ACTIVATE** the following REMOTE FUNCTIONS:
   **RF RCR04** to remove power from valve
   **RF WDR02A** Pump in PTL (A reactor coolant drain tank pump)
   **RF WDR02B** Pump in Run (B reactor coolant drain tank pump)
8. Cycle PORV to attain:
   PRT temp ~ 150°F
   PRT level > 88%
   PRT pressure corresponding to above conditions: ~ 20-25 psig
9. Ensure FCV-81-12 is OPEN.
10. Due to time restraints, CUEs for PRT level and temperature will be given at appropriate times.

**Tools/Equipment/Procedures Needed:**

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

**References:**

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

================================================================================

## 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;<br>Section 8.2, Reducing PRT Level Using B RCDT Pump<br>Section 8.4, Reducing the Temperature of the PRT.<br>The sections can 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**.<br>STANDARD: Operator verifies that FCV-81-12 is open by observing 1-HS-81-12A Red light on, Green light Off.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 2.: **[8.4.2] OPEN** 1-FCV-68-303 by placing 1-HS-68-303A to **OPEN** position.<br>STANDARD: Operator takes hand switch HS-68-303A on M-5 to OPEN. Hand switch indicates valve is open by red light "ON".<br>This step is critical to induce primary water into the PRT nozzles to lower temperature.<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step** |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 3.: **[8.4.3] IF** PRT level increases to ≥ 88% OR PRT temperature decreases to ≤ 120°F THEN close FCV-68-303<br>***Cue:*** ***PRT level is 88%.<br>PRT temp is as indicated.***<br>STANDARD: Operator monitors PRT level on LI-68-300 and temperature on TI-68-309, then places FCV-68-303 in the closed position and verifies green light ON.<br>This step is critical to prevent overfill of the PRT<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step** |
| STEP 4.: **[8.4.4] IF** PRT level is ≥ 88%, THEN GO TO section 8.2 or 8.3.<br>STANDARD: Operator goes to section 8.2 "Reducing PRT Level Using "B" RCDT Pump" (1A RCDT pump is inop)<br>COMMENTS: | ______ SAT<br>______ 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 check list 1-77-1.02.<br>***Cue:*** ***NO deviations.***<br>STANDARD: Operator explains how to check status log to ensure no deviations exist.<br>COMMENTS: | ______ SAT<br>______ 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.<br>***Cue:*** ***Role play as the Rad Waste AUO. State that you are at 0-L-2 panel and will stay here and wait on your instructions.***<br>STANDARD Operator ensures an AUO is stationed at 0-L-2 panel.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 7.: **[8.2.3]** If RCDT level >20%, THEN PUMP down RCDT level.<br>***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%.***<br>STANDARD: Operator checks with an AUO at 0-L-2 panel and ensures level is < 20%<br>COMMENTS: | ______ SAT<br>______ 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.<br>STANDARD: Operator verifies FCV-77-9 and FCV-77-10 open on panel M-15 (red lights on hand-switches illuminated)<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 9.: **[8.2.5] ENSURE** [1-HS-77-6A] for RCDT pump B is in the PULL-P-AUTO position.<br>***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%.***<br>STANDARD: Operator contacts Rad Waste Operator and verifies HS-77-6A for RCDT Pump B is in P-AUTO.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 10.: **[8.2.6] OPEN** [1-FCV-68-305] Nitrogen supply to PRT.<br>STANDARD: Operator opens FCV-68-305 by placing 1-HS-68-305A to OPEN on panel 1 M-5 and verifies Red lights ON<br>This step is critical to ensure normal pressure maintained in the PRT during the level decrease.<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step** |

**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<br>***Cue:*** ***When operator opens FCV-68-310 and the operator contacts the Rad Waste operator, then state to the operator the B RCDT pump is running.***<br>STANDARD: Operator places 1-HS-68-310A to OPEN on panel 1-M-5 and verifies Red lights ON<br>This step is critical to provide a suction flowpath to the RCDT pump and to make up the pump starting logic.<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step** |
| STEP 12.: **[8.2.8]** ENSURE RCDT Pump B starts.<br>***Cue:*** ***RCDT pump B is running.***<br>STANDARD: Operator checks with Rad Waste AUO to ensure RCDT pump B starts.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 13.: **[8.2.9]** IF PRT pressure drops < 1.5 psig, THEN...<br>STANDARD: Operator monitors PRT pressure with PI-68-301 on 1-M-5.<br>COMMENTS: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

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

**Job Performance Checklist:**

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

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 20.: Inform the US/SRO that the PRT parameters have not been returned to within normal operating conditions/ranges.<br>STANDARD: Operator informs the US/SRO that the PRT parameters have not been returned to within normal operating conditions/ranges and needs to return to section 8.4 to continue temperature reduction.<br>***Cue:* After candidate indicates the need to return to section 8.4, state "This completes the JPM."** | ______ SAT<br>______ UNSAT<br>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.

# 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 <u>inoperable</u>.

**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.

**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** ______ **Mockup** ______

---

**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<br>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<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>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.<br>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.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 3.: **[2] MONITOR** RCP temperatures and CCS flow through upper and lower oil coolers.<br>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.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 4.: **[3] IF** upper or lower motor bearing temperature approaches 200°F, **THEN GO TO** AOP-R.04, *Reactor Coolant Pump Malfunctions.*<br>STANDARD: Operator determines that temperature is approaching the upper limit for the upper radial bearing and implements AOP-R.04.<br>COMMENTS: | ______ SAT<br>______ 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.<br>STANDARD: Operator determines MODE 1 conditions<br>**AND**<br>Determines reactor should be tripped before stopping the RCP.<br>COMMENTS: | ______ SAT<br>______ 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:<br>a. **TRIP** the reactor.<br>STANDARD: Operator performs reactor trip by operating reactor trip handswitch 1-RT-1 (M-4) or 1-RT-2 (M-6.)<br>Step is critical to manually trip Rx prior to tripping the RCP<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**Critical Step**<br>**(shaded portion)** |
| STEP 8.: b. **WHEN** reactor is tripped, **THEN STOP** affected RCP(s).<br>Time: ______________<br>STANDARD: Operator observes reactor trip breakers open, reactor trip indications THEN stops RCP # 2, and records the current time.<br>COMMENTS: | ______ SAT<br>______ UNSAT<br>**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.<br>***CUE:*** When Rx is tripped, ***CUE*** operator that another operator completed steps 1 – 4 of E-0.<br>STANDARD: Operator ensures that someone is performing remaining E-0 immediate actions.<br>COMMENTS: | ______ SAT<br>______ 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:<br>1. Check for any of the following:<br>• RCP Seal Leak-off greater than 8 gpm<br>OR<br>• RCP Seal Leak-off greater than 6 gpm and Lower bearing or seal temperature rising uncontrolled.<br>STANDARD: Operator determines that seal leakoff is not outside of normal values and continues to step 4.<br>COMMENTS: | ______ SAT<br>______ UNSAT |
| STEP 11.: 4. **PULL TO DEFEAT** affected loop ΔT and T-avg:<br>• XS-68-2D (ΔT)<br>• XS-68-2M (T-avg)<br>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<br>COMMENTS: | ______ SAT<br>______ UNSAT |

# 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.

# 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)<br>1-FS-70-106 (upper) | 100 gpm decreasing |
| SER 1138 (Unit 1 annunciator system)<br>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).<br>Time: ___________<br>**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:<br>a. **TRIP** the reactor.<br>b. **WHEN** reactor is tripped, **THEN** **STOP** affected RCP(s).<br>Time: ____________<br>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.

   RESPONSE NOT OBTAINED: 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:<br>• 3.2.5, DNB Parameters<br>• 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation<br>• 3.4.1.2, Reactor Coolant System - Hot Standby<br>• 3.4.1.3, Reactor Coolant System - Shutdown<br>• 3.4.6.2, RCS Operational Leakage | |
| 8. | **GO TO** appropriate plant procedure. | |

**END OF SECTION**

### 2.2 #1 Seal Leakoff High Flow on ANY RCP

**CAUTION 1:** **RCP bearing damage may occur if temperature exceeds 225°F.**

**CAUTION 2:** **IF any RCP must be stopped due to high seal leakoff flow, the seal return valve on the affected RCP(s) must be closed <u>within 5 minutes</u>. This action is addressed in Section 2.1.**

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 1. | **MONITOR** #1 seal leakoff less than 6 gpm per pump:<br>• FR-62-24 [RCP 1 & 2]<br>• FR-62-50 [RCP 3 & 4] | **PERFORM** the following:<br>a. **MONITOR** RCP lower bearing temperature and seal temperature.<br>**IF** RCP lower bearing temperature **OR** seal temperature are rising uncontrolled,<br>**THEN**<br>**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1] [C.2]**<br>**IF** lower bearing temperature **AND** seal temperature indication are NOT available for affected RCP,<br>**THEN**<br>**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** |

(Step continued on next page.)

**2.2 #1 Seal Leakoff High Flow on ANY RCP (cont'd)**

1. (Continued)

b. **MONITOR** #1 seal leakoff flow:

**IF** #1 seal leakoff flow
greater than 8 gpm,
**THEN**
**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]**

**IF** #1 seal leakoff flow less than 8 gpm,
**THEN**
**PERFORM** the following:

1) **CONTROL** RCP seal injection flow for the affected RCP greater than or equal to 9 gpm.

2) **CONTACT** Engineering for recommendations WHILE continuing with this procedure.

3) **IMPLEMENT** Engineering recommendations to address specific RCP seal conditions

**OR**

**COMPLETE** normal plant shutdown within 8 hours **USING** appropriate plant procedure.

4) **WHEN** reactor is shutdown or tripped,
**THEN**
**GO TO** Sect. 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]**

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| **2.2** | **#1 Seal Leakoff High Flow on ANY RCP (cont'd)** | |
| 2. | **MONITOR** RCP lower bearing and seal water temperatures less than 225°F. | **IF** any of the following conditions met:<br>• RCP lower bearing temperature or seal water temperature greater than 225°F<br>**OR**<br>• seal leakoff flow greater than 6 gpm **AND** lower bearing and seal temp NOT available for affected RCP<br>**THEN**<br>**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** |
| 3. | **MONITOR** #1 seal ΔP greater than 220 psid:<br>• PDI-62-8A<br>• PDI-62-21A<br>• PDI-62-34A<br>• PDI-62-47A | **GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** |

### 2.2 #1 Seal Leakoff High Flow on ANY RCP (cont'd)

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 4. | **ENSURE** RCP seal water supply flow 6-10 gpm per pump:<br>• FI-62-1A<br>• FI-62-14A<br>• FI-62-27A<br>• FI-62-40A | **IF** seal water supply flow is less than 6 gpm **AND** CANNOT be restored,<br>**THEN**<br>**ENSURE** CCS supply to thermal barriers less than 105°F on TR-70-161 [CCS HX 1A1/1A2 (2A1/2A2) Outlet Temp] |
| 5. | **CONTACT** Engineering for recommendations WHILE continuing with this procedure. | |
| 6. | **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix. | |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| **2.2** | **#1 Seal Leakoff High Flow on ANY RCP (cont'd)** | |
| 7. | **EVALUATE** the following Tech Specs for applicability:<br>• 3.2.5, DNB Parameters<br>• 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation<br>• 3.4.1.2, Reactor Coolant System - Hot Standby<br>• 3.4.1.3, Reactor Coolant System - Shutdown<br>• 3.4.6.2, RCS Operational Leakage | |
| CAUTION: | **Slow and uniform temperature adjustments (approx. 50°F in one hour) will prevent thermal shock to the seals.** | |
| 8. | **CHECK** VCT outlet temperature less than 130°F [TI-62-131]. | **ADJUST** HIC-62-78A to reduce VCT temperature to less than 130°F. |
| 9. | **ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122]. | |

**2.2 #1 Seal Leakoff High Flow on ANY RCP (cont'd)**

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 10. | **CHECK** RCP lower bearing and seal water temperature less than 180°F: | **IF** any of the following conditions met:<br>• affected RCP lower bearing or seal water temperature greater than 180°F<br>**OR**<br>• lower bearing and seal water temp indication NOT available for affected RCP,<br>**THEN**<br>**GO TO** Step 1. |
| 11. | **GO TO** appropriate plant procedure. | |

**END OF SECTION**

## 2.3 #1 Seal Leakoff Low Flow on ANY RCP

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 1. | **CHECK** #1 seal leakoff flow greater than 0.8 gpm per pump:<br>• FR-62-23 [RCP 1 & 2]<br>• FR-62-49 [RCP 3 & 4] | **GO TO** Step 4. |
| 2. | **CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing:<br>• FR-62-23 [RCP 1 & 2]<br>• FR-62-49 [RCP 3 & 4] | **GO TO** Step 4. |
| 3. | **GO TO** appropriate plant procedure. | |
| 4. | **ENSURE** RCP seal water supply flow between 6 gpm and 10 gpm per pump:<br>• FI-62-1A<br>• FI-62-14A<br>• FI-62-27A<br>• FI-62-40A | **IF** seal water supply flow is less than 6 gpm **AND** CANNOT be restored,<br>**THEN**<br>**ENSURE** CCS supply to thermal barriers is less than 105°F on TR-70-161.<br>[CCS HX 1A1/1A2 (2A1/2A2) Outlet Temp] |

### 2.3 #1 Seal Leakoff Low Flow on ANY RCP (cont'd)

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 5. | **CONTACT** Engineering for recommendations WHILE continuing with this procedure. | |
| 6. | **ENSURE** VCT pressure between 17 psig and 45 psig [PI-62-122]. | |
| 7. | **CHECK** RCP standpipe level alarms DARK [M-5B, A-2, B-2, C-2, D-2]. | **MONITOR** the following:<br>a. RCDT parameters (0-L-2 AB, el. 669)<br>• Level, LI-77-1<br>• Pressure, PI-77-2<br>• Temperature, TI-77-21<br>b. Cntmt Fl. & Eq. Sump Level rate of rise (ICS pt. U0969) |

### 2.3 #1 Seal Leakoff Low Flow on ANY RCP (cont'd)

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 8. | **MONITOR** #2 seal leakoff less than or equal to 0.5 gpm **USING** Appendix A, RCDT Level Rate-of-Change. | **GO TO** Section 2.4, #2 Seal Leakoff High Flow on ANY RCP. |
| 9. | **MONITOR** RCP lower bearing temperature and seal water temperature are stable and within limits (less than 225°F). | **IF** any of the following conditions met:<br>• affected RCP lower bearing temp <u>or</u> seal water temp rising uncontrolled<br>**OR**<br>• affected RCP lower bearing temp <u>or</u> seal water temp greater than 225°F<br>**OR**<br>• affected RCP lower bearing temp <u>and</u> seal temp indication NOT available<br>**THEN**<br>**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** |

### 2.3 #1 Seal Leakoff Low Flow on ANY RCP (cont'd)

**CAUTION: If low seal leakoff compensatory actions are NOT successful, seal failure may result as indicated by a sudden increase in seal leakoff flow (greater than 8 gpm).**

**NOTE:** Plant shutdown may be terminated if Seal Leakoff flow stabilizes at greater than 0.8 gpm with pump Lower Bearing temperature and Seal Water Temperature remaining stable (no indications of seal failure).

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 10. | **MONITOR** #1 seal leakoff flow greater than 0.8 gpm:<br>• FR-62-23 [RCP 1 & 2]<br>• FR-62-49 [RCP 3 & 4] | **INITIATE** normal plant shutdown **USING** appropriate plant procedures.<br>**ENSURE** affected RCP STOPPED within 8 hours.<br>**IF** #1 seal leakoff flow reverts to high leakage (greater than 8.0 gpm):<br>• FR-62-24 [RCP 1 & 2]<br>• FR-62-50 [RCP 3 & 4]<br>**THEN**<br>**GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| **2.3** | **#1 Seal Leakoff Low Flow on ANY RCP (cont'd)** | |
| 11. | **EVALUATE** the following Tech Specs for applicability:<br>• 3.2.5, DNB Parameters<br>• 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation<br>• 3.4.1.2, Reactor Coolant System - Hot Standby<br>• 3.4.1.3, Reactor Coolant System - Shutdown<br>• 3.4.6.2, RCS Operational Leakage | |
| 12. | **CHECK** #1 seal leakoff flow greater than 0.9 gpm per pump and NOT decreasing:<br>• FR-62-23 [RCP 1 & 2]<br>• FR-62-49 [RCP 3 & 4] | **GO TO** Step 1. |
| 13. | **GO TO** appropriate plant procedure. | |

**END OF SECTION**

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| **2.4** | **#2 Seal Leakoff High Flow on ANY RCP** | |
| 1. | **EVALUATE** RCP standpipe alarms: | |
| | a. **CHECK** RCP standpipe level alarm(s) LIT [M-5B, window A-2, B-2, C-2, D-2]. | a. **GO TO** Step 2. |
| | b. **MONITOR** RCDT parameters at Radwaste Panel [Aux Bldg, el. 669']:<br>• Level, LI-77-1<br>• Pressure, PI-77-2<br>• Temperature, TI-77-21 | |
| | c. **FILL** affected RCP standpipe **USING** AR-M-5B, Annunciator Response:<br>• RCP 1 [window A-2]<br>• RCP 2 [window B-2]<br>• RCP 3 [window C-2]<br>• RCP 4 [window D-2] | |
| | d. **IF** RCP standpipe level alarm clears, **THEN**<br>**GO TO** Section 2.5, #3 Seal Leakoff High Flow on ANY RCP. | |

### 2.4 #2 Seal Leakoff High Flow on ANY RCP (cont'd)

**NOTE:** A leakoff of greater than 0.5 gpm indicates that a seal problem exists.

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 2. | **MONITOR** #2 seal INTACT on affected RCP:<br>• **VERIFY** #2 seal leakoff less than or equal to 0.5 gpm **USING** Appendix A, RCDT Level Rate-of-Change.<br>• **VERIFY** RCP vibration is within limits of annunciator response 1-AR-M5-A (window D-3) VIBRATION & LOOSE PARTS MONITORING ALM. | **PERFORM** the following within 8 hours:<br>a. **PERFORM** normal plant shutdown **USING** appropriate plant procedure.<br>b. **WHEN** reactor is shutdown or tripped, **THEN** **PERFORM** the following:<br>1) **STOP** and **LOCK OUT** affected RCP.<br>2) **PULL TO DEFEAT** affected loop ΔT and T-avg:<br>• XS-68-2D (ΔT)<br>• XS-68-2M (T-avg) |
| 3. | **CONSULT** Engineering:<br>a. **NOTIFY** Engineering to provide recommendations.<br>b. **EVALUATE** need to consult with Westinghouse for continued RCP operation. | |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| **2.4** | **#2 Seal Leakoff High Flow on ANY RCP (cont'd)** | |
| 4. | **CHECK** RCPs 1 and 2 RUNNING. | **CLOSE** affected loop's pressurizer spray valve. |
| 5. | **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix. | |
| 6. | **EVALUATE** the following Tech Specs for applicability:<br>• 3.2.5, DNB Parameters<br>• 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation<br>• 3.4.1.2, Reactor Coolant System - Hot Standby<br>• 3.4.1.3, Reactor Coolant System - Shutdown<br>• 3.4.6.2, RCS Operational Leakage | |
| 7. | **GO TO** appropriate plant procedure.<br>➡ | |

**END OF SECTION**

### 2.5 #3 Seal Leakoff High Flow on ANY RCP

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 1. | **CHECK** RCP standpipe level alarms DARK [M-5B, A-2, B-2, C-2, D-2]. | **PERFORM** the following:<br>a. **MONITOR** Cntmt Fl. & Eq. Sump Level rise rate (ICS pt. U0969)<br>b. **FILL** affected RCP standpipe **USING** AR-M-5B, Annunciator Response:<br>• RCP 1 [A-2]<br>• RCP 2 [B-2]<br>• RCP 3 [C-2]<br>• RCP 4 [D-2]<br>c. **IF** RCP bearing temperature rising, **THEN** **GO TO** Section 2.4, #2 Seal Leakoff High Flow on ANY RCP. |

## 2.5 #3 Seal Leakoff High Flow on ANY RCP (cont'd)

**NOTE:** A leakoff rate of greater than 500 cc/hr indicates that a seal problem exists. The frequency and length of time filling the RCP standpipe may indicate the severity of the leak.

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 2. | **MONITOR** #3 seal intact on affected RCP:<br>• **VERIFY** RCP vibration is within limits of annunciator response 1-AR-M5-A (window D-3) VIBRATION & LOOSE PARTS MONITORING ALM.<br>• **CONTACT** Engineering for assistance in determining acceptable leak rate for continued RCP operation. | **PERFORM** the following within 8 hours:<br>a. **PERFORM** normal plant shutdown **USING** appropriate plant procedure.<br>b. **WHEN** reactor is shutdown or tripped, **THEN** **STOP** and **LOCK OUT** affected RCP.<br>c. **PULL TO DEFEAT** affected loop ΔT and T-avg:<br>• XS-68-2D (ΔT)<br>• XS-68-2M (T-avg) |
| 3. | **CHECK** RCPs 1 and 2 RUNNING. | **CLOSE** affected loop's pressurizer spray valve. |
| 4. | **EVALUATE** EPIP-1, Emergency Plan Initiating Conditions Matrix. | |

**2.5 #3 Seal Leakoff High Flow on ANY RCP (cont'd)**

5. **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

6. **GO TO** appropriate plant procedure.

→

**END OF SECTION**

## 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:<br>• Pump 1: T0409A, 411A or 412A<br>• Pump 2: T0429A, 431A or 432A<br>• Pump 3: T0449A, 451A or 452A<br>• Pump 4: T0469A, 471A or 472A | a. **IF** RCP Motor Stator temperature reaches applicable limit **AND** indication is verified valid, **THEN** **PERFORM** the following:<br>1) **IF** reactor power less than 20%, **THEN** **GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]**<br>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.<br>3) **WHEN** reactor is tripped, **THEN** **GO TO** Section 2.1, ANY RCP Tripped or RCP Shutdown Required. **[C.1]** |

### 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**

## 3.0 SYMPTOMS AND ENTRY CONDITIONS

### 3.1 Symptoms

A. Any of the following annunciators may indicate a RCP malfunction:

| PANEL 0-XA-55-27-B-A, COMPONENT COOLING | |
|---|---|
| D-2 | RC PUMP 1 OIL COOLERS OUTLET FLOW LOW |
| D-3 | RC PUMP 2 OIL COOLERS OUTLET FLOW LOW |
| D-4 | RC PUMP 3 OIL COOLERS OUTLET FLOW LOW |
| D-5 | RC PUMP 4 OIL COOLERS OUTLET FLOW LOW |

| PANEL 0-XA-55-27-B-E, COMPONENT COOLING/MISC | |
|---|---|
| D-2 | RC PUMP 1 OIL COOLERS OUTLET FLOW LOW |
| D-3 | RC PUMP 2 OIL COOLERS OUTLET FLOW LOW |
| D-4 | RC PUMP 3 OIL COOLERS OUTLET FLOW LOW |
| D-5 | RC PUMP 4 OIL COOLERS OUTLET FLOW LOW |

| PANEL 1(2)-XA-55-1B, AUXILIARY POWER/STATION SERVICE | |
|---|---|
| A-1 | 6900V UNIT BD 1(2)A TRANSFER |
| A-2 | 6900V UNIT BD 1(2)B TRANSFER |
| A-3 | 6900V UNIT BD 1(2)C TRANSFER |
| A-4 | 6900V UNIT BD 1(2)D TRANSFER |
| B-1 | 6900V UNIT BD 1(2)A FAILURE OR UNDERVOLTAGE |
| B-2 | 6900V UNIT BD 1(2)B FAILURE OR UNDERVOLTAGE |
| B-3 | 6900V UNIT BD 1(2)C FAILURE OR UNDERVOLTAGE |
| B-4 | 6900V UNIT BD 1(2)D FAILURE OR UNDERVOLTAGE |
| E-3 | MOTOR TRIPOUT PNL 1(2)-M-1 THRU 1(2)-M-6 |

## 3.1 Symptoms (cont'd)

| PANEL XA-55-5A, REACTOR COOLANT - STM - FW | |
|---|---|
| A-6 | TS-68-2M/N REACTOR COOLANT LOOPS T AVG/AUCT T AVG DEVN HIGH - LOW |
| B-5 | CNTMT FLOOR & EQUIP DRAIN SUMP HI-HI-HI |
| B-6 | TS-68-2A/B REACTOR COOLANT LOOPS ΔT DEVN HIGH - LOW |
| D-3 | VIBRATION & LOOSE PARTS MONITOR ALARM |

| PANEL XA-55-5B, CVCS SEAL WATER AND RCP | |
|---|---|
| A-2 | LS-62-6A REAC COOL PMP 1 STANDPIPE LVL HIGH-LOW |
| A-3 | FS-62-10 REAC COOL PMPS SEAL LEAKOFF LOW FLOW |
| A-4 | PdIS-62-96 SEAL WATER INJECTION FILTER HIGH ΔP |
| A-5 | LS-68-10A/B REAC COOL PMP 1 OIL RESERVOIR LEVEL HI-LOW |
| B-2 | LS-62-19A REAC COOL PMP 2 STANDPIPE LVL HIGH-LOW |
| B-3 | FS-62-11 REAC COOL PMPS SEAL LEAKOFF HIGH FLOW |
| B-4 | PdIS-62-97 SEAL WATER INJECTION FILTER 2 HIGH ΔP |
| B-5 | LS-68-34A/B REAC COOL PMP 2 OIL RESERVOIR LEVEL HI-LOW |
| C-2 | LS-62-32A REAC COOL PMP 3 STANDPIPE LVL HIGH-LOW |
| C-3 | FS-62-1 REAC COOL PMPS SEAL WATER FLOW LOW |
| C-5 | LS-68-53A/B REAC COOL PMP 3 OIL RESERVOIR LEVEL HI-LOW |
| D-2 | LS-62-45A REAC COOL PMP 4 STANDPIPE LVL HIGH-LOW |
| D-3 | PdS-62-8 REAC COOL PMPS SHAFT SEAL WATER ΔP |
| D-5 | LS-68-76A/B REAC COOL PMP 4 OIL RESERVOIR LEVEL HI-LOW |
| E-1 | REAC COOL PMPS MOTOR STATOR TEMPERATURE HIGH |
| E-2 | TS-62-42 REAC COOL PMPS LOWER BEARING TEMP HIGH |
| E-3 | REACTOR COOLANT PUMPS MOTOR THRUST BEARING TEMP HIGH |
| E-4 | TS-62-43 REAC COOL PMPS SEAL WATER TEMP HI |
| E-5 | FIS-62-12 RCP NO 1 SEAL BYPASS FLOW LOW |

## 3.1 Symptoms (cont'd)

| PANEL XA-55-6A COMPONENT COOLING | |
|---|---|
| A-4 | FS-68-6A REACTOR COOLANT LOOP 1 LOW FLOW |
| B-4 | FS-68-29A REACTOR COOLANT LOOP 2 LOW FLOW |
| C-4 | FS-68-48A REACTOR COOLANT LOOP 3 LOW FLOW |
| D-4 | FS-68-71A REACTOR COOLANT LOOP 4 LOW FLOW |
| E-4 | RCP BUS UNDERFREQUENCY / UNDERVOLTAGE |

B. Deviations or unexpected indication on any of the following may indicate a RCP malfunction:

1. Erratic or abnormal RCP motor current
2. Erratic RCP motor frequency
3. Erratic or low RCS Loop Flow indications
4. Plant Computer RCP temperature alarms
5. Indication of high vibrations on a RCP
6. Low RCP #1 seal $\Delta P$
7. High or low RCP #1 Seal leakoff flow
8. High or low RCP #1 Seal supply flow
9. Increasing RCP #1 Seal temperature
10. Increasing RCP lower bearing temperature
11. High VCT temperature
12. High VCT pressure
13. High VCT level
14. Increasing Reactor Coolant Drain Tank level
15. High Containment Floor & Equipment Sump Level rate of rise

## 3.1 Symptoms (cont'd)

C. Any of the following automatic actions may indicate a RCP malfunction:

1. RCP trip from motor faults
2. Reactor Trip
3. Safety Injection

## 3.2 Entry Conditions

None

END OF SECTION

## 4.0 REFERENCES

### 4.1 Performance

A. EPIP-1, Emergency Plan Initiating Conditions Matrix

B. E-0, Reactor Trip or Safety Injection

C. AR-M-5B, Annunciator Response

D. AOP-C.03, Rapid Shutdown or Load Reduction.

### 4.2 Technical Specifications

A. 3.2.5, DNB Parameters

B. 3.4.1.1, Reactor Coolant Loops and Coolant Circulation - Startup and Power Operation

C. 3.4.1.2, Reactor Coolant System - Hot Standby

D. 3.4.1.3, Reactor Coolant System - Shutdown

E. 3.4.6.2, RCS Operational Leakage

## 4.3 Plant Drawings

A. 47W600, Sheets 57, 60

B. 47W610-68, Sheets 1, 2, 3, 4, 6

C. 47W610-77-3

D. 47W610-62-2

E. 47W610-72-1

F. 47W610-74-1

G. 47W610-63-1

H. 47W610-67-1

I. 47W610-3-3

J. 47W610-70-1

K. 47W610-30-2

L. 47W610-47-1

M. 47W610-82-1

N. 45N765, Sheets 1, 2

O. 45N724, Sheets 1, 2, 3, 4

P. 45N751, Sheets 1, 2, 3, 4, 5, 6, 7, 8

Q. 45N732, Sheets 1, 2

## 4.4 10 CFR

A. 10CFR50, Appendix R

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## APPENDIX A
## RCDT LEVEL RATE OF CHANGE

**CALCULATE** RCDT level rate of change to obtain #2 seal leakoff flowrate.

Instrument Used: ICS point L2400MA ☐ LI–77–1 [AB el. 669, Pnl 0-L-2] ☐

______ Time ______% Initial Level ______ gal Initial Volume

______ Time ______% Final Level ______ gal Final Volume

$$\frac{\text{FINAL VOLUME (gal)} - \text{INITIAL VOLUME (gal)}}{\Delta \text{ TIME (minutes)}} = \text{LEVEL RATE OF CHANGE}$$ ______gpm

### REACTOR COOLANT DRAIN TANK (RCDT) LEVEL VS. VOLUME

| Level (%) | Volume (Gal) | Level (%) | Volume (Gal) | Level (%) | Volume (Gal) | Level (%) | Volume (Gal) |
|---|---|---|---|---|---|---|---|
| 0.0 | 17.4 | 25.0 | 86.4 | 50.0 | 179.1 | 75.0 | 271.8 |
| 1.0 | 19.4 | 26.0 | 89.8 | 51.0 | 182.9 | 76.0 | 275.2 |
| 2.0 | 21.6 | 27.0 | 93.3 | 52.0 | 186.8 | 77.0 | 278.5 |
| 3.0 | 23.8 | 28.0 | 96.8 | 53.0 | 190.6 | 78.0 | 281.7 |
| 4.0 | 26.1 | 29.0 | 100.4 | 54.0 | 194.5 | 79.0 | 285.0 |
| 5.0 | 28.4 | 30.0 | 103.9 | 55.0 | 198.3 | 80.0 | 288.2 |
| 6.0 | 30.8 | 31.0 | 107.5 | 56.0 | 202.2 | 81.0 | 291.3 |
| 7.0 | 33.3 | 32.0 | 111.2 | 57.0 | 206.0 | 82.0 | 294.4 |
| 8.0 | 35.8 | 33.0 | 114.8 | 58.0 | 209.9 | 83.0 | 297.5 |
| 9.0 | 38.4 | 34.0 | 118.5 | 59.0 | 213.7 | 84.0 | 300.5 |
| 10.0 | 41.1 | 35.0 | 122.2 | 60.0 | 217.4 | 85.0 | 303.4 |
| 11.0 | 43.7 | 36.0 | 125.3 | 61.0 | 221.2 | 86.0 | 306.2 |
| 12.0 | 46.4 | 37.0 | 129.5 | 62.0 | 224.9 | 87.0 | 309.1 |
| 13.0 | 49.2 | 38.0 | 133.3 | 63.0 | 228.7 | 88.0 | 311.8 |
| 14.0 | 52.0 | 39.0 | 137.1 | 64.0 | 232.4 | 89.0 | 314.5 |
| 15.0 | 54.9 | 40.0 | 140.9 | 65.0 | 236.1 | 90.0 | 317.2 |
| 16.0 | 57.7 | 41.0 | 144.6 | 66.0 | 239.8 | 91.0 | 319.9 |
| 17.0 | 60.8 | 42.0 | 148.4 | 67.0 | 243.5 | 92.0 | 322.4 |
| 18.0 | 63.8 | 43.0 | 152.2 | 68.0 | 247.2 | 93.0 | 324.9 |
| 19.0 | 66.8 | 44.0 | 156.0 | 69.0 | 250.8 | 94.0 | 327.4 |
| 20.0 | 69.9 | 45.0 | 159.8 | 70.0 | 254.4 | 95.0 | 329.8 |
| 21.0 | 73.2 | 46.0 | 163.7 | 71.0 | 257.9 | 96.0 | 332.1 |
| 22.0 | 76.4 | 47.0 | 167.5 | 72.0 | 261.5 | 97.0 | 334.4 |
| 23.0 | 79.6 | 48.0 | 171.4 | 73.0 | 265.0 | 98.0 | 336.7 |
| 24.0 | 83.0 | 49.0 | 175.2 | 74.0 | 268.4 | 99.0 | 338.7 |
|  |  |  |  |  |  | 100.0 | 340.8 |

## COMMITMENT LIST

| COMMITMENT ID | SUMMARY OF COMMITMENT | COMMITMENT CORRESPONDENCE |
|---|---|---|
| C.1 | Provide clear instructions to the operators should any seal temperature, pressure, or leakage alarms annunciate. Include conditions for continued operation or immediate shutdown. | NER 82-005<br>INPO SOER 81-007<br>INPO SOER 82-005 |
| C.2 | Update procedural guidance to conform to most recent Westinghouse recommendations on RCP shutdown with No. 1 seal leakage outside the operating limits. | NER 930512001<br>Westinghouse Tech Bulletin NSD-TB-93-01-R1 |
| C.3 | Update procedural guidance to include RCP vibration as a limitation. | NER 970134001<br>TROI INPO SER 97-002 |

# SEQUOYAH NUCLEAR PLANT
## September 2010 NRC Exam

## SIM E (RO\SRO)

## Respond to High Containment Pressure, Place RHR Spray in Service

**Task:**

**Task #:**

**Task Standard:**

**Time Critical Task**

**K/A Reference/Ra**

**Method of Testing**

**Simulated Perform**

**Evaluation Method**

**Simulator**

**Main Control Room**

---

**Performer:**

**Evaluator:**

**Performance Ratin**

**Validation Time:**

**Performance Time:**

## 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) with 240 sec ramp.
    c. Complete the actions of ES-1.3, Sump Swapover. Stop RCPs.
    d. Activate Override **ZDIHS7241A CLOSE**, to prevent FCV-72-41 from opening.
    e. Activate **ZAOPDI30133 f:5**
    f. 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. At JPM step 15, when candidate opens 1-FCV-72-40:
    a. Modify malfunction CH01A f:0 r:240 k:1
    b. Modify malfunction CH01B f:0 r:240 k:1
    c. Modify malfunction CH01B f:0 r:240 k:1
    d. Modify malfunction CH01D f:0 r:240 k:1
9. 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 |

=========================================================================

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

**Job Performance Checklist:**

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

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 7.: [13.c] ESTABLISH Train B RHR spray:<br>[13.c.1] CHECK Train B RHR pump RUNNING.<br>STANDARD: Operator checks that 1B-B RHR pump is running as indicated by red light on HS-74-20A "LIT".<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 8.: [13.c] ESTABLISH Train B RHR spray:<br>[13.c.2] ENSURE RHR crosstie FCV-74-35 CLOSED.<br>STANDARD: Operator verifies FCV-74-35 in the CLOSED position as indicated by HS green light ON and red light OFF.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 9.: [13.c] ESTABLISH Train B RHR spray:<br>[13.c.3] CLOSE RHR Injection FCV-63-94.<br>STANDARD: Operator places handswitch for RHR injection FCV-63-94 in the CLOSED position and verifies the green light ON.<br>This step is critical to ensure the 1B-B RHR discharge is isolated from the cold leg injection flowpath.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**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.<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| **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.<br>STANDARD: Operator verifies FCV-72-41 is still closed as indicated by green light ON and red light OFF.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 12.: [13.c RNO b] IF RHR aligned for cold leg recirculation<br>THEN<br>ENSURE FCV-63-94 OPEN.<br>STANDARD: Operator places handswitch for RHR injection FCV-63-94 in the OPEN position and verifies red light ON.<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 13.: [13.c RNO c.1] ESTABLISH Train A RHR spray:<br>ENSURE RHR crosstie FCV-74-33 CLOSED.<br>STANDARD: Operator verifies RHR crosstie FCV-74-33 in the CLOSED position as indicated by green light ON handswitch.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 14.: [13.c RNO c.2] **CLOSE** RHR Injection FCV-63-93.<br>STANDARD: Operator places handswitch for RHR injection FCV-63-93 in the CLOSED position and recognizes that the red light goes OFF and the green light is LIT, continues in the RNO column.<br>This step is critical because the operator must determine that Train A RHR spray can be placed in service and continues with step 14.c RNO to realign Train A RHR to cold leg injection.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

**Simulator Operator Note:** When candidate starts to open FCV-72-40, initate a 240 sec ramp on CH01 A thru D to reduce CNMT pressure from 10.2 to zero (0).

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 15.: [13.c RNO c.3] **OPEN** RHR spray FCV-72-40.<br>STANDARD: [a] Operator places handswitch for RHR spray FCV-72-40 in OPEN position and recognizes that the red light goes OFF and the green light is LIT.<br>Critical step to complete flow path from A RHR pump to spray header.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 16.: Operator verifies that RHR Containment spray is affective in lowering CNMT pressure.<br>STANDARD: Operator verifies that CNMT pressure is lowering by observing Lower pressure readings on CH01A thru D<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 17.: Communicates with SRO and informs him/her of status of RHR spray.<br>STANDARD: Operator informs US that Train B RHR spray could not be established however, Train A RHR spray was placed in service in accordance with FR-Z.1, step 13.<br>COMMENTS:<br>***CUE: This completes the JPM*** | ___ SAT<br>___ UNSAT<br>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.

## 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)<br>**WHEN** 10 minutes have elapsed from Phase B actuation,<br>**THEN ENSURE** containment air return fans running. |
| 6. | **MONITOR** containment air return fans:<br>• **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running. |
| 11. RNO. | **IF** all S/Gs Faulted,<br>**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:<br>• Containment pressure greater than 9.5 psig<br>• **AND** at least 1 hour has elapsed since beginning of accident<br>• **AND** RHR suction ALIGNED to containment sump<br>• **AND** at least one CCP **AND** one SI pump RUNNING. |
| 13.d. RNO | (if RHR spray in service)<br>**WHEN** Containment pressure is less than 4 psig,<br>**THEN REMOVE** RHR spray from service. |
| 14. | **MONITOR** if containment spray should be stopped:<br>(containment pressure less than 2.0 psig) |
| 14.c RNO | (if containment spray suction aligned to sump)<br>**WHEN** directed by TSC,<br>**THEN STOP** containment spray. |

## HANDOUT

Page 1 of 1

| STEP | ACTION |
|---|---|
| 1. | **MONITOR** RWST level greater than 27%. |
| 4.d<br>RNO | (if any S/G is faulted and air return fans are NOT running)<br>**WHEN** 10 minutes have elapsed from Phase B actuation,<br>**THEN ENSURE** containment air return fans running. |
| 6. | **MONITOR** containment air return fans:<br>• **WHEN** 10 minutes have elapsed from Phase B actuation, **THEN ENSURE** containment air return fans running. |
| 11.<br>RNO. | **IF** all S/Gs Faulted,<br>**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:<br>• Containment pressure greater than 9.5 psig<br>• **AND** at least 1 hour has elapsed since beginning of accident<br>• **AND** RHR suction ALIGNED to containment sump<br>• **AND** at least one CCP **AND** one SI pump RUNNING. |
| 13.d.<br>RNO | (if RHR spray in service)<br>**WHEN** Containment pressure is less than 4 psig,<br>**THEN REMOVE** RHR spray from service. |
| 14. | **MONITOR** if containment spray should be stopped:<br>(containment pressure less than 2.0 psig) |
| 14.c<br>RNO | (if containment spray suction aligned to sump)<br>**WHEN** directed by TSC,<br>**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,<br>**THEN**<br>**GO TO** ES-1.3, Transfer to RHR Containment Sump.<br>➡ |
| 2. | **VERIFY** Phase B valves CLOSED:<br>• Panel 6K PHASE B GREEN<br>• Panel 6L PHASE B GREEN. | **IF** 1-FCV-32-110 (2-FCV-32-111) is NOT closed,<br>**THEN**<br>**PERFORM** EA-32-3, Isolating Non-Essential Air to Containment.<br><br>**IF** other valves NOT closed<br>**AND** flow path is NOT necessary,<br>**THEN**<br>**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:<br>• Any S/G pressure DROPPING in an uncontrolled manner<br>**OR**<br>• Any S/G pressure less than 140 psig. | a. **GO TO** Step 5.<br>→ |
| | b. **CHECK** containment pressure less than 12 psig. | b. **GO TO** Step 5.<br>→ |
| | c. **CHECK** at least one containment spray pump RUNNING and delivering flow. | c. **IF** containment pressure is greater than 2.8 psig,<br>**THEN**<br>**GO TO** Step 5.<br>→ |
| | d. **CHECK** at least one containment air return fan RUNNING. | d. **WHEN** 10 minutes have elapsed from Phase B actuation,<br>**THEN**<br>**ENSURE** air return fans RUNNING. |
| | e. **RETURN** to procedure and step in effect.<br>→ | |

| 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,<br>**THEN**<br>**PERFORM** the following:<br>1) **OPERATE** containment spray as directed by ECA-1.1.<br>2) **GO TO** Step 6. | |
| | b. **VERIFY** containment spray pumps RUNNING. | b. **IF** containment pressure is greater than 2.8 psig,<br>**THEN**<br>**START** containment spray pumps. |
| | c. **CHECK** RWST level greater than 27%. | c. **IF** any of following conditions met:<br>• RWST level less than or equal to 8%<br>**OR**<br>• containment sump level greater than 56%,<br>**THEN**<br>**PERFORM** the following:<br>1) **ENSURE** cntmt spray pump suction aligned for sump recirc **USING** ES-1.3, Transfer to RHR Containment Sump, Step 21.<br>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:<br>• FCV-72-22 OPEN<br>• FCV-72-21 OPEN. | d. **ALIGN** valves as necessary. |
| | e. **VERIFY** containment spray discharge valves OPEN:<br>• FCV-72-39<br>• FCV-72-2. | e. **OPEN** valves for running containment spray pumps. |
| | f. **VERIFY** containment spray recirc valves CLOSED:<br>• FCV-72-34<br>• 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,<br>**THEN**<br>**PERFORM** the following:<br>1) **CONTINUE** efforts to restore at least one train of containment spray.<br>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:<br>• **WHEN** at least 10 minutes have elapsed from Phase B, **THEN** **ENSURE** containment air return fans RUNNING. | |
| 7. | **VERIFY** containment ventilation dampers CLOSED:<br>• Panel 6K CNTMT VENT GREEN<br>• Panel 6L CNTMT VENT GREEN. | **CLOSE** dampers. |
| 8. | **VERIFY** Phase A valves CLOSED:<br>• Panel 6K PHASE A GREEN<br>• Panel 6L PHASE A GREEN. | **IF** flow path NOT necessary,<br>**THEN**<br>**CLOSE** valves. |
| 9. | **VERIFY** cntmnt vacuum relief isolation valves CLOSED: [Pnl 6K MANUAL]<br>• FCV-30-46<br>• FCV-30-47<br>• FCV-30-48. | **IF** containment pressure is greater than 1.5 psig,<br>**THEN**<br>**CLOSE** valves. [M-9] |
| 10 | **VERIFY** MSIVs and MSIV bypass valves CLOSED. | **CLOSE** valves.<br>**IF** any MSIV CANNOT be closed,<br>**THEN**<br>**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:<br>• CONTROLLED or RISING<br>**AND**<br>• Greater than 140 psig. | **IF** all S/Gs Faulted,<br>**THEN**<br>**PERFORM** the following:<br>1) **CONTROL** feed flow at greater than or equal to 50 gpm to each S/G.<br>2) **OPEN** MD AFW pump recirc valves FCV-3-400 and -401 as necessary.<br>3) **GO TO** Step 13. |
| | **CAUTION** **Isolating all S/Gs will result in a loss of secondary heat sink.** | |
| 12. | **DETERMINE** if any S/G Faulted: | |
| | a. **CHECK** S/G pressures:<br>• Any S/G pressure DROPPING in an uncontrolled manner<br>**OR**<br>• Any S/G pressure less than 140 psig. | a. **GO TO** Step 13. |
| | b. **ISOLATE** feed flow to affected S/G:<br>• MFW<br>• AFW | |

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 13. | **MONITOR** if RHR spray should be placed in service: | |
| | a. **CHECK** the following:<br>• Containment pressure greater than 9.5 psig<br>**AND**<br>• At least 1 hour has elapsed since beginning of accident<br>**AND**<br>• RHR suction ALIGNED to containment sump<br>**AND**<br>• 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:<br>1) **ENSURE** only one CCP RUNNING (same train as running RHR pump preferred).<br>2) **PLACE** non-operating CCP in PULL TO LOCK.<br>3) **ENSURE** only one SI pump RUNNING (same train as running RHR pump preferred).<br>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:<br>1) **CHECK** Train B RHR pump RUNNING.<br>2) **ENSURE** RHR crosstie FCV-74-35 CLOSED.<br>3) **CLOSE** RHR injection FCV-63-94.<br>4) **OPEN** RHR spray FCV-72-41. | c. **IF** Train B RHR spray CANNOT be established, **THEN** **PERFORM** the following:<br>a) **ENSURE** RHR spray FCV-72-41 CLOSED.<br>b) **IF** RHR aligned for cold leg recirculation, **THEN** **ENSURE** FCV-63-94 OPEN.<br>c) **ESTABLISH** Train A RHR spray:<br>(1) **ENSURE** RHR crosstie FCV-74-33 CLOSED.<br>(2) **CLOSE** RHR injection FCV-63-93.<br>(3) **OPEN** RHR spray FCV-72-40.<br>**IF** Train A RHR spray CANNOT be established, **THEN** **PERFORM** the following:<br>a) **CLOSE** RHR spray FCV-72-40.<br>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,<br>**THEN**<br>**PERFORM** the following:<br>1) **ENSURE** FCV-72-40 and FCV-72-41 CLOSED.<br>2) **IF** RHR aligned for cold leg recirculation,<br>**THEN**<br>**ENSURE** FCV-63-93 and FCV-63-94 OPEN.<br>3) **IF** ECCS is aligned for hot leg recirculation,<br>**THEN**<br>**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.<br>**WHEN** directed by TSC, **THEN** **PERFORM** Substeps 14.d through 14.f.<br>**GO TO** Step 15. |
| | d. **RESET** Containment Spray. | |
| | e. **STOP** containment spray pumps and **PLACE** in A-AUTO. | |
| | f. **CLOSE** containment spray discharge valves:<br>• FCV-72-39, Train A<br>• FCV-72-2, Train B. | |

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

## SPECIAL INSTRUCTIONS TO EVALUATOR:

1. Critical steps are identified in step SAT/UNSAT column by bold print 'Critical Step'.
2. This task is to be performed using the simulator in IC #116.
   **[Rx Power should be ~ 100 %]**
3. **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%.**
4. **After making the adjustments to N-41 and N-43 Log the pot settings for each NI:**
   **N41** ________
   **N42** ________
   **N43** ________
   **N44** ________
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, 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 |

==================================================================

## READ TO OPERATOR

**Directions to Trainee:**

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## 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.
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.

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 1.: Obtain the appropriate procedure.<br>STANDARD: Operator obtains 0-SI-OPS-092-078.0 and goes to section 6.0 "Performance". | ___ SAT<br>___ UNSAT |
| STEP 2.: [1] **VERIFY** availability of LEFM calorimetric power…<br>***Cue: Per initial conditions, LEFM calorimetric power is available.***<br>STANDARD: Operator pulls up LEFM ICS screen and annotates procedure that LEFM calorimetric power is available.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 3.: **[2] IF** LEFM calorimetric power NOT available OR ICS computer NOT available, THEN….<br>***Cue: Per initial conditions, ICS and LEFM calorimetric power are available.***<br>STANDARD: Operator marks step N/A.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 4.: **[3] DETERMINE** reactor core power level by performing the applicable appendix below.<br>STANDARD: Operator goes to Appendix A.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

**STEP/STANDARD** **SAT/UNSAT**

**EVALUATOR NOTE:** The following steps are from Appendix A.

STEP 5.: **[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.***

STANDARD: 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.

COMMENTS:

___ SAT

___ UNSAT

NOTE: The operator should transition back to section 6.1 at the completion of App A.

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

**STEP/STANDARD** **SAT/UNSAT**

**EVALUATOR NOTE:** The following steps are from Section 6.1. The values for each pot setting are on the setup page.

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:

STEP 8.: **[5] COMPARE** NIS indication with core thermal power level.

___ SAT

___ UNSAT

**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.

COMMENTS:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 9.: **[6] VERIFY** that all NIS channel indications are within ± 3 % of the determined core thermal power level.<br>STANDARD: Operator checks the YES box.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 10.: **[7] IF** a NIS channel was more than 3 percent in error in the non-conservative direction (core thermal > NIS) THEN ...<br>STANDARD: Operator marks this step N/A.<br>COMMENTS: | ___ SAT<br>___ 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%.<br>STANDARD: The operator checks **NO** for N-41 and N-43 and checks **YES** for N-42 and N-44.<br>Critical step because operator needs to be able to identify which channels will need to be adjusted.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 12.: **[9] IF** any NIS channels were inoperable during the performance of this instruction, THEN<br>STANDARD: The operator N/A's this step.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 13.: **[10] IF** any NIS channel does not meet acceptance criteria (step 6.1[5] and/or step 6.1[8]),<br>OR<br>NIS Channel Adjustment is desired, THEN<br>• PERFORM adjustment using Section 6.2<br>STANDARD: The operator initials this step and proceeds to Section 6.2.<br>COMMENTS: | ___ SAT<br>___ 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,<br>**THEN**...<br>NOTIFY Engineering to determine the cause<br>STANDARD: Operator N/As this step.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 15.: **[2]** **VERIFY** reactor power has remained constant (± 0.5%) since performance of section 6.1.<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 16.: **[3]** **IF** NIS power range channel is inoperable, THEN....<br>STANDARD: Operator N/As this step since all channels are operable.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 17.: **[4]** **ENSURE** all NIS power range channels are operable or bypassed with no bistables tripped.<br>STANDARD: Operator verifies no bistables tripped or bypassed. (Initial conditions had all channels operable)<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 18.: **[5] ENSURE** rod control system is in MANUAL in accordance with 0-SO-85-1<br>STANDARD: Operator turns HS-85-5110 to the MANUAL position.<br>This step is critical to ensure no automatic rod movement during NIS adjustments.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 19.: **[6] IF** rate trip exists (or occurs) on the NIS channel being calibrated, **THEN**<br>**CLEAR** that channel's trip signal (momentarily set RATE MODE switch to RESET position) and annunciator XA-55-6A.<br>***Cue:*** ***For this step and the following steps, inform the operator that "for JPM purposes the CV is not required".***<br>STANDARD: Operator verifies NO rate trip signals are in on ANY of the PR and the annunciator is clear. * **CRITICAL PORTION: If rate trip is caused he/she resets the rate trip prior to continuing to the next channel.**<br>This step is critical because failure to comply could result in a reactor trip during the next channel adjustment.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 20.: **[7]** ADJUST gain potentiometer on associated channel's power range B drawer to bring that channel's indicated power level to within ± 0.5% of the calorimetric power recorded in section 6.1 or listed on the printed copy. AND<br>ENSURE gain potentiometer latch re-engaged.<br>STANDARD : **Operator must adjust N41 and N43 to satisfy criteria.** The operator should repeat step [6] prior to adjusting any subsequent PR. **(only the <u>bold</u> portion of the standard is critical)**<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| **EVALUATOR NOTE: Step [8] on adjusting coarse adjust was omitted from JPM.** | |
| STEP 21.: **[9] IF** additional NIS channel(s) require calibration, **THEN**<br>RETURN to step **[6]**<br>STANDARD: Operator may return to step [6] to adjust either N41 or N42.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 22.: **[10] WHEN** NIS adjustments have been completed, **THEN** **RECORD** the "as left" power level from NIS power range channels. | ___ SAT<br>___ 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**....<br>STANDARD: Operator N/As this step since all are operable.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 24.: **[12] CHECK** appropriate box to indicate whether the following "as left" acceptance criteria were satisfied.<br>STANDARD: Operator checks **YES** box for N41, N42, N43, & N44, all being within ± 0.5% of caliometric power.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 25.: **[13] IF** acceptance criteria were NOT satisfied for any NIS channel **THEN**.....<br>STANDARD: Operator N/As this step.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 26.: **[14] RETURN** rod control system to AUTO in accordance with 0-SO-85-1.<br>STANDARD: Operator places control rod bank selector switch to AUTO after waiting at least 3 minutes for signal to decay.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 27.: Notify SRO that the NIS channels have been calibrated.<br>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.<br>COMMENTS:<br>***CUE: This completes the JPM*** | ___ SAT<br>___ UNSAT |

**End of JPM**

## 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:

**You are the CRO and the US has directed you to perform 0-SI-OPS-092-078.0.**

**Section 4.0 of 0-SI-OPS-092-078.0 has been completed.**

**Notify the US when the SI has been completed and any necessary adjustments have been made.**

## 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:

**You are the CRO and the US has directed you to perform 0-SI-OPS-092-078.0.**

**Section 4.0 of 0-SI-OPS-092-078.0 has been completed.**

**Notify the US when the SI has been completed and any necessary adjustments have been made.**

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 $\Delta T$ 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 ________

**Acceptance Criteria:** 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%<br>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<br>(XI-92-5005B) | |
| N-42<br>(XI-92-5006B) | |
| N-43<br>(XI-92-5007B) | |
| N-44<br>(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)

**NOTE**

The gain potentiometers have latches which must be disengaged prior to adjustment, and re-engaged following adjustment.

[7] **ADJUST** gain potentiometer on associated channel's power range B drawer to bring that channel's indicated power level to within ±0.5% of the calorimetric power recorded in Section 6.1 or as listed on the printed copy. **AND**

**ENSURE** gain potentiometer latch re-engaged. [C.2]

|  | Adjustment Required | 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)

[8] **IF** fine gain potentiometer on power range B drawer will not provide enough adjustment to satisfy the calibration requirements of step 6.2[7], **THEN**

**REQUEST** Instrument Maintenance to adjust the coarse gain (resistor R312, Coarse Level Adjust) inside the applicable power range drawer, **AND**

**READJUST** fine gain potentiometer to achieve calibration requirements specified in step 6.2[7].

| | Adjustment Required | N/A |
|---|---|---|
| NIS Channel N-41 | ☐ | ☐ |
| NIS Channel N-42 | ☐ | ☐ |
| NIS Channel N-43 | ☐ | ☐ |
| NIS Channel N-44 | ☐ | ☐ |

First Person ____________________

CV__________________

[9] **IF** additional NIS channel(s) require calibration, **THEN**

**RETURN TO** step 6.2[6]. ________

Unit______

## 6.2 NIS Channel Adjustment (continued)

[10] **WHEN** NIS adjustments have been completed, **THEN**

**RECORD** "as-left" power level from NIS power range channels.

| 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) | |

First Person ____________________

IV ____________________

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

**REQUEST** Instrument Maintenance to remove Bypass on inoperable NIS channel in accordance with 0-PI-IXX-092-001.0. ________

**Unit______**

## 6.2 NIS Channel Adjustment (continued)

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

**Acceptance Criteria:** The indicated NIS power level recorded in step 6.2[10] is within ± 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 A
(Page 1 of 3)

## CALCULATION OF CORE THERMAL POWER USING LEFM

**Unit______**

### NOTES

1) ICS allows two options for blowdown flows:

Option #1 (Preferred) -use point [F2261A] which requires no operator entered data (computer automatically updates the blowdown flows).

Option #2 - use manually entered S/G blowdown flow rates.

2) Computer point [F2261A] is more accurate than flow indicators located in the fan rooms. If the computer point is inoperable and blowdown flows from the FIS's are used, then indicated core thermal power may be a slightly different value.

[1] **ENSURE** S/G blowdown flows are updated by performing the following functions on ICS:

[1.1] **SELECT** "NSSS AND BOP". ________

[1.2] **SELECT** "CALORIMETRIC FUNCTION MENU". ________

[1.3] **SELECT** "UPDATE OPERATOR ENTERED BLOWDOWN FLOW" on menu **AND**

**PERFORM** one of the following options (N/A option not used):

[1.3.1] **IF** using computer point [F2261A] S/G Total Blowdown Flow, **THEN**

A. **VERIFY** point value is updating (changing values). ________

B. **IF** computer point is NOT updating, **THEN**

**NOTIFY** MIG that point is NOT updating and initiate WO. ________

## Appendix A
(Page 2 of 3)

**Unit**______

**NOTE**

Local readings of steam generator blowdown flow are obtained from Panel L-357.

[1.3.2] **IF** manually updating blowdown flows, **THEN**

A. **RECORD** local readings for S/G blowdown flow: ________

| RCS LOOP | BLOWDOWN FLOW (GPM) |
|---|---|
| 1 | ________<br>FI-1-152 |
| 2 | ________<br>FI-1-156 |
| 3 | ________<br>FI-1-160 |
| 4 | ________<br>FI-1-164 |

B. **ENSURE** blowdown flows above entered in ICS. ________

C. **IF** blowdown flows were updated, **THEN**

**WAIT** a minimum of 10 minutes to allow program to accurately reflect new value. ________

## Appendix A
(Page 3 of 3)

**Unit______**

**NOTE**

ICS printout may be used to document power level and NIS values. Since core thermal power fluctuates, a slight deviation may exist between the recorded core thermal power value (if used) and the printed sheet value (if used). SI acceptance is satisfied in the body of the instruction.

[2] **SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND**

**PERFORM** one of the following (Mark step not performed N/A.):

[2.1] **RECORD** the following:

LEFM Core Thermal Power (U2118) __________Mwt

Percent Rated Core Thermal Power (U1127) __________%

**OR**

[2.2] **PRINT** power level and NIS values **AND**

**ATTACH** report to this instruction. ________

## Appendix B
(Page 1 of 1)

## SUBSTITUTION OF RCS ΔT AT LOW POWER LEVELS (≤40% WITH LEFM NOT AVAILABLE)

**Unit______**

## 1.0 PERFORMANCE

**NOTES**

1) RCS delta T loops (ΔT°) are aligned to results of a secondary-side heat balance. Consequently, using ΔTs to adjust NIS at low power levels still satisfies the requirement to use heat balance. Loop ΔT is used to avoid potentially non-conservative errors in NIS power range indication if adjustments were made based upon an inaccurate secondary heat balance at a low feedwater flowrate. At low power levels the traditional secondary-side heat balance (U1118) is not as accurate as Reactor Coolant Loop ΔT's.

2) This appendix should NOT be used if LEFM is operable.

[1] **CALCULATE** the average RCS delta T using control board indications or computer point for average RCS ΔT.

| | | | PLANT COMPUTER |
|---|---|---|---|
| Loop A (TI-68-2D) | ________% | | |
| Loop B (TI-68-25D) | ________% | OR | UO485_______% |
| Loop C (TI-68-44D) | ________% | | |
| Loop D (TI-68-67D) | ________% | | |

Total________% ÷ (4) = Avg ________%

________

[2] **RECORD** average RCS delta T as the core thermal power level_______%. ________

## Appendix C
(Page 1 of 3)

## CALCULATION OF CORE THERMAL POWER LEVEL USING U1118 (> 40% WITH LEFM NOT AVAILABLE)

**Unit______**

## 1.0 PERFORMANCE

**NOTES**

1) This appendix is used when RCS ΔT is greater than 40% and LEFM (U2118) NOT available, but ICS and U1118 are available.

2) ICS allows two options for blowdown flows:

   Option #1 (Preferred) - use point **[F2261A]** which requires no operator entered data (computer automatically updates the blowdown flows).

   Option #2 - use manually entered S/G blowdown flow rates.

3) Computer point **[F2261A]** is more accurate than flow indicators located in the fan rooms. If the computer point is inoperable and blowdown flows from the FIS's are used in the calculation of U1118, then expect U1118 to indicate a different value and adjustment of NIS may be required.

[1] **ENSURE** S/G blowdown flows are updated by performing the following on ICS:

[1.1] **SELECT** "NSSS AND BOP". ______

[1.2] **SELECT** "CALORIMETRIC FUNCTION MENU" ______

[1.3] **SELECT** "UPDATE OPERATOR ENTERED BLOWDOWN FLOW" on menu **AND**

**PERFORM** one of the following options (N/A option not used):

[1.3.1] **IF** using computer point **[F2261A]** S/G Total Blowdown Flow, **THEN**

A. **VERIFY** point value is updating (changing values). ______

B. **IF** computer point is **NOT** updating, **THEN**

**NOTIFY** MIG that point is not updating and initiate WO. ______

## Appendix C
(Page 2 of 3)

Unit______

## 1.0 PERFORMANCE (continued)

**NOTE**

Local readings of steam generator blowdown flow are obtained from Panel L-357.

[1.3.2] **IF** manually updating blowdown flows, **THEN**

A. **RECORD** local readings for S/G blowdown flow: ________

| RCS LOOP | BLOWDOWN FLOW (GPM) |
|---|---|
| 1 | ________<br>FI-1-152 |
| 2 | ________<br>FI-1-156 |
| 3 | ________<br>FI-1-160 |
| 4 | ________<br>FI-1-164 |

B. **ENSURE** blowdown flows above entered in ICS. ________

C. **IF** blowdown flows were updated, **THEN**

**WAIT** a minimum of 10 minutes to allow program to accurately reflect new value. ________

**Appendix C**
**(Page 3 of 3)**

**Unit______**

**1.0 PERFORMANCE (continued)**

> **NOTE**
>
> ICS printout may be used to document power level and NIS values. Since core thermal power fluctuates, a slight deviation may exist between the recorded core thermal power value (if used) and the printed sheet value (if used). SI acceptance is satisfied in the body of the instruction.

[2] **SELECT** "DISPLAY CURRENT CALORIMETRIC DATA" on ICS Calorimetric menu **AND** ________

**PERFORM** one of the following:

[2.1] **RECORD** the following:

Venturi Core Thermal Power (U1118) ___________Mwt

Percent Rated Core Thermal Power (U1127) ___________%

**OR**

[2.2] **PRINT** power level and NIS values **AND**

**ATTACH** report to this instruction. ________

[3] **IF** any value is a blue "NCAL" quality, **THEN**

**PERFORM** the following:

[3.1] **IF** cause of bad data is unknown, **THEN**

**REQUEST** assistance from MIG or ICS computer engineer. ________

[3.2] **INITIATE** WO if required. ________

[3.3] **GO TO** Appendix D. ________

## 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)

## Appendix D
## (Page 4 of 8)

**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

**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

## Appendix E
(Page 1 of 2)

## CALCULATION OF CORE THERMAL POWER WITH U1118 AND U2118 INOPERABLE DUE TO BAD FEEDWATER PRESSURE INPUT (ICS AND LEFM OPERABLE)

**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% (ICS and LEFM remain operable). This appendix will calculate thermal power using the SPECIAL LEFM OFFLINE CALORIMETRIC screen on ICS. (NSSS AND BOP, CALORIMETRIC FUNCTION MENU).
2) To limit the magnitude of errors, this appendix may only be used when one feedwater pressure input is inoperable.

[1] **SELECT** SPECIAL LEFM OFFLINE CALORIMETRIC screen on ICS. ________

[2] **VERIFY** the following on SPECIAL LEFM OFFLINE CALORIMETRIC screen:

- LEFM MFW HDR FLOW shows good quality/valid data ________
- LEFM MFW HDR TEMPERATURE shows good quality/valid data ________
- MFW header temperature greater than 250°F ________
- S/G Total Blowdown Flow F2261MA shows valid data and point is updating. ________
- With the exception of average feedwater pressure and individual blowdown flows, no more than one input point shows bad data (all other input point except for failed feedwater pressure indicate good quality/valid data). ________

## Appendix E
(Page 2 of 2)

Unit______

## 1.0 PERFORMANCE (continued)

[3] **MANUALLY ENTER** feedwater pressure for invalid point:

[3.1] **VERIFY** all four S/G pressures shown on SPECIAL LEFM OFFLINE CALORIMETRIC screen are stable and indicate valid data. ________

[3.2] **CALCULATE** average of remaining three (operable) feedwater pressures.

________________ psig

________________
1st

________________
IV

[3.3] **ENTER** calculated average feedwater pressure in place of invalid feedwater pressure input on SPECIAL LEFM OFFLINE CALORIMETRIC screen .

________
1st

________
IV

[3.4] **SELECT** F3 (EXECUTE). ________

[3.5] **SELECT** desired printer for printout. ☐

[3.6] **ATTACH** printout to this SI package. ☐

**End of Section**

## Source Notes
(Page 1 of 1)

| Requirements Statement | Source Document | Implementing Statement |
|---|---|---|
| Ensure calculation of thermal power is correct before calibrating excore detectors. | INPO SER 89-23<br>CAQR SQQ 90052 | C.1 |
| Excore detectors should be calibrated based on best available power indication. | INPO SER 89-09 | C.2 |
| NIS power range calibrations should be performed periodically following power ascension above 15% power. | INPO SOER 90-03 | C.3 |
| Careful consideration and caution should be exercised before adjusting nuclear instrumentation. Operations and Engineering Management should be notified if larger than normal channel adjustments are required. | INPO SOER 90-03 | C.4 |
| 0-SI-OPS-092-078.0 will be revised to allow the use of a Plant Computer program to provide an increased frequency of the performance of this procedure. | LER 328/91005<br>S10 910819 844 | C.5 |

# 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**

______________________________________________

______________________________________________

______________________________________________

______________________________________________

## 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 the simulator to IC-114 and complete the following setup.
4. **Override # AN:OVRDN_584** to **ON**, to bring in alarm for SPENT FUEL PIT LEVEL.
5. **Override ZAOLI68320, ZAOLI68321, ZAOLI68335A, ZAOLI68339A at 50** to simulate PZR at refueling level.
6. **Override ZAOPI6866A, ZAOPI6869, ZAOPI6862 at 35** to simulate refuel flood up pressure.
7. **Override AN:OVRDN_1695 to OFF** to keep midloop high level alarm from alarming.
8. **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)**
9. 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.
10. Add Caution Order tag to FCV-63-1 per 0-GO-13 App. O. (jumpers placed to remove seal in)

**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 |

| Task Number | | Task Title | Cont TRN |
|---|---|---|---|
| 3210110401 | **(RO)** | Initiate Makeup to the Refueling Cavity | |

==================================================================

## 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.

| **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.<br>STANDARD: Operator obtains a copy of AOP-M.04.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>Start Time____ |
| STEP 2: 1. EVALUATE the following Tech Specs for applicability:<br>▪ 3.9.8.2, RHR - Low Water Level<br>▪ 3.9.10, Rx Vessel Water Level<br>▪ 3.9.11, Refueling Operations - Spent Fuel Pit Water Level<br>***Cue:*** ***The US will evaluate the Tech Specs for applicability***<br>STANDARD: Operator notifies US of the need to evaluate these three Tech Spec items.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 3: 2. EVALUATE EPIP-1, Emergency Plan Initiating Conditions Matrix.<br>***Cue:*** ***The SM will evaluate the Emergency Plan***<br>STANDARD: Operator notifies US/SM of the need to evaluate the Emergency Plan.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 4: 3. Diagnose conditions to determine appropriate section, of AOP-M.04, to perform.<br>STANDARD: Based on plant indications and initial conditions, determines that section 2.1 must be performed and proceeds to page 4.<br>COMMENTS: | ___ SAT<br>___ 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.<br>***Cue:*** ***The SM would like you to make that announcement.***<br>STANDARD: Operator makes this announcement.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 6: 2.1.2 **ENSURE** the following personnel notified that seal failure has occurred:<br>• Control Room<br>• RADCON - to monitor refueling area and Aux Bldg as required<br>• Fuel Handling Supervisor<br>***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.***<br>STANDARD: Operator ensures these people are notified.<br>COMMENTS: | ___ SAT<br>___ 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:<br>a. INITIATE makeup from RWST using Appendix A, "Filling Refueling Cavity from RWST."<br>b.<br>***Cue:*** ***US directs makeup from RWST using CCP***<br>STANDARD: Operator obtains a copy of Appendix A Section A of AOP-M.04.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| **NOTE: The following are from Appendix A, Filling Refueling Cavity From RWST, Section A of AOP-M.04.** | |
| STEP 8: A.1.a. **VERIFY** RWST level greater than 8%.<br>STANDARD: Operator verifies RWST level greater than 8% using one or more of the RWST level indicators located on M-6.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

Job Performance Checklist

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 9: A.1.b. **ENSURE** the following charging valves OPEN:<br>FCV-62-90<br>STANDARD: Operator verifies FCV-62-90 open by observing 1-HS-62-90A RED light LIT.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 10: A.1.b. **ENSURE** the following charging valves OPEN:<br>FCV-62-91<br>STANDARD: Operator verifies FCV-62-91 open by observing 1-HS-62-91A RED light LIT<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 11: A.1.b. **ENSURE** the following charging valves OPEN:<br>FCV-62-85 OR FCV-62-86<br>STANDARD: Operator verifies FCV-62-85 or 86 is open by observing 1-HS-62-85A or 1-HS-62-86A RED light LIT.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 12: A.1. c **OPEN** the following valves: FCV-62-135 and 136, CCP suction from RWST.<br>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.<br>***Cue:*** **If required, acknowledge request and ask for recommendation to complete task from candidate.**<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

**Evaluator Note:** The candidate should recommend using the alternate method of filling Reactor Cavity by performing step 2 of Appendix A.

| | |
|---|---|
| STEP 13: Operator reports to US that neither CCP suction from the RWST will open.<br>***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.***<br>STANDARD: Operator determines that step 2 of Appendix A is appropriate action to take.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

**NOTE: The following are from Appendix A, Section A, Step 2 of AOP-M.04.**

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**

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 16: A.2. **IF** initiating makeup from RWST using RHR Pump suction, **THEN PERFORM** the following:<br>c. CLOSE one the following valves:<br>▪ FCV-74-1, RHR suction from Hot Leg No.4 or<br>▪ FCV-74-2, RHR suction from Hot Leg No. 4.<br>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<br>This step is critical to isolate the normal RHR suction flowpath and to swap over to the RWST suction flowpath.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 18: A.2.d VERIFY flow to RCS.<br>STANDARD: Operator verifies flow into the RCS by observing flow on 1-FI-63-91B or 1-FI-63-92B.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

| **STEP/STANDARD** | **SAT/UNSAT** |
|---|---|
| STEP 19: Inform the US of flow from RWST to Spent Fuel Pit.<br>STANDARD: Operator informs US and/or SM that flow has been established from RWST to Spent Fuel Pit.<br>***Cue:*** ***After operator reports that flow has been established, State "This completes the JPM."***<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>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. 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.

## Directions to Trainee:

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# 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.

## 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**

## 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

### 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:<br>1) **INITIATE** makeup using normal charging with CCP suction aligned to VCT **USING** App. E, Refueling Cavity Makeup Using Normal Charging.<br>2) **INITIATE** actions to restore RWST level **USING** 0-SO-62-4 (to transfer HUT to RWST) or other applicable procedures.<br>3) **EVALUATE** need to staff TSC and OSC.<br>4) **GO TO** Step 4. |
| | b. **MAINTAIN** RWST level greater than 5%. | b. **REALIGN** pump suctions **USING** Appendix A, Filling Refueling Cavity from RWST:<br>• RHR Pump suction to RCS Loop 4 hot leg<br>• 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<br>**OR** position is unknown,<br>**THEN**<br>**DISPATCH** two operators to perform Appendix F, Closing Wafer Valve. | |
| 5. | **CHECK** for any of the following:<br>• fuel movement in progress<br>OR<br>• any irradiated fuel assembly out of normal storage location (core or spent fuel pool). | **PERFORM** the following:<br>a. **IF** any radioactive component is being handled in Spent Fuel Pool or Refueling Cavity,<br>**THEN**<br>**NOTIFY** Fuel Handling Supervisor to ensure component is placed in storage location or lowered fully.<br>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)

### 2.1 Reactor Cavity Seal Failure [C.1]

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 6. | Continued | **IF** more than one irradiated fuel assembly in RCCA Change Fixture<br>**AND** time allows,<br>**THEN**<br>**PERFORM** the following:<br>a. **REMOVE** second irradiated fuel assembly from RCCA change fixture.<br>b. **INSERT** irradiated fuel assembly as far as possible into any available core location.<br>c. **RECORD** location ________________ |
| 7. | **VERIFY** manipulator crane empty of fuel. | **INSERT** fuel assembly as far as possible into any available core location.<br>**RECORD** location ____________________ |
| 8. | **ENSURE** the following:<br>• Fuel transfer cart on SFP side<br>• Upender in horizontal position | |
| 9. | **WHEN** transfer cart is on SFP side,<br>**THEN**<br>**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) | |
| 10. | **VERIFY** SFP bridge hoist empty of fuel. | **PERFORM** the following:<br>a. **TRANSPORT** fuel assembly on SFP bridge hoist to SFP.<br>b. **INSERT** fuel assembly into any SFP location.<br>c. **RECORD** location ________________ |
| 11. | **VERIFY** SFP water level above SFP cooling pump suction strainer. | **PERFORM** the following:<br>a. **STOP** running SFP cooling pumps [Aux Bldg, 714' elev, SFP Pump Platform]<br>b. **FILL** SFP **USING** 0-SO-78-1, Spent Fuel Pit Cooling System.<br>c. **IF** additional makeup is needed, **THEN**<br>1) **NOTIFY** Chem Lab Supervisor.<br>2) **INITIATE** makeup from Fire water to SFP using hose reel station as required.<br>d. **WHEN** SFP water level above SFP cooling pump suction strainer, **THEN** **CONTINUE** with this procedure.<br>e. **VENT** SFP cooling pumps casings.<br>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. | a. **GO TO** Substep d. |
| | b. **CONSULT** Fuel Handling SRO and Radcon. | |
| | c. **IF** equipment hatch requires closure,<br>**THEN**<br>**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.

| STEP | ACTION/EXPECTED RESPONSE | RESPONSE NOT OBTAINED |
|---|---|---|
| 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. ☐

# 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 1A-A Diesel Generator per EA-82-1.

**Job Performance Checklist:**

**STEP / STANDARD** | **SAT / UNSAT**

STEP 1.: Obtain appropriate copy of procedure.

STANDARD: Operator obtains a copy of EA-82-1 and proceeds to Section 4.1.

COMMENTS:

______ SAT

______ UNSAT

Start Time ____

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:

______ SAT

______ UNSAT

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:

______ SAT

______ UNSAT

STEP 4.: 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. | ☐ | ☐ | ☐ | ☐ |

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:

______ SAT

______ UNSAT

**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.: 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 | ☐ |

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:

| 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 allow safe parallel operation of the D/G.

COMMENTS:

______ SAT

______ UNSAT

**Critical Step**

STEP 9.: 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 | ☐ |

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:

______ SAT

______ UNSAT

**Critical Step**

**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:

| 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:

______ SAT

______ UNSAT

**Critical Step**

STEP 11.: 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 | ☐ |

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:

______ SAT

______ UNSAT

**Critical Step**

**Job Performance Checklist:**

**STEP / STANDARD** | **SAT / UNSAT**

STEP 12.: 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 | ☐ |

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:

_______ SAT

_______ UNSAT

**Critical Step**

---

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:

_______ SAT

_______ UNSAT

**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:

| 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 | ☐ |

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**

**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<br>______ 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<br>___ UNSAT<br>**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<br>___ 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<br>___ 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 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:

| 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:

___ SAT

___ UNSAT

**Critical Step**

STEP 23.: 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 | ☐ |

STANDARD: Operator places handswitch 1-HS-57-47, on panel 0-M-26, in the OFF position.

COMMENTS:

___ SAT

___ UNSAT

**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: | ___ SAT<br>___ UNSAT |

| 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:

---

STEP 25.: 7. **GO TO** Section 4.1, step in effect.

______ SAT

______ UNSAT

STANDARD: Operator returns to section 4.1 and determines 1A-A DG is shutdown.

***Cue:*** ***When candidate returns to section 4.1, state "This completes the JPM."***

Stop Time____

COMMENTS:

# 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 1A-A Diesel Generator per EA-82-1.

# 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 1A-A Diesel Generator 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<br>√ |
|---|---|---|
| 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<br>√ |
|---|---|
| 1A-A | ☐ |
| 1B-B | ☐ |
| 2A-A | ☐ |
| 2B-B | ☐ |

b. **PLACE** selected D/G **[86 LOR]** switch to RESET:

| D/G RELAY BOARD | SWITCH | RESET<br>√ |
|---|---|---|
| 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<br>1-HS-67-68A | ☐<br>☐ |
| 1B-B | 1-HS-67-67A<br>1-HS-67-65A | ☐<br>☐ |
| 2A-A | 2-HS-67-66A<br>2-HS-67-68A | ☐<br>☐ |
| 2B-B | 2-HS-67-67A<br>2-HS-67-65A | ☐<br>☐ |

7. **GO TO** Section 4.1, step in effect. ☐

## END OF TEXT

## 5.0 REFERENCES

None.

# 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.<br>STANDARD: Operator obtains 0-SO-250-1, section 8.1.1 to place Spare Charger 1-S in service in place of charger 1.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>Start Time____ |
| **Note:** 1-S Spare Vital Battery Charger is used to replace I or II Vital Charger. | |
| STEP 2.: [1] Ensure Power Checklist 0-250-1.09 has been performed (Spare Charger Fuses).<br>***Cue:*** ***Power Checklist 0-250-1.09 is complete with NO deviations.***<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 3.: [2] Ensure Power Checklist 0-250-1.10 has been performed.<br>***Cue:*** ***Power Checklist 0-250-1.10 is complete with NO deviations.***<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 4.: [3] ENSURE Spare Vital Battery Charger 1-S breakers are in OFF position.<br>A. 0-BKRC-250-QF/02-S, OUTPUT DC BKR is OFF<br>B. 0-BKRC-250-QF/01-S, INPUT AC BKR is OFF<br>***Cue:*** ***a. The DC Power breaker is in the DOWN, OFF position.***<br>***b. The AC Power breaker is in the DOWN, OFF position.***<br>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.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 5.: [4] Ensure timer for equalizing voltage on 1-S spare charger is set to Zero.<br>***Cue:*** ***Timer is set on zero.***<br>STANDARD: Operator verifies timer is on zero.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| **Note:** Equipment referenced in the following two steps is located on the 480V AC Vital Transfer Switch 1-S. | |
| STEP 6.: [5] 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.<br>***Cue:*** ***The potential light for the A train board is LIT.***<br>STANDARD: Operator locates the transfer switch and VERIFIES that the potential light from 480 V SD Bd 1A2-A (A train) is LIT.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 7.: [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.<br>***Cue:*** ***The breaker is in the ON, UP, position.***<br>STANDARD: Operator locates the A train feeder (orange placard), on the Spare 480V Vital Trans Switch box and places it is in the closed, UP position.<br>**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.**<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 8.: [6] If 1-S Spare 125V Vital Battery Charger transfer switch is to be aligned to 480V SD Bd 1B1-B (alternate supply) THEN<br>STANDARD: Operator N/A's this step.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 9.: [7] PLACE 0-BKRC-250-QF/02-S, OUTPUT DC breaker on 1-S spare charger cabinet in ON position.<br>***Cue:*** ***DC power breaker is in the UP (ON) position***<br>STANDARD: Operator locates DC POWER breaker and places it in the UP, ON position.<br>**This step is critical for spare charger breaker alignment.**<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 10.: [8] Place 0-BKRC-250-QF/01-S, INPUT AC breaker on 1-S spare charger cabinet in ON position.<br>***Cue:*** ***AC power breaker is in the UP (ON) position***<br>STANDARD: Operator locates AC POWER breaker and places it in the UP, ON position.<br>**This step is critical for spare charger breaker alignment.**<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 11.: [9] VERIFY spare charger is energized with output voltage between 131 and 138 volts indicated on 1-S charger voltmeter.<br>***Cue:*** ***Volts are at ~134 volts.***<br>STANDARD: Operator checks voltmeter to ensure voltage between 131 and 138 volts.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 12.: [10] PLACE ALARM DISABLE switch on 1-S spare charger cabinet in ON position.<br>***Cue:*** ***Switch is pointing to the ON position.***<br>STANDARD: Operator rotates the ALARM DISABLE switch to the ON position [placing the alarm in service].<br>COMMENTS: | ___ SAT<br>___ UNSAT |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| **Note:** Located on 1-S Spare 125V Vital Battery Charger 125V DC Transfer Switch on el 749' AB outside 125V Vital Batt Rm II. | |
| STEP 13.: [11] 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)<br>***Cue:*** ***Breaker is in the UP, ON position***<br>STANDARD: Operator locates DC transfer switch and places the breaker to the #I VBB (Feeder to #I Vital Battery Board "Red Placard") is in the UP, closed position.<br>**This step is critical for spare charger breaker alignment.**<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| **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. | |
| STEP 14.: [12] PLACE 0-BKRC-250-KE/225-D in ON position on Vital Battery Board I.<br>***Cue:*** ***Breaker is in the UP, ON position.***<br>STANDARD: Operator locates breaker 225 (near bottom of board) and places it in the UP, ON position.<br>This step is critical to tie the spare charger onto the Vital Battery Board I.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 15.: [13] PLACE 0-BKRC-250-KE/226-D, 125V VITAL BATT CHGR I NOR SUPPLY, in OFF position on Vital Battery Board I.<br>***Cue:*** ***Breaker is in the DOWN, OFF position.***<br>STANDARD: Operator locates breaker 226 (near bottom of board) and places it in the DOWN, OFF position.<br>This step is critical to ensure normal charger not parallel to spare charger.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| **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. | |
| STEP 16.: [14] VERIFY on Battery Board I 0-EI-250-KE1-D, Spare Charger output voltage, stabilizes at 131.5 to 137.5 volts<br>***Cue:*** ***Voltage stabilized at 134 volts,***<br>STANDARD: Operator checks Spare Charger Volt meter on Battery Board I to ensure **charger** voltage stabilizes between 131.5 and 137.5 volts.<br>COMMENTS: | ___ SAT<br>___ UNSAT |
| STEP 17.: [15] VERIFY 0-EI-250-KE3-D Battery Board 1 Voltmeter is within 5 volts of 0-EI-250-KE1-D spare charger voltage.<br>***Cue:*** ***Battery Board voltage at 134 volts,***<br>***Battery Charger voltage at 134 Volts.***<br>STANDARD: Operator checks Battery Board Volt meters to Battery Board Voltage within 5 volts of charger voltage.<br>COMMENTS: | ___ SAT<br>___ UNSAT |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| **Note:** Placing either of the following breakers in the OFF position will result in annunciator window 1, 2-XA-55-1C (A4) actuation. | |
| STEP 18.: [16] PLACE the following breakers in OFF position on Charger I to shutdown charger.<br>A) 0-BKRC-250-QE/01-D, 125V DC BATT CHGR I INPUT AC BKR in OFF position<br>B) 0-BKRC-250-QE/02-D, 125V DC BATT CHGR I OUTPUT DC BKR in OFF position<br>**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.**<br>***Cue:*** ***Respond as Unit Operator if called and acknowledge report of incoming alarm.***<br>***Cue:*** ***a) AC POWER breaker is in the DOWN, OFF position***<br>***b) DC POWER breaker is in the DOWN, OFF position.***<br>STANDARD: Operator locates the #1 VB Charger and places the AC and DC power breakers in the down, OFF position.<br>This step is critical to shut down the charger and place in condition requested by Maintenance.<br>COMMENTS: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 19.: INFORM the Unit 1 SRO that the #1 VB charger is out of service.<br>STANDARD: Operator informs the Unit 1 SRO that the #I VB charger is out of service.<br>***Cue:*** **This completes the JPM**<br>**Comments:** | ___ SAT<br>___ UNSAT<br>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.

## 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 ≈ 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.<br>STANDARD: Operator obtains a copy of EA-3-10. | ___ SAT<br>___ UNSAT<br>Start Time____ |
| STEP 2.: SELECT applicable unit and pump.<br>STANDARD: Operator checks Unit 1 and MD AFW Pump B-B. | ___ SAT<br>___ UNSAT |
| STEP 3.: If starting MD AFW pump locally....<br>***Cue:*** ***IF asked: Pump is running.***<br>STANDARD: Operator N/As this step. | ___ SAT<br>___ UNSAT |
| STEP 4.: IF MD AFW LCV valve or controller failure has occurred, THEN GO TO Section 4.3.<br>STANDARD: Operator goes to section 4.3. | ___ SAT<br>___ UNSAT |

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].<br>**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.**<br>**NOTE: This step is considered part of operator knowledge and the specific actions are not addressed by the procedure.**<br>**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.**<br>**NOTE: LCV-3-148 controller is located on panel L-11B.**<br>***Cue:*** ***1. If the manual button is depressed, inform the operator that the amber light illuminates and the auto green light goes out.***<br>***2. Controller output needle is to the far right.***<br>***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.***<br>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.)<br>**NOTE: This starts the alternate path** | ___ SAT<br>___ UNSAT |
| STEP 6.: If Step 4.3.1 has restored MD AFW flow, THEN:<br>STANDARD: Operator should N/A this step. | ___ SAT<br>___ UNSAT |
| STEP 7.: Establish communications with U-1 MCR UO.<br>***Cue:*** ***If guidance is requested, direct AUO to locally isolate AFW flow to # 3 S/G per EA-3-10.***<br>STANDARD: Operator establishes communications with U-1 MCR UO. | ___ SAT<br>___ UNSAT |

Job Performance Checklist:

| STEP/STANDARD | SAT/UNSAT |
|---|---|
| STEP 8.: Close upstream or downstream AFW LCV isolation valve for # 3 S/G.<br>**Cue:** ***Valve handwheel moves several turns in the clockwise direction. IF operator calls MCR: Give AFW flow to # 3 S/G as zero gpm.***<br>**NOTE:** **VLV-3-826 is at Aux Bldg, elev 714, AFW mezzanine**<br>**VLV-3-834 is above WVVR entrance.**<br>STANDARD: Operator unlocks and closes VLV-3-826, or VLV-3-834 for # 3 S/G.<br>**This step is critical to isolate the flowpath of the failed open valve.** | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 9.: NOTIFY UO to ensure MD AFW pumps running.<br>**Cue:** ***Both MDADW pumps are running.***<br>STANDARD: Operator checks with Unit 1 UO to ensure pumps running. | ___ SAT<br>___ UNSAT |
| STEP 10.: CONTROL S/G level as directed by UO by throttling AFW LCV isolation valve.<br>**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.***<br>STANDARD: Operator simulates turning valve handwheel 3 turns to the right to make adjustments as necessary to 3-826 or 3-834.<br>**This step is critical to set the required flow to maintain adequate heat sink.** | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 11.: Notify UO to operate pump recirculation valves FCV-3-400, 401.<br>**Cue:** ***Role play as UO and report that recirculation valves have been operated***<br>STANDARD: Operator informs the UO to operate valves. | ___ SAT<br>___ UNSAT |

# 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 ≈ 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.

## 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 ≈ 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

**QUALITY RELATED**

VFU
Today
aB

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).

Master

## 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 open and the bypass LCVs fail closed.

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 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. 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.<br>STANDARD: 2-SO-90-2 Section 8.3 is identified as appropriate procedure.<br>COMMENT: | ___ SAT<br>___ UNSAT<br>Start Time_____ |
| STEP 2.: [1] ENSURE 2-RM-90-112 Upper Containment Rad Monitor in service per the following:<br>[a] Valve checklist 2-90-2.03 (Attachment 3) complete.<br>***Cue:*** ***If asked Valve checklist is complete.***<br>STANDARD: Candidate notes that valve checklist is signed-off<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 3.: [b] Pump running (Section 5.1).<br>**NOTE: The rad monitor flow alarms will not reset until the operator manually resets the alarms as indicated in the cues.**<br>STANDARD: Operator determines that pump is NOT running and goes to Section 5.1.<br>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:<br>STANDARD: Operator checks 2-RM-90-112.<br>Comment: | ______ SAT<br>______ 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.<br>STANDARD: Operator indicates that 2-RM-90-112 valve checklist 2-90-2.03 Attachment 3 is complete.<br>Comment: | ______ SAT<br>______ UNSAT |
| STEP 6.: [3] IF placing 2-RM-90-106 in service THEN……..<br>STANDARD: Operator N/As this step<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 7.: [4] ENSURE radiation monitor heat trace is in service for monitor being placed in service (N/A monitor not required)<br>STANDARD: Operator N/As 2-RM-90-106 portion of step. Operator places 2-HS-90-112 to the ON position.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 8.: [5] IF testing heat trace circuit, THEN PERFORM Section 8.4 AND RETURN TO step [6]<br>***Cue:*** ***Testing heat tracing IS complete.***<br>STANDARD: Operator acknowledges that heat trace circuit testing is complete and continues with next step.<br>COMMENT: | |
| STEP 9.: [6] COORDINATE with MIG to place 2-RM-90-106 or 112 sample pumps In Service.<br>***Cue:*** ***Unit 2 CRO will coordinate with MIG.***<br>STANDARD: Coordination set up with MIG.<br>COMMENT: | ___ SAT<br>___ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 10.: [7] ESTABLISH flow through radiation monitor by performing the following steps:<br>[a] IF starting 2-RM-90-112 sample pump, THEN DEPRESS one of the following local start buttons<br>***CUE:*** **MIG has aligned the #1 sample pump for service.**<br>STANDARD: Operator locates and indicates that HS-90-112A has been depressed.<br>This step is critical because it is required to start sample pump.<br>COMMENT: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 11.: [b] IF starting 2-RM-90-106 sample pump, THEN ..<br>STANDARD: Operator N/As this step<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 12.: [c] NOTIFY I & C to adjust flow as required.<br>***Cue:*** ***I & C has been contacted and will monitor flow.***<br>STANDARD: Operator contacts I & C for support.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 13.: [d] IF flow cannot be established through the Rad Monitor THEN.........<br>***Cue:*** ***Flow has been established through 2-RM-90-112.***<br>STANDARD: Operator N/As this step<br>COMMENT: | ___ SAT<br>___ 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.<br>STANDARD: Operator resets local low flow seal-in by turning [2-HS-90-112F] to the left to reset.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 15.: [f] ENSURE MCR malfunction alarms are RESET:<br>***Cue:*** ***Role play as Unit 2 CRO and state that alarms 2-RA-90-112B and 112C are RESET***<br>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.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 16.: [g] IF placing RM-90-106 in service THEN.........<br>STANDARD: Operator N/As step.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 17.: [8] IF performing source check of rad monitor, THEN......<br>***Cue:*** ***Source check will not be performed at this time.***<br>STANDARD: Operator returns to Section 8.3, Step [1] [c]<br>COMMENT: | ___ SAT<br>___ 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.<br>**Cue:** ***HS is in the ON position, based on performance of Section 8.4***<br>STANDARD: Operator determines 2-HS-90-112 heat trace is on based on prior performance of Section 8.4 steps.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 19.: [2] If testing the heat trace circuit, THEN……<br>STANDARD: Operator N/As step, since heat trace was tested previously.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 20.: [3] If 2-RE-90-112 background count rate is less than 9000 cpm THEN……<br>**Cue:** ***Source check is not required.***<br>STANDARD: Operator N/As step.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 21.: [4] OPEN 2-ISIV-90-283G Crosstie Valve Between Upper and Lower Compartment Rad Monitors.<br>**Cue:** ***Valve turns CCW several turns then stops.***<br>STANDARD: Valve 2-ISIV-90-283G located & opened, handwheel turned as far left (counter-clockwise) as possible.<br>This is a critical task to place the rad monitor in service<br>COMMENT: | ___ SAT<br>___ UNSAT<br>**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.<br>***Cue:*** ***Acknowledge report from operator.***<br>STANDARD: Operator contacts MCR and reports procedure steps are completed<br>COMMENT:<br>*Cue:* **This completes the JPM.** | ______ SAT<br>______ UNSAT<br>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. 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).

# 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. 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
# JOB PERFORMANCE MEASURE

## INPLANT K (RO/SRO)

## Local Alignment of 1-RM-90-112 To Lower Containment

## RO/SRO
## JOB PERFORMANCE MEASURE

**Task:** Local Alignment of 1-RM-90-112 to Lower Containment

**Task #:** 0730990101 **(RO);** 0730020104 **(AUO)**

**Task Standard:** Manually align 1-RM-90-112 (locally) to LOWER containment.

**Alternate Path:** **YES:** ____ **NO:** X

**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:**

1-SO-90-2, Sections 5.1 and 8.3

**References:**

| | Reference | Title | Rev No. |
|---|---|---|---|
| 1. | 1-SO-90-2 | Gaseous Process Radiation Monitoring System | 38 |
| | | | |

==========================================================================

# 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. 1-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. 1-RM-90-106 has just tripped and neither of its associated pumps can be started.
3. Precautions, Limitation and 1-SO-90-2 Section 4, Prerequisite Actions, are current, complete and signed off.

## INITIATING CUES:

1. The Unit 1 CRO has directed you, the Unit 1 Aux. Bldg AUO, to align rad. monitor 1-RM-90-112 to sample lower containment per 1-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.<br>STANDARD: 1-SO-90-2 Section 8.3 is identified as appropriate procedure.<br>COMMENT: | ___ SAT<br>___ UNSAT<br>Start Time_____ |
| STEP 2.: [1] ENSURE 1-RM-90-112 Upper Containment Rad Monitor in service per the following:<br>[a] Valve checklist 1-90-2.03 (Attachment 3) complete.<br>***Cue:*** ***If asked Valve checklist is complete.***<br>STANDARD: Candidate notes that valve checklist is signed-off<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 3.: [b] Pump running (Section 5.1).<br>**NOTE:** **The rad monitor flow alarms will not reset until the operator manually resets the alarms as indicated in the cues.**<br>STANDARD: Operator determines that pump is NOT running and goes to Section 5.1.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| **Evaluator Note: The following steps are from 1-SO-90-2, Section 5.1** | |
| STEP 4.: [1] INDICATE below which rad monitor will be placed in service:<br>STANDARD: Operator checks 1-RM-90-112.<br>Comment: | ______ SAT<br>______ 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.<br>STANDARD: Operator indicates that 1-RM-90-112 valve checklist 1-90-2.03 Attachment 3 is complete.<br>Comment: | _____ SAT<br>_____ UNSAT |
| STEP 6.: [3] IF placing 1-RM-90-106 in service THEN........<br>STANDARD: Operator N/As this step<br>COMMENT: | _____ SAT<br>_____ UNSAT |
| **Note 1:** Heat trace handswitches 1-HS-90-106 and 112 are located at the Heat Trace Control Panel [1-JBOX-90-3918], east wall adjacent to 1-RM-90-106.<br>**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 110ºF. | |
| STEP 7.: [4] ENSURE radiation monitor heat trace is in service for monitor being placed in service (N/A monitor not required)<br>STANDARD: Operator N/As 1-RM-90-106 portion of step. Operator places 1-HS-90-112 to the ON position.<br>COMMENT: | _____ SAT<br>_____ UNSAT |
| STEP 8.: [5] IF testing heat trace circuit, THEN PERFORM Section 8.4 AND RETURN TO step [6]<br>***Cue:*** ***Testing heat tracing IS complete.***<br>STANDARD: Operator acknowledges that heat trace circuit testing is complete and continues with next step.<br>COMMENT: | _____ SAT<br>_____ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| STEP 9.: [6] COORDINATE with MIG to place 1-RM-90-106 or 112 sample pumps In Service.<br>**_Cue:_** ***Unit 1 CRO will coordinate with MIG.***<br>STANDARD: Coordination set up with MIG.<br>COMMENT: | ___ SAT<br>___ UNSAT |
| STEP 10.: [7] ESTABLISH flow through radiation monitor by performing the following steps:<br>[a] IF starting 1-RM-90-112 sample pump, THEN DEPRESS one of the following local start buttons<br>***CUE:*** **MIG has aligned the #1 sample pump for service.**<br>STANDARD: Operator locates and indicates that HS-90-112A has been depressed.<br>This step is critical because it is required to start sample pump.<br>COMMENT: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| STEP 11.: [b] IF starting 1-RM-90-106 sample pump, THEN ..<br>STANDARD: Operator N/As this step<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 12.: [c] NOTIFY I & C to adjust flow as required.<br>**_Cue:_** ***I & C has been contacted and will monitor flow.***<br>STANDARD: Operator contacts I & C for support.<br>COMMENT: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

| **STEP / STANDARD** | **SAT / UNSAT** |
|---|---|
| STEP 13.: [d] IF flow cannot be established through the Rad Monitor THEN………<br>***Cue:*** ***Flow has been established through 1-RM-90-112.***<br>STANDARD: Operator N/As this step<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 14.: [e] IF placing [1-RM-90-112] in service , THEN RESET [1-HS-90-112F] local low flow seal-in.<br>STANDARD: Operator resets local low flow seal-in by turning [1-HS-90-112F] to the left to reset.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 15.: [f] ENSURE MCR malfunction alarms are RESET:<br>***Cue:*** ***Role play as Unit 1 CRO and state that alarms 1-RA-90-112B and 112C are RESET***<br>STANDARD: Operator contacts MCR to ensure alarms 1-RA-90-112B, Window A-2 and 1-RA-90-112C, Window A-3 on M12A are DARK. Operator N/As alarms associated with 1-RM-90-106.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 16.: [g] IF placing 1-RM-90-106 in service THEN………<br>STANDARD: Operator N/As step.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 17.: [8] IF performing source check of rad monitor, THEN……<br>***Cue:*** ***Source check will not be performed at this time.***<br>STANDARD: Operator returns to Section 8.3, Step [1] [c]<br>COMMENT: | ______ SAT<br>______ UNSAT |

**Job Performance Checklist:**

| STEP / STANDARD | SAT / UNSAT |
|---|---|
| **Evaluator Note: The following steps are from 1-SO-90-2, Section 8.3:** | |
| STEP 18.: [c] 1-HS-90-112 Heat trace is in the ON position.<br>***Cue:*** ***HS is in the ON position, based on performance of Section 5.1***<br>STANDARD: Operator determines 1-HS-90-112 heat trace is on based on prior performance of Section 5.1 steps.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 19.: [2] If testing the heat trace circuit, THEN......<br>STANDARD: Operator N/As step, since heat trace was tested previously.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 20.: [3] If 1-RE-90-112 background count rate is less than 9000 cpm THEN......<br>***Cue:*** ***Source check is not required.***<br>STANDARD: Operator N/As step.<br>COMMENT: | ______ SAT<br>______ UNSAT |
| STEP 21.: [4] OPEN 1-ISIV-90-283G Crosstie Valve Between Upper and Lower Compartment Rad Monitors.<br>***Cue:*** ***Valve turns CCW several turns then stops.***<br>STANDARD: Valve 1-ISIV-90-283G located & opened, handwheel turned as far left (counter-clockwise) as possible.<br>This is a critical task to place the rad monitor in service<br>COMMENT: | ___ SAT<br>___ UNSAT<br>**Critical Step** |
| | |

# 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. 1-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. 1-RM-90-106 has just tripped and neither of its associated pumps can be started.
3. Precautions, Limitation and 1-SO-90-2 Section 4, Prerequisite Actions, are current, complete and signed off.

## INITIATING CUES:

1. The Unit 1 CRO has directed you, the Unit 1 Aux. Bldg AUO, to align rad. monitor 1-RM-90-112 to sample lower containment per 1-SO-90-2, Section 8.3 steps 1 through 4 (along with any other applicable sections).

# 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. 1-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. 1-RM-90-106 has just tripped and neither of its associated pumps can be started.
3. Precautions, Limitation and 1-SO-90-2 Section 4, Prerequisite Actions, are current, complete and signed off.

## INITIATING CUES:

1. The Unit 1 CRO has directed you, the Unit 1 Aux. Bldg AUO, to align rad. monitor 1-RM-90-112 to sample lower containment per 1-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

# 1-SO-90-2

# GASEOUS PROCESS RADIATION MONITORING SYSTEM

Revision 38

**QUALITY RELATED**

PREPARED/PROOFREAD BY: CWMATHES

RESPONSIBLE ORGANIZATION: OPERATIONS

APPROVED BY: W. T. LEARY

EFFECTIVE DATE: 12/03/09

LEVEL OF USE: **CONTINUOUS USE**

REVISION DESCRIPTION: Revised to add RM-90-400 disconnect switch to the Power Checklist (PCR 08000521). Added reference to 0-PI-OPS-301-001.0 in section 5 and 7 (PCR 07000297). Added section 8.11 and revised 5.3 for the primary sampling pumps alignments ( PCR 09000155, 09000613 & 09001214). Added step in section 8.9 to return sampling to automatic mode. Added LCO reference to section 8.7 ( 07000470). Replaced "MIG" with "I & C" throughout procedure to reflect organization name change. Deleted IV column in power checklist.

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**ATTACHMENT**

## 1.0 INTRODUCTION

### 1.1 Purpose

This Instruction provides the detailed steps necessary for operation of the Gaseous Process Radiation Monitoring System.

### 1.2 Scope

This Instruction provides the steps required for the operation of the following Gaseous Rad Monitors:

A. Containment Bldg Lower Compartment Air Monitor 1-RE-90-106.

B. Containment Bldg Upper Compartment Air Monitor 1-RE-90-112.

C. Shield Bldg Vent Monitor 1-RE-90-400.

D. Condenser Vacuum Pump Air Exhaust Low Range Monitor 1-RE-90-119.

E. Condenser Vacuum Pump Air Exhaust Low Range Monitor 1-RE-90-99.

F. Alignment of Containment Purge Air Exhaust Monitors 1-RE-90-130 and 1-RE-90-131 for operation with “A” Purge Fans.

G. Alignment of Containment Purge Air Exhaust Monitors 1-RE-90-130 and 1-RE-90-131 for operation with “B” Purge Fans.

H. Alignment of Containment Purge Air Exhaust Monitors 1-RE-90-130 and 1-RE-90-131 for operation with “A” and “B” Purge Fans.

## 2.0 REFERENCES

### 2.1 Performance References

None.

### 2.2 Developmental References

A. SOI-90.1B, *Gaseous Process Rad Monitors*

B. SI-2, *Shift Log*

C. NUREG-0737

D. SQN-DC-V-9.0, R3

E. FSAR

1. 9.5.10, *Postaccident Sampling Facility*
2. 11.3, *Gaseous Waste Systems*
3. 11.4, *Process and Effluent Radiological Monitoring System*
4. 15.5, *Environmental Consequences of Accidents*

F. Technical Specifications

1. 3.3.2.1, *Engineered Safety Feature Actuation System Instrumentation*
2. 3.4.6.1, *Leakage Detection System*
3. 3.3.3.1, *Rad Monitoring Instrumentation*

G. Offsite Dose Calculation Manual

## 2.2 Developmental References (Continued)

H. TVA Drawings

1. 47W610-90-1
2. 47W610-90-2
3. 47W610-90-3
4. 47W610-90-5
5. 47W600-106
6. 47W600-464
7. 47W600-465
8. 47W600-104
9. 47W600-494
10. 45N690-1
11. 45N703-1
12. 45N703-2
13. 45N703-5
14. 45N703-6
15. 45N706-1
16. 45N706-2
17. 45N708-4
18. 45N708-5
19. 45N756-1
20. 45N756-2
21. 45N756-6
22. 45N1416-1
23. 45N1620-15
24. 45N1620-18
25. 45N1759-3
26. 45N1620-3
27. 45N1620-4
28. 45N1620-17

## 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 unit 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 19 of LCO 3.3.2, Table 3.3-3 must be complied with before blocking 1-RE-90-130 and 1-RE-90-131 simultaneously during Modes 1, 2, 3, 4, or 6.

G. Moisture accumulation in the 1-90-106 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 1-RM-90-99 or 1-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. 1-RE-90-106/1-RE-90-400 local sample pump handswitches have AUTO-OFF-HAND positions. Normally the 'AUTO' position is used if starting/stopping the pump from the MCR (1-RI-90-106A/1-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.

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

[3] **ENSURE** Power Checklist 1-90-2.01 complete (Attachment 1).

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

| Print Name | Initials |
|---|---|
| | |
| | |
| | |
| | |

[5] **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 1-RM-90-112 to Lower Containment using Section 8.3

Date__________

### 8.3 Alignment of Containment Upper Compartment Monitor to the Lower Compartment

**NOTE 1** Containment Building Lower and Upper Compartment Air Monitors 1-RE-90-106 and 1-RE-90-112 do not initiate CVI.

**NOTE 2** Heat Trace handswitches 1-HS-90-106 and 112 are located at the Heat Trace Control Panel **[1-JBOX-90-3918]**, east wall adjacent to 1-RM-90-106.

[1] **ENSURE** 1-RE-90-112 Upper Compartment Rad Monitor in service per the following:

A. Valve Checklist 1-90-2.03 (Attachment 3) complete. __________

B. Pump Running (Section 5.1). __________

C. **[1-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 activity may mask the source and prevent an upward deflection when source check is performed. Source check of RE-90-112 is not required for T.S operability.

[3] **IF** 1-RE-90-112 background count rate is less than 9,000 cpm,

**THEN**

**PERFORM** Section 8.1 of this Instruction to source check 1-RE-90-112. __________

Date___________

## 8.3 Alignment of Containment Upper Compartment Monitor to the Lower Compartment (Continued)

[4] **OPEN** [1-ISIV-90-283G] Crosstie Valve Between Upper and Lower Compartment Rad Monitors.

_______ 1st _______ IV

[5] **ENSURE** the following FCVs are **OPEN**:

| VALVE | INITIALS | |
|---|---|---|
| 1-FCV-90-108 | _______ 1st | _______ IV |
| 1-FCV-90-109 | _______ 1st | _______ IV |
| 1-FCV-90-107 | _______ 1st | _______ IV |
| 1-FCV-90-117 | _______ 1st | _______ IV |
| 1-FCV-90-116 | _______ 1st | _______ IV |

[6] **ENSURE** [1-RE-90-112] is operable by verifying the following:

- Power "ON" ☐
- 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 1-RE-90-106 and 1-RE-90-112 do not initiate CVI.

[1] **INDICATE** below which Rad Monitor will be placed in service:

| RAD MONITOR | FUNCTION | ☑ |
|---|---|---|
| 1-RE-90-106 | Containment Bldg Lower Compartment Air Monitor | ☐ |
| 1-RE-90-112 | Containment Bldg Upper Compartment Air Monitor | ☐ |

[2] **ENSURE** the following valve checklist(s) completed for Rad Monitor(s) to be placed in service (**N/A** the other):

| RAD MONITOR | FUNCTION | VALVE CHECKLIST | ATTACH NUMBER | INITIALS |
|---|---|---|---|---|
| 1-RE-90-106 | Containment Bldg Lower Compartment Air Monitor | 1-90-2.02 | 2 | ______ |
| 1-RE-90-112 | Containment Bldg Upper Compartment Air Monitor | 1-90-2.03 | 3 | ______ |

Date__________

## 5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

[3] **IF** placing 1-RE-90-106 in service, **THEN**

**ENSURE** 1-ISIV-90-283G Crosstie Valve Between Upper and Lower Compartment Rad Monitors is **CLOSED** (Valve Checklist 1-90-2.03). __________

**NOTE 1** Heat Trace handswitches 1-HS-90-106 and 112 are located at the Heat Trace Control Panel **[1-JBOX-90-3918]**, east wall adjacent to 1-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 the monitor being placed in service (**NA** monitor not required):

| HANDSWITCH | DESCRIPTION | POSITION | INITIALS |
|---|---|---|---|
| 1-HS-90-106 | Heat Trace for 1-RE-90-106 activated | ON | ________ |
| 1-HS-90-112 | Heat Trace for 1-RE-90-112 activated | ON | ________ |

[5] **IF** testing the 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 1-RM-90-112 sample pumps when placing in service or swapping pumps due to vacuum switches.

[6] **COORDINATE** with I & C to place 1-RM-90-106 or 112 sample pumps In Service.

[7] **ESTABLISH** flow through radiation monitor by performing the following steps:

[a] **IF** starting [1-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 [1-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 per 1-PI-IPM-90-106.0. __________

Date__________

## 5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

3. **DEPRESS** one of the following pushbuttons, **AND CHECK** PB illuminated: (**N/A** other)

| LOCATION | UNID | PUSHBUTTON | PB ILLUMINATED √ | INITIALS |
|---|---|---|---|---|
| Local | 1-RI-90-106B | FLOW | ☐ | ________ |
| MCR | 1-RI-90-106A | FLOW | ☐ | ________ |

**[c]** **NOTIFY** I & C to adjust flow in accordance with 1-SI-IFT-090-112.0, Functional Test of Containment Building Upper Compartment Air Monitor 1-R-90-112. ☐

**[d]** **IF** flow cannot be established through the Rad Monitor, **THEN**

**NOTIFY** Unit Operator. ________

**[e]** **IF** placing **[1-RM-90-112]** in service, **THEN**

**RESET** **[1-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 |
|---|---|---|---|
| 1-RA-90-106B | 0-XA-55-12A | A-5 | ________ |
| 1-RA-90-106C | 0-XA-55-12A | A-6 | ________ |
| 1-RA-90-112B | 0-XA-55-12A | A-2 | ________ |
| 1-RA-90-112C | 0-XA-55-12A | A-3 | ________ |

**[g]** **IF** placing **[1-RM-90-106]** in service, **THEN** **VERIFY** acceptable flow by verifying green 'OPER' LED indicators **ILLUMINATED** either 1-RI-90-106B (local) or 1-RI-90-106A (MCR). ________

Date________

## 5.1 Placing Containment Building Upper and Lower Compartment Air Monitors in Service (Continued)

**NOTE** If placing 1-RM-90-106 OR 112 in service and background activity 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**