Watts Bar Nuclear Plant

NRC Exam 2013-302

System JPM **A**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE

A

NRC EXAM 2013-302

EVALUATION SHEET

Task: Transfer from Aux Feedwater LCV to Bypass Reg Valve during Startup.

Alternate Path: n/a

Facility JPM #: New

Safety Function: 4S **Title:** Heat Removal From Reactor Core - Secondary System

K/A 059 A4.08 Ability to manually operate and/or monitor in the control room: Feed regulating valve controller.

Rating(s): 3.0/2.9 **CFR:** 41.7/45.5 to 45.8

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: 1-SOI-3.02, “Auxiliary Feedwater System," Rev. 2.

Task Number: RO-003-SOI-3.02-012 **Title:** Transfer SG level control from Auxiliary to Main Feedwater.

Task Standard: The applicant performs the actions required to transfer feedwater supply from 1-1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A to 1-LIC-3-48A, SG 2 MFW BYPASS REG CONTROL.

Validation Time: 20 minutes **Time Critical:** Yes _____ No **X**

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Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 305 by performing the following actions:**
   a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   b. **Locate IC# 305.**
   c. **Right "click" on IC# 305.**
   d. **Select Reset on the drop down menu.**
   e. **Right "click" on RESET.**
   f. **Enter the password for IC# 305.**
   g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   h. **Perform SWITCH CHECK.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	fw27c	lcv-6-105a fail position	M		00:00:00	00:00:00	00:00:00		100	100
	fw27d	lcv-6-105b fail position	M		00:00:00	00:00:00	00:00:00		100	100
	fw28b	lcv-6-190ba fail position	M		00:00:00	00:00:00	00:00:00		100	100
	mux_01c047	36-d heater a5 level hi/lo (ls-6-133a/b)	M		00:00:00	00:00:00	00:00:00		On	On
	mux_01c048	37-d heater b5 level hi/lo (ls-6-153a/b)	M		00:00:00	00:00:00	00:00:00		On	On
	mux_01c049	37-d heater c5 level hi/lo (ls-6-172a/b)	M		00:00:00	00:00:00	00:00:00		On	On

4. **ENSURE "Extra Operator" is present in the simulator.**
5. **PLACE simulator in "FREEZE" until Examiner cue is given.**

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READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **Unit 1 is at approximately 2.5% power, with a startup in progress.**

2. **The motor driven AFW pumps are in service, with SG 2, 3, and 4 LCVs in AUTO controlling SG level. SG 1 AFW LCV is in MANUAL and CLOSED.**

3. **SG 1 Bypass Reg valve is in AUTO, controlling level.**

3. **Main Feedwater System is in Long Cycle Recirculation.**

4. **You are the control room operator.**

INITIATING CUES:

The Unit Supervisor directs you to transfer from Auxiliary Feedwater LCV to Bypass Reg valve control on SG 2 using 1-SOI-3.02, “Auxiliary Feedwater System,” Section 8.11, "Transfer SG Level Control from Auxiliary to Main Feedwater," beginning at Step 3.

Notify the Unit Supervisor when transfer from AFW LCV to SG 2 Bypass Reg valve control is complete.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

NOTES

1) One SG level LCV / Bypass Reg Valve control should be transferred at a time. SG level should be stable BEFORE proceeding to the next SG.

2) Actions taken in Step 8.11[3] should correlate with expected responses in Step 8.11[4].

STEP 1: [3] **PLACE** Bypass Reg Valves in MANUAL **AND SLOWLY OPEN** valves [1-M-3]: (**NA** valves **NOT** needed): [3.2] 1-LIC-3-48A, SG 2 MFW BYPASS REG CONTROL STANDARD: ____Applicant locates 1-LIC-3-48A, SG 2 MFW BYPASS REG CONTROL and slowly opens the valve by depressing the >> pushbutton repeatedly until an increase in flow is observed on 1-FI-3-238 SG 2 BYPASS FLOW. **(Critical).** **Step is critical to establish main feedwater flow to SG 2.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

NOTE

Aux Feedwater SG LCVs may be placed in MANUAL prior to 8.11[5] if required to maintain SG levels on program.

STEP/STANDARD	SAT/UNSAT

STEP 2: [4] **ENSURE** the following Aux Feedwater SG LCVs close as required to maintain SG levels on program [1-M-4]: (**N/A** valves **NOT** needed)

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A		1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A		1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD:

____Applicant locates 1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A, and observes OUTPUT indicator moving to the left, indicating that the valve is closing. **(Critical).**

Step is critical to determine that 1-LIC-3-156A is responding properly.

COMMENTS:

EXAMINER: Based on the NOTE preceding Step 4, the applicant may place 1-LIC-3-156A in MANUAL and CLOSE the LCV if SG 2 level is off program level.

If the applicant elects to close the valve manually, THEN the following actions will be required:

_____Applicant depresses the R/M pushbutton on 1-LIC-3-156A to place the controller in MANUAL.

_____Applicant moves the “slider” control to the left to close the LCV.

NOTES

1) One SG level LCV / Bypass Reg Valve control should be transferred at a time. SG level should be stable BEFORE proceeding to the next SG.

2) Actions taken in Step 8.11[3] should correlate with expected responses in Step 8.11[4].

NOTES

Aux Feedwater SG LCVs may be placed in MANUAL prior to 8.11[5] if required to maintain SG levels on program.

STEP/STANDARD	SAT/UNSAT

STEP 4: [4] **ENSURE** the following Aux Feedwater SG LCVs close as required to maintain SG levels on program [1-M-4]: (**N/A** valves **NOT** needed)

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A		1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A		1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	

___ SAT
___ UNSAT

STANDARD:

Applicant observes 1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A, and observes OUTPUT indicator moving to the left, indicating that the valve is closing.

Applicant observes flow lowering on 1-FI-3-155A, AFW FLOW TO SG 2 and/or 1-FI-3-155B, AFW FLOW TO SG 2.

COMMENTS:

STEP 5: [5] **WHEN** AFW LCV is approx 5% open, **THEN PLACE** controller in MANUAL **AND CLOSE** the following, as needed [1-M-4]: (**NA** valves **NOT** needed)

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A		1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A		1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	

___ SAT
___ UNSAT

STANDARD:

Applicant locates 1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A and observes position indication at approximately 5%, then moves the "slider" to the left to fully close 1-LCV-3-156A.

COMMENTS:

STEP/STANDARD	SAT/UNSAT
STEP 6: [6] **WHEN** SG level stable and on Program, **THEN PLACE** Bypass Reg Controller in AUTO [1-M-3]: (**NA** valves **NOT** needed) [6.2] 1-LIC-3-48A, SG 2 MFW BYPSS REG CONTROL STANDARD: Applicant observes 1-LI-3-55, SG 2 LEVEL, 1-LI-3-52, SG 2 LEVEL, 1-LI-3-51, SG 2 LEVEL and based on the indications may place 1-LIC-3-48A, SG 2 MFW BYPASS REG CONTROL in AUTO by depressing the "AUTO/MANUAL" pushbutton and observing the BLUE AUTO light LIT. COMMENTS:	___ SAT ___ UNSAT
STEP 7: Applicant notifies the Unit Supervisor that the transfer from AFW LCV to BYPASS REG VALVE for SG 2 has been completed. STANDARD: Applicant notifies the Unit Supervisor. ***CUE: When the applicant notifies the Unit Supervisor that the transfer is complete, repeat back the statement.*** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

A

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **Unit 1 is at approximately 2.5% power, with a startup in progress.**

2. **The motor driven AFW pumps are in service, with SG 2, 3, and 4 LCVs in AUTO controlling SG level. SG 1 AFW LCV is in MANUAL and CLOSED.**

3. **SG 1 Bypass Reg valve is in AUTO, controlling level.**

3. **Main Feedwater System is in Long Cycle Recirculation.**

4. **You are the control room operator.**

INITIATING CUES:

The Unit Supervisor directs you to transfer from Auxiliary Feedwater LCV to Bypass Reg valve control on SG 2 using 1-SOI-3.02, "Auxiliary Feedwater System," Section 8.11, "Transfer SG Level Control from Auxiliary to Main Feedwater," beginning at Step 3.

Notify the Unit Supervisor when transfer from AFW LCV to SG 2 Bypass Reg valve control is complete.

Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

1-SOI-3.02

Auxiliary Feedwater System

Revision 0002

Quality Related

Level of Use: Continuous Use

VFU
Today
DAH

Effective Date: 06-05-2013

Responsible Organization: OPS, Operations

Prepared By: R. C. Davidson

Approved By: Ryan Nessell

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0	04/16/13	ALL Attachment 1H page 1	New procedure developed from SOI-3.02. Corrected location for 1-XS-77-2561 [PER644658-001]
1	05/10/13	2, 53-55	Added steps in Section 8.7 to lockout AFW Pumps prior to vent. [PER 666491]
2	06/05/13	2, 75 ATT-1V ATT-1H	Minor/editorial revision to change reference location of 1-XS-77-2561 from 1-M-4 to VBB RM III [PER 678083-001] Changed C6 & 7 to refer to SOER 84-003 [PCR 6843] Added TDAFW Pump Room Fan Handswitches to ATT-1H. [PCR 6837] Ensured sign off blocks shaded and IV removed for components configured IAW 0-PI-OPS-17.0. [PCR 7051]

Table of Contents

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EXTERNAL ATTACHMENTS

Attachment 1P: Power Checklist 3.02-1P

Attachment 1V: Valve Checklist 3.02-1V

Attachment 1H: Handswitch Checklist 3.02-1H

1.0 INTRODUCTION

1.1 Purpose

Provide instructions for operation of the Auxiliary Feedwater (AFW) System.

1.2 Scope

This Instruction includes startup and shutdown of the following equipment:

A. Motor Driven Auxiliary Feedwater Pumps

B. Turbine Driven Auxiliary Feedwater Pump

2.0 REFERENCES

2.1 Performance References

A. TI-4, Part III, Plant Curve Book-Pump Curves

B. Chemistry Manual

C. 0-PI-OPS-17.0, 18 Month Locked Valve Verification

2.2 Developmental References

A. 1-SI-3-80, 18 Month Channel Calibration Of Auxiliary Feedwater Pump 1A-A Differential Pressure Loops 1-LPP-3-122C and 1-LPP-3-122A

B. 1-SI-3-81, 18 Month Channel Calibration Of Auxiliary Feedwater Pump 1B-B Differential Pressure Loops 1-LPP-3-132C and 1-LPP-3-132A

C. 1-AOI-7 series, Maximum Probable Flood

D. FSAR 10.4.9, Auxiliary Feedwater System

E. GOI-7, Section 5.16, Pump Pre-Startup and Post Startup Guidelines

F. WBN-VTM-DR04-0240 Vendor Technical Manual for Dresser-Rand (formerly Ingersoll-Rand, Turbine Driven Auxiliary Feedwater Pumps)

G. WBN-VTM-I075-0070 Vendor Technical Manual for Ingersoll-Rand Motor Driven Auxiliary Feedwater Pumps

H. TI-57.002, Verification of Normal Position for Nor-Aux Switches

I. Tech Specs

J. TVA Drawings:
1-45N600-3-1, -2, -3, -4, -11
1-45N706-1, -2, -3, -4
1-45W600-46-6
1-45W703-5, -6, -7, -8
1-45W760-3-1, -2, -3, -4, -5
1-47W600-221, -221C
1-47W610-3-3
1-47W803-2, -3
1-47W804-1

3.0 PRECAUTIONS AND LIMITATIONS

A. Work in Radiologically Controlled Areas (RCAs) requires the use of existing Radiation Work Permits (RWPs) and may require additional ALARA Preplans. Failure to follow posted radiological control requirements can cause unnecessary radiation exposure. Radiation Protection should be notified of work having the potential to change radiological conditions.

B. Instrument maintenance department should be notified to ensure required instrumentation is placed in service to support system operation.

C. Pump recirculation valves must remain LOCKED OPEN.

D. If Motor Driven AFW Pump suction pressure falls below 1.2 psig (A Train) or 2.0 psig (B Train) for 10 seconds, the suction supply will shift to ERCW. The Turbine Driven AFW Pump suction supply will shift to ERCW at the same time the associated train's MDAFW Pump suction supply shifts.

E. AFWT rated speed is 3950 rpm; minimum speed is 2076 rpm.

1. Electrical Overspeed TRIP at 4345 rpm (110%)
2. Mechanical Overspeed TRIP at 4937.5 rpm (125%).

F. A visual check is required to verify the Trip and Throttle (T&T) valve motor operator is latched to the valve stem after resetting to ensure the valve will OPEN on an automatic pump start signal. [C.3, C.5, C.8]

G. When charging a cold steam line to AFWT, the valve should be locally throttled to warm the line slowly to avoid water hammer.

H. Tech Spec 3.7.5 requires all AFW Pumps OPERABLE in MODES 1, 2, and 3, and only 1 MD AFW Pump required OPERABLE in MODE 4 when either of its supplied steam generators is relied upon for heat removal.

I. Main Steam must be at or above 125 psig for TD Pump to be OPERABLE.

J. The following computer points indicate backleakage in each loop supply piping:

Loop 1 - log T-2425 (variable)	Loop 3 - log T-2427 (190°F)
Loop 2 - log T-2426 (190°F)	Loop 4 - log T-2428 (variable)

Backleakage may cause steam binding of AFW Pump(s) or water/ steam hammer on pump start. If loop piping exceeds the computer high temp alarm limit, total flow rate to affected loop should be minimized until temp is below the high limit, unless a valid emergency start condition exists. Consideration should be given to periodic operation of appropriate AFW Pump(s) to maintain cooling for affected piping. (Memo T28 950512 812)

3.0 PRECAUTIONS AND LIMITATIONS (continued)

K. After each MD AFW Pump start, its respective 6.9kV ACB closing spring must be checked to ensure it is charged. [C.10]

L. An operator with no other duties will be assigned to initiate AFW any time the auto initiation circuits are inoperable. Engineering or Maintenance personnel must notify the Shift Manager (SM) if this condition exists. [C.8]

M. Excessive RCS cooldown is possible when using the AFW System.

N. Any time Turbine Driven or Motor Driven AFW Pumps are running, oil level and temperature should be checked frequently. Pumps must be TRIPPED if pump bearing oil temperature exceeds 165°F. The cause of overheating should be determined and corrected prior to resuming pump operation.

O. Turbine Bearing Oil pressure should be above 15 psig and Turbine Bearing Oil temperature below 180°F. TD AFW Pump should be TRIPPED if Turbine Bearing Oil Temperature exceeds 200°F.

P. When SGs are above 212°F, backleakage to the AFW system can lead to pump steam binding. AUO rounds require periodic checking of the pumps for this condition. Venting is required until the cause is found and corrected whenever this condition occurs. [C.1, C.2, C.4, C.6, C.7]

Q. 4" LCVs from the Motor Driven AFW Pumps auto close when Feedwater header pressure drops below 500 psig to prevent cavitation damage to the LCV.

R. Low flow operation of both motor and turbine driven AFW pumps must be minimized to prevent possible degradation of pump impeller. Main Feedwater System should be utilized for low flow conditions if available.

S. The minimum pressure that the backup nitrogen supply bottles can reach and still supply the required volume to cycle one train of LCVs five times is 1085 psig. Bottles should be changed out when pressure lowers to 1200 psig or below.

T. With the additional recirculation line in service, use of the Motor driven pump(s) (if available), is preferred over the use of the Turbine driven pump during low flow conditions when the AFW demand is within the capability of the Motor driven pump(s).

U. SGBD isolation will initially raise indicated Calorimetric Power associated with the resulting feedwater flow transient. It may take several minutes for Calorimetric Power and Feedwater Flow to stabilize at their new lower values. [C.11]

3.0 PRECAUTIONS AND LIMITATIONS (continued)

V. The turbine lube oil level in the sight glass is expected to drop out of the marked fill band while the turbine is operating, but oil level should remain visible in the sight glass at all times.

W. When the NOR-AUX transfer switches for the AFW controllers are in the NOR position, the master level controller for each SG at the local station (TD pump) and in the Aux Control room (MD pump) can be operated in MANUAL if the corresponding MCR controllers are selected to AUTO. Placing the master controller(s) in MANUAL will override the MCR controllers (if they are in AUTO) & allow control from the master controller if necessary. Likewise, placing the MCR controllers in MANUAL will override the master controllers & allow manual control from the MCR controller if necessary, even if the master controller is also in MANUAL. A green light on a controller indicates AUTO mode on that controller; a red light indicates MANUAL mode on that controller. The left amber light on a MCR controller indicates that the MCR controller is in control; the right amber light on a MCR controller indicates that the master controller is in control. Master controller amber lights are **NOT** operable.

X. Loss of power to the control circuits for the MDAFW LCVs or TDAFW LCVs or master flow controller will result in the controller swapping to MAN after power is restored. Operator action will be required to **GO TO** the master controller (Aux. Control Rm. for MD AFW, local control station on El. 692 for TD AFW), match the setpoint and controller output, then place the controller back in AUTO. Checking MCR controllers after placing master controllers in AUTO is also recommended for the affected AFW controllers, to ensure they are also in AUTO.

Date Today Initials

4.0 PREREQUISITE ACTIONS

NOTES

1) Signoffs/ information in unused sections may be left blank.
2) Throughout this instruction where **IF/THEN** exists, the step is **N/A** if the condition does **NOT** exist.
3) Throughout this instruction, Concurrent Verification (CV) may be marked **N/A** for breaker or fuse steps where **NO** manipulation is performed.

4.1 Preliminary Actions

[1] **INDICATE** Section to be used, and the reason:

5.0	Standby Alignment	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	N/A	8.0	Infrequent Operations	B.11

Section/Reason/Remarks: Transfer from Aux feed LCV's to Bypass Reg valves

4.2 Field Preparations

[1] **REVIEW** Plant procedures, processes, and programs in progress to ensure accurate configuration of components necessary for System operation. DAH

[2] **ENSURE** AFWT Room sump pumps are in service. DAH

[3] **ENSURE** CST meets chemical requirements of destination per Chemistry Manual. DAH

[4] **ENSURE** ERCW valves to AFW Pumps CLOSED. DAH

4.3 Approvals and Notifications

[1] **COORDINATE** system operations/manipulations with Unit Operator (UO). DAH

Date Today Initials

8.11 Transfer SG Level Control from Auxiliary to Main Feedwater

[1] **ENSURE** Main Feedwater is aligned and appropriate number of pumps running to maintain SG levels for long cycle deaeration/ recirc operation at present SG pressure. DAH

[2] **PLACE** the following Aux Feedwater SG LCVs controls in AUTO as needed [1-M-4]: (**NA** valves **NOT** needed)

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A	✓	1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	N/A
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A	✓	1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	N/A
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	N/A
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	N/A

NOTES

1) One SG level LCV / Bypass Reg Valve control should be transferred at a time. SG level should be stable BEFORE proceeding to the next SG.

2) Actions taken in Step 8.11[3] should correlate with expected responses in Step 8.11[4].

[3] **PLACE** Bypass Reg Valves in MANUAL **AND**

SLOWLY OPEN valves [1-M-3]: (**NA** valves **NOT** needed)

[3.1] 1-LIC-3-35A, SG 1 MFW BYPASS REG CONTROL DAH

[3.2] 1-LIC-3-48A, SG 2 MFW BYPASS REG CONTROL

[3.3] 1-LIC-3-90A, SG 3 MFW BYPASS REG CONTROL

[3.4] 1-LIC-3-103A, SG 4 MFW BYPASS REG CONTROL

Date Today **Initials**

8.11 **Transfer SG Level Control from Auxiliary to Main Feedwater (continued)**

NOTE

Aux Feedwater SG LCVs may be placed in MANUAL prior to 8.11[5] if required to maintain SG levels on program.

[4] **ENSURE** the following Aux Feedwater SG LCVs close as required to maintain SG levels on program [1-M-4]:
(**N/A** valves **NOT** needed) _____

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A	✓	1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	N/A
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A		1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	N/A
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	N/A
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	N/A

[5] **WHEN** AFW LCV is approx 5% open, **THEN**

PLACE controller in MANUAL **AND**

CLOSE the following, as needed [1-M-4]:
(**NA** valves **NOT** needed) _____

MOTOR DRIVEN PUMP LCVs	√	TURBINE DRIVEN PUMP LCVs	√
1-LIC-3-164A, SG 1 SUPPLY FRM PMP A-A	✓	1-LIC-3-174A, SG 1 SUPPLY FRM T-D PMP	N/A
1-LIC-3-156A, SG 2 SUPPLY FRM PMP A-A		1-LIC-3-173A, SG 2 SUPPLY FRM T-D PMP	N/A
1-LIC-3-148A, SG 3 SUPPLY FRM PMP B-B		1-LIC-3-172A, SG 3 SUPPLY FRM T-D PMP	N/A
1-LIC-3-171A, SG 4 SUPPLY FRM PMP B-B		1-LIC-3-175A, SG 4 SUPPLY FRM T-D PMP	N/A

Date Today **Initials**

8.11 Transfer SG Level Control from Auxiliary to Main Feedwater (continued)

[6] **WHEN** SG level stable and on Program, **THEN**

PLACE Bypass Reg Controller in AUTO [1-M-3]:
(**NA** valves **NOT** needed)

[6.1]	1-LIC-3-35A, SG 1MFW BYPSS REG CONTROL	DAH
[6.2]	1-LIC-3-48A, SG 2 MFW BYPSS REG CONTROL	_____
[6.3]	1-LIC-3-90A, SG 3 MFW BYPSS REG CONTROL	_____
[6.4]	1-LIC-3-103A, SG 4 MFW BYPSS REG CONTROL	_____

NOTE

Step 8.11[7] is performed as directed from 1-GO-2 during initial startup.

[7] **PERFORM** the following, as required, to return AFW to STANDBY alignment:

[7.1]	**GO TO** Section 8.1.4 for MD AFWP A-A.	_____
[7.2]	**GO TO** Section 8.1.5 for MD AFWP B-B.	_____
[7.3]	**GO TO** Section 8.1.6 for TD AFWP.	_____

End of Section

Watts Bar Nuclear Plant

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System JPM **B**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
B
NRC EXAM 2013-302
EVALUATION SHEET

Task: Align ECCS pumps by performing ES-1.3, "Transfer to Containment Sump."

Alternate Path: During performance of ES-1.3, Transfer to Containment Sump," the applicant will be unable to fully open 1-FCV-63-73, requiring the 1B-B RHR Pump to be placed in STOP, PULL-TO-LOCK.

Facility JPM #: 3-OT-JPM 021(Modified)

Safety Function: 3 **Title:** Reactor Pressure Control

K/A EA1.11 Ability to operate and monitor the following as they apply to a Large Break LOCA: Long-term core cooling.

Rating(s): 4.2/4.2 **CFR:** 41.7 / 45.5 / 45.6

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: ES-1.3, "Transfer to Containment Sump," Rev. 18

Task Number: RO-113-ES-1.3-001 **Title:** Perform transfer to Containment sump.

Task Standard: The applicant:

1.) Identifies the failure of 1-FCV-63-73, CNTMT SUMP TO RHR PUMP B SUCT, to OPEN and places the 1B-B RHR Pump in STOP, PULL-TO-LOCK.
2.) Stops one of the two running Containment Spray pumps and aligns for standby.
3.) Aligns the ECCS pumps for containment sump recirculation using ES-1.3, "Transfer to Containment Sump."

Validation Time: 15 minutes **Time Critical:** Yes _____ No **X**

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Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
B
NRC EXAM 2013-302

SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 306 by performing the following actions:**
   - a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   - b. **Locate IC# 306.**
   - c. **Right "click" on IC# 306.**
   - d. **Select Reset on the drop down menu.**
   - e. **Right "click" on RESET.**
   - f. **Enter the password for IC# 306.**
   - g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   - h. **Perform SWITCH CHECK.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	fw27c	lcv-6-105a fail position	M		00:00:00	00:00:00	00:00:00		100	100
	cs06g	air return fan a-a fail to start on phase b	M		00:00:00	00:00:00	00:00:00		Active	Active
	cs06h	air return fan b-b fail to start on phase b	M		00:00:00	00:00:00	00:00:00		Active	Active
	sir14	rwst to rhr pmp flow cntl vlv power, fcv-63-1	R		00:00:00	00:00:00	00:00:00		on	on
	th02c	loca – cold leg loop 3	M	1	00:00:00	00:00:00	00:00:00		100	100
	fw27d	lcv-6-105b fail position	M	19	00:00:00	00:00:00	00:00:00		100	100
	fw28b	lcv-6-190b fail	M	19	00:00:00	00:00:00	00:00:00		100	100
	rh09	fail cnt sump to rhr b fcv-63-73 to position	M	2	00:00:00	00:00:00	00:00:00		25	25

4. **Place simulator in RUN and acknowledge any alarms.**
5. **ENSURE a marked-up copy of ES-1.3, "Transfer to Containment Sump," is available for the Examiner.**
6. **ENSURE the "Extra Operator" is present in the simulator.**
7. **Place simulator in FREEZE until Examiner cue is given.**

SIMULATOR CONTINGENCY ACTIONS:

IF INITIAL CONDITION 306 is unavailable for any reason, the following actions must be taken to reconstruct the IC.

1. **Initialize to IC 50, 100% power BOL.**
2. **Perform switch check.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	fw27c	lcv-6-105a fail position	M		00:00:00	00:00:00	00:00:00		100	100
	cs06g	air return fan a-a fail to start on phase b	M		00:00:00	00:00:00	00:00:00		Active	Active
	cs06h	air return fan b-b fail to start on phase b	M		00:00:00	00:00:00	00:00:00		Active	Active
	sir14	rwst to rhr pmp flow cntl vlv power, fcv-63-1	R		00:00:00	00:00:00	00:00:00		on	on
	th02c	loca – cold leg loop 3	M	1	00:00:00	00:00:00	00:00:00		100	100
	fw27d	lcv-6-105b fail position	M	19	00:00:00	00:00:00	00:00:00		100	100
	fw28b	lcv-6-190b fail	M	19	00:00:00	00:00:00	00:00:00		100	100
	rh09	fail cnt sump to rhr b fcv-63-73 to position	M	2	00:00:00	00:00:00	00:00:00		25	25

4. **Place simulator in RUN and acknowledge any alarms.**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
B
NRC EXAM 2013-302
READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **A large break loss-of-coolant event occurred 22 minutes ago.**
2. **The crew responded using 1-E-1, "Loss of Reactor or Secondary Coolant."**
3. **1-E-1, "Loss of Reactor or Secondary Coolant," Appendix B, "1-FCV-63-1 Breaker Operation," is complete.**
4. **A-A Containment Air Return fan was out-of-service for repairs, and B-B Air Return Fan tripped when it received a start signal. Both Air Return Fans are currently in STOP, PULL-TO-LOCK.**
5. **RWST level is currently approximately 34% and lowering.**
6. **ES-1.3, "Transfer to Containment Sump," was entered and has been performed through Step 4.**

INITIATING CUES:

The Unit Supervisor directs you to complete transfer of the Emergency Core Cooling Pump (ECCS) suctions using ES-1.3, Transfer to Containment Sump," beginning at Step 5.

Notify the Unit Supervisor when transfer to the containment sump has been completed.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 5. **ENSURE** automatic switchover complete: a. **ENSURE** cntmt sump valves 1-FCV-63-72 and 1-FCV-63-73 OPEN. STANDARD: Applicant locates 1-HS-63-72A, CNTMT SUMP TO RHR PMP A SUCT, and determines that the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. Applicant locates 1-HS-63-73A, CNTMT SUMP TO RHR PMP B SUCT, and determines that the valve is in MID-POSITION by observing the RED light is LIT and GREEN light is LIT. Applicant may rotate 1-HS-63-73A, CNTMT SUMP TO RHR PMP B SUCT, to the RIGHT to attempt to manually OPEN the valve. Applicant determines that 1-FCV-63-73A has failed to OPEN and enters the RESPONSE NOT OBTAINED column. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 2: 5.a. **RESPONSE NOT OBTAINED**: **IF** ONE cntmt sump valve can **NOT** be fully opened, **THEN STOP** and **PULL TO LOCK** RHR pump on the associated train. STANDARD: _____Applicant locates 1-HS-74-20A, RHR PMP B (ECCS) and rotates the handswitch to the left to the STOP position, then pulls the handswitch out. **(Critical).** Applicant determines that the 1B-B RHR Pump is off by observing the RED light is DARK and GREEN light is LIT. **Step is critical since 1-FCV-63-73 must be fully open to satisfy the open interlock with 1-FCV-63-11.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 3: 5. **ENSURE** automatic switchover complete: b. **ENSURE** RWST to RHR suction valves 1-FCV-74-3 and 1-FCV-74-21 CLOSED. STANDARD: Applicant locates 1-HS-74-3A, RHR PMP A SUCTION and determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. Applicant locates 1-HS-74-21A, RHR PMP B SUCTION and determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 4: 5. **ENSURE** automatic switchover complete: c. **INITIATE** power restoration to 1-FCV-63-1 USING Appendix A (ES-1.3), 1-FCV-63-1 Breaker Operation. STANDARD: Applicant determines from the INITIAL CONDITIONS that power has been restored to 1-FCV-63-1 during performance of 1-E-1, Appendix B. COMMENTS:	___ SAT ___ UNSAT
CAUTION **If RWST level drops to 8%, then any charging, SI or cntmt spray pump taking suction from the RWST must be stopped.**	
STEP 5: 6. **MONITOR** RWST level greater than 8%. STANDARD: Applicant locates 1-LI-63-50, RWST LEVEL, 1-LI-63-51, RWST LEVEL, 1-LI-63-52, RWST LEVEL and 1-LI-63-53, RWST LEVEL, and determines level is greater than 8%. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 6: 7. **DETERMINE** if cntmt spray should be stopped: a. **MONITOR** cntmt press less than 2.0 psig. STANDARD: Applicant locates 1-PDI-30-42, CNTMT PRESS, 1-PDI-30-43, CNTMT PRESS, 1-PDI-30-43, CNTMT PRESS, and 1-PDI-30-42, CNTMT PRESS, and determines pressure is GREATER THAN 2 psig. COMMENTS:	___ SAT ___ UNSAT
STEP 7: 7.a. **RESPONSE NOT OBTAINED**: a. **WHEN** cntmt press less than 2.0 psig, **THEN PERFORM** Substeps 7b thru e. **GO TO** Step 8. STANDARD: Applicant acknowledges the continuous action step, and proceeds to Step 8. COMMENTS:	___ SAT ___ UNSAT
STEP 8: 8. **DETERMINE** if ONE train cntmt spray should be stopped: a. **CHECK** BOTH trains cntmt spray delivering flow. STANDARD: Applicant observes 1-FI-72-34, CS PMP A FLOW and 1-FI-72-13, CS PMP B FLOW and determines both spray pumps are delivering flow. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 9: 8. **DETERMINE** if ONE train cntmt spray should be stopped: b. **RESET** cntmt spray signal. STANDARD: _____Applicant locates 1-HS-72-43A and depresses the pushbutton to RESET Train A CS signal. Applicant observes RED CS light DARK on 1-XX-55-6C,MASTER ISOLATION SIGNAL STATUS PANEL **OR** _____Applicant locates 1-HS-72-42A and depresses the pushbutton to RESET Train B CS signal. Applicant observes RED CS light DARK on 1-XX-55-6D,MASTER ISOLATION SIGNAL STATUS PANEL **Step is critical to shutdown one containment spray pump to conserve inventory in the RWST while performing ECCS pump swapover.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 10: 8. **DETERMINE** if ONE train cntmt spray should be stopped: c. **STOP** ONE cntmt spray pump **AND PLACE** in A-AUTO. STANDARD: _____Applicant locates 1-HS-72-27A, CNTMT SPRAY PMP A and rotates the handswitch to the LEFT to the STOP position. Applicant observes RED light DARK and GREEN light LIT. **OR** _____Applicant locates 1-HS-72-10A, CNTMT SPRAY PMP B and rotates the handswitch to the LEFT to the STOP position. Applicant observes RED light DARK and GREEN light LIT **Step is critical to shutdown one containment spray pump to conserve inventory in the RWST while performing ECCS pump swapover.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 11: 8. **DETERMINE** if ONE train cntmt spray should be stopped: d. **CLOSE** spray discharge valve for stopped pump. STANDARD: _____Applicant locates 1-HS-72-39A, CNTMT SPRAY HDR A TO CNTMT and rotates the handswitch to the LEFT to the CLOSE position. Applicant observes RED light DARK and GREEN light LIT. **OR** _____Applicant locates 1-HS-72-2A, CNTMT SPRAY HDR B TO CNTMT and rotates the handswitch to the LEFT to the CLOSE position. Applicant observes RED light DARK and GREEN light LIT. **Step is critical to shutdown one containment spray pump to conserve inventory in the RWST while performing ECCS pump swapover.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 12: 9. **MONITOR** RCS press less than 1350 psig. STANDARD: Applicant locates a RCS wide range pressure instrument and determines that pressure is less than 1350 psig. COMMENTS:	___ SAT ___ UNSAT
CAUTION **If a valve fails during the transfer sequence, any corrective action should be postponed UNTIL transfer is complete, EXCEPT as required to satisfy each step.**	
NOTE Each transfer sequence action is identified by a number on the control board (e.g. #1).	

STEP/STANDARD	SAT/UNSAT
STEP 13: 10. (#1) **ISOLATE** SI pump miniflow: • **CLOSE** 1-FCV-63-3. • **CLOSE** 1-FCV-63-175. • **CLOSE** 1-FCV-63-4. STANDARD: _____Applicant rotates handswitch 1-HS-63-3A to the left to the CLOSE position **(Critical).** Applicant determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. _____Applicant rotates handswitch 1-HS-63-175A to the left to the CLOSE position **(Critical).** Applicant determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. _____Applicant rotates handswitch 1-HS-63-4A to the left to the CLOSE position **(Critical).** Applicant determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. **Steps are critical since closure of the recirculation valves prevents radioactive sump water from being pumped to the RWST.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 14: 11. (#2) **ISOLATE** RHR crossties: • **CLOSE** 1-FCV-74-33. • **CLOSE** 1-FCV-74-35. STANDARD: _____Applicant rotates handswitch 1-HS-74-33A to the left to the CLOSE position **(Critical).** Applicant identifies the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. _____Applicant rotates handswitch 1-HS-74-35A to the left to the CLOSE position **(Critical).** Applicant determines that the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. **Step is critical to provide complete separation of the two low-head SI cold leg injection headers. Also, by closing these valves, a desirable increase in the total system resistance is obtained should only one RHR pump be available, since it would deliver to only two RHR branch lines while simultaneously delivering to the suction of the operating charging and SI pumps.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15: 12. (#3) **ALIGN** charging pump and SI pump supply from RHR: • **OPEN** 1-FCV-63-6. • **OPEN** 1-FCV-63-7. • **ENSURE** 1-FCV-63-177 OPEN. STANDARD: _____Applicant rotates handswitch 1-HS-63-6A right to the OPEN position **(Critical).** Applicant identifies the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. _____Applicant rotates handswitch 1-HS-63-7A right to the OPEN position **(Critical).** Applicant identifies the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. Applicant determines 1-HS-63-177A is OPEN observing the RED light is LIT and GREEN light is DARK. **Step is critical since this alignment is required to support long-term cooling from the containment sump.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

NOTE

1-FCV-63-8 and 1-FCV-63-11 are interlocked with the SI pump miniflows being full closed.

STEP/STANDARD	SAT/UNSAT
STEP 16: 13. (#4) **ALIGN** RHR discharge to charging pump and SI pump suction: a. **OPEN** 1-FCV-63-8. STANDARD: _____Applicant rotates handswitch 1-HS-63-8A to the right to the OPEN position **(Critical).** Applicant identifies the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. **Step is critical since this alignment is required to support long-term cooling from the containment sump.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 17: 13. (#4) **ALIGN** RHR discharge to charging pump and SI pump suction: b. **OPEN** 1-FCV-63-11. STANDARD: Applicant determines that 1-HS-63-11A WILL NOT open since the open interlock conditions are not met. Applicant identifies the valve is CLOSED by observing the RED light is DARK and GREEN light is LIT. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 18: 13.b, **RESPONSE NOT OBTAINED:** b. **ENSURE** Train A RHR operation: • Train A RHR pump RUNNING. • 1-FCV-63-8 OPEN. • Either 1-FCV-63-6 or 1-FCV-63-7 OPEN. STANDARD: Applicant locates 1-HS-74-10A, RHR PMP A (ECCS) and determines that the 1A-A RHR Pump is running by observing the RED light is LIT and GREEN light is DARK. AND Applicant locates 1-HS-63-8A and determines the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. AND Applicant locates 1-HS-63-6A and determines the valve is OPEN by observing the RED light is LIT and GREEN light is DARK OR Applicant locates handswitch 1-HS-63-7A and determines the valve is OPEN by observing the RED light is LIT and GREEN light is DARK. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 19: 14. **DO NOT CONTINUE** this Instruction UNTIL Steps 10 thru 13 complete. STANDARD: Applicant determines that all steps or related contingency actions have been completed and continues to Step 15. COMMENTS:	___ SAT ___ UNSAT
CAUTION **If RCS press is greater than 1350 psig, the SI pumps should NOT be restarted because the recirc path is isolated.**	
STEP 20: 15. **RESTART** any charging pumps and SI pumps as necessary. STANDARD: Applicant determines that all charging and SI pumps are running. COMMENTS:	___ SAT ___ UNSAT
CAUTION **If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.**	

STEP/STANDARD	SAT/UNSAT
STEP 21: 16. (#5) **RESET** SI, and **CHECK** the following: • SI ACTUATED permissive DARK. • AUTO SI BLOCKED permissive LIT. STANDARD: _____Applicant depresses each SI reset pushbutton on panel 1-M-6 and observes the SI ACTUATED permissive light DARK, and the AUTO SI BLOCKED light is LIT. **Step is critical since the valves to be operated in subsequent steps cannot be repositioned until the SI signal is reset.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 22: 17. **IF** offsite power is lost, **THEN:** a. **PLACE** charging pumps in PULL TO LOCK. b. **RESTART** RHR pumps. c. **RESTART** charging pumps. d. **IF** RCS press less than 1350 psig, **THEN RESTART** SI pumps. STANDARD: Applicant acknowledges information in the step, and since power has not been lost, continues to the next step. COMMENTS:	___ SAT ___ UNSAT
CAUTION **ECCS pump discharge flow and motor amps should be monitored WHILE closing the RWST suction valves.**	

STEP/STANDARD	SAT/UNSAT
STEP 23: 18. (#6) **ISOLATE** charging pump suction from RWST: a. **CLOSE** 1-LCV-62-135. b. **CLOSE** 1-LCV-62-136. c. **ENSURE** 1-HS-62-135A in A-AUTO (pushed in). d. **ENSURE** 1-HS-62-136A in A-AUTO (pushed in). STANDARD: _____Applicant pushes 1-HS-62-135A handswitch in, and then rotates the handswitch to the left to the CLOSED position **(Critical).** Applicant identifies the valve is closed by observing the RED light is DARK and GREEN light is LIT. _____Applicant pushes 1-HS-62-136A handswitch in, and then rotates the handswitch to the left to the CLOSED position **(Critical).** Applicant identifies the valve is closed by observing the RED light is DARK and GREEN light is LIT. _____Applicant determines that the handswitch for 1-HS-62-135A has remained in the "pushed-in" position **(Critical).** _____Applicant determines that the handswitch for 1-HS-62-136A has remained in the "pushed-in" position **(Critical).** **Step is critical to complete the alignment of ECCS pumps to establish and maintain long term core cooling.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 24: 19. (#7) **ISOLATE** SI pump suction from RWST: • **CLOSE** 1-FCV-63-5. STANDARD: _____Applicant rotates handswitch 1-HS-63-5A to the left to the CLOSED position **(Critical).** Applicant identifies the valve is closed by observing the RED light is DARK and GREEN light is LIT. **Step is critical to complete the alignment of ECCS pumps to establish long term core cooling.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 25: 20. (#8) **ISOLATE** RHR suction from RWST: a. **ENSURE** power restored to1-FCV-63-1 USING Appendix A (ES-1.3), 1-FCV-63-1 Breaker Operation. b. **CLOSE** 1-FCV-63-1. STANDARD: Applicant determines from the INITIAL CONDITIONS that power has been restored to 1-FCV-63-1, "RWST TO RHR ECCS SUCTION." _____Applicant rotates handswitch 1-HS-63-1A to the left to the CLOSED position **(Critical).** Applicant identifies the valve is closed by observing the RED light is DARK and GREEN light is LIT. **Step is critical to complete the alignment of ECCS pumps to establish long term core cooling.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 26: Notify the Unit Supervisor that transfer to the RHR containment sump is complete. STANDARD: Applicant notifies the Unit Supervisor that ECCS pumps are aligned to the containment sump, and reports portions of the system that failed to operate as expected (1-FCV-63-73 failed to close; which resulted in the OPEN interlock for 1-FCV-63-11 to fail.) **EXAMINER CUE: Another operator will continue with the alignment of containment spray RWST suction:** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

B

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **A large break loss-of-coolant event occurred 22 minutes ago.**
2. **The crew responded using 1-E-1, "Loss of Reactor or Secondary Coolant."**
3. **1-E-1, "Loss of Reactor or Secondary Coolant," Appendix B, "1-FCV-63-1 Breaker Operation," is complete.**
4. **A-A Containment Air Return fan was out-of-service for repairs, and B-B Air Return Fan tripped when it received a start signal. Both Air Return Fans are currently in STOP, PULL-TO-LOCK.**
5. **RWST level is currently approximately 34% and lowering.**
6. **ES-1.3, "Transfer to Containment Sump," was entered and has been performed through Step 4.**

INITIATING CUES:

The Unit Supervisor directs you to complete transfer of the Emergency Core Cooling Pump (ECCS) suctions using ES-1.3, Transfer to Containment Sump," beginning at Step 5.

Notify the Unit Supervisor when transfer to the containment sump has been completed.

Watts Bar Nuclear Plant

Unit 1

Emergency Operating Instruction

ES-1.3

Transfer to Containment Sump

Revision 0018

Quality Related

Level of Use: Continuous Use

Effective Date: 03-23-2011

Responsible Organization: OPS, Operations

Prepared By: R. A. O'Rear

Approved By: Gregory A. Evans

Current Revision Description

Conversion to Word 2007 template. Minor editorial changes: Revised Step 5 RNO to restore wording of previous revision for clarification and to give better guidance to Operators. [PCR 4319] Training feedback to clarify wording within guidelines of writer guide which did not change intent of affected steps [PCR 3552] Added Note after transfer sequence to remind Operators FRs can be implemented.

1.0 PURPOSE

This Instruction provides actions for transferring ECCS and containment spray suction to the containment sump for recirculation mode.

2.0 SYMPTOMS AND ENTRY CONDITIONS

2.1 Indications

RWST level below 34%.

2.2 Transitions

A. E-1, Loss Of Reactor Or Secondary Coolant.

B. ES-1.2, Post LOCA Cooldown.

C. FR-C.1, Inadequate Core Cooling.

D. FR-C.2, Saturated Core Cooling.

E. FR-H.1, Loss Of Secondary Heat Sink.

F. ECA-2.1, Uncontrolled Depressurization Of All Steam Generators.

G. ECA-3.1, SGTR and LOCA - Subcooled Recovery.

H. ECA-3.2, SGTR and LOCA - Saturated Recovery.

3.0 OPERATOR ACTIONS

Step	Action/Expected Response	Response Not Obtained

CAUTION

ECCS flow to RCS must be maintained at all times to ensure adequate core cooling.

Transfer to recirculation mode may cause high radiation in the Auxiliary Building.

NOTES

Performance of this Instruction is a higher priority than performance of the FRs because it maintains ECCS pump suction.

The transfer sequence should be performed without delay. Implementation of FRs is delayed UNTIL transfer sequence is completed or transitioned from.

1. **ENSURE** both RHR pumps RUNNING.

IF NO RHR pumps can be started, **THEN**

****GO TO** ECA-1.1, Loss of RHR Sump Recirculation.

Step	Action/Expected Response	Response Not Obtained
2.	**ESTABLISH** CCS to RHR heat exchangers [M-27B]:	
	a. **ENSURE** RHR heat exchanger outlet valves 1-FCV-70-153 and 1-FCV-70-156 OPEN.	
	b. **CLOSE** SFP heat exchanger A CCS supply 0-FCV-70-197.	
	c. **ENSURE** CCS flow to ESF supply header and greater than 5000 gpm. • Train A: 1-FI-70-159 • Train B: 1-FI-70-165	c. **WHEN** transfer to cntmt sump completed, **THEN** **REFER TO** Appendix B (ES-1.3), CCS Operation, to adjust CCS flows as necessary.
	d. **MONITOR** level in CCS surge tanks.	
3.	**CHECK** RWST level less than 34%.	**DO NOT CONTINUE** this Instruction UNTIL RWST level less than 34%.
4.	**CHECK** cntmt sump level greater than or equal to 16.1 %.	****GO TO** ECA-1.1, Loss of RHR Sump Recirculation.

Step	Action/Expected Response	Response Not Obtained

5. **ENSURE** automatic switchover complete:

   a. **ENSURE** cntmt sump valves 1-FCV-63-72 and 1-FCV-63-73 OPEN.

   IF ONE cntmt sump valve can **NOT** be fully opened, **THEN**

   STOP and **PULL TO LOCK** RHR pump on the associated train.

   IF flow from cntmt sump can **NOT** be established, **THEN**

   **** GO TO** ECA-1.1, Loss of RHR Sump Recirculation.

   b. **ENSURE** RWST to RHR suction valves 1-FCV-74-3 and 1-FCV-74-21 CLOSED.

   c. **INITIATE** power restoration to 1-FCV-63-1 USING Appendix A (ES-1.3), 1-FCV-63-1 Breaker Operation.

CAUTION **If RWST level drops to 8%, then any charging, SI or cntmt spray pump taking suction from the RWST must be stopped.**

6. **MONITOR** RWST level greater than 8%.

   STOP and **PULL TO LOCK** pumps taking suction from the RWST.

Step	Action/Expected Response	Response Not Obtained
7.	**DETERMINE** if cntmt spray should be stopped:	
	a. **MONITOR** cntmt press less than 2.0 psig.	a. **WHEN** cntmt press less than 2.0 psig, **THEN** **PERFORM** Substeps 7b thru e. ****GO TO** Step 8.
	b. **CHECK** at least one cntmt spray pump RUNNING.	b. ****GO TO** Step 9.
	c. **RESET** cntmt spray signal.	
	d. **STOP** cntmt spray pumps **AND** **PLACE** in A-AUTO.	
	e. **CLOSE** cntmt spray discharge valves 1-FCV-72-2 and 1-FCV-72-39.	
	f. ** **GO TO** Step 9.	

Step	Action/Expected Response	Response Not Obtained
8.	**DETERMINE** if ONE train cntmt spray should be stopped:	
	a. **CHECK** BOTH trains cntmt spray delivering flow.	a. ****GO TO** Step 9.
	b. **RESET** cntmt spray signal.	
	c. **STOP** ONE cntmt spray pump **AND** **PLACE** in A-AUTO.	
	d. **CLOSE** spray discharge valve for stopped pump.	
9.	**MONITOR** RCS press less than 1350 psig.	**STOP** both SI pumps.

Step	Action/Expected Response	Response Not Obtained

CAUTION **If a valve fails during the transfer sequence, any corrective action should be postponed UNTIL transfer is complete, EXCEPT as required to satisfy each step.**

NOTE Each transfer sequence action is identified by a number on the control board (e.g. #1).

10. (#1) **ISOLATE** SI pump miniflow:
    - **CLOSE** 1-FCV-63-3.
    - **CLOSE** 1-FCV-63-175.
    - **CLOSE** 1-FCV-63-4.

    ENSURE either:

    a. 1-FCV-63-3 CLOSED,

    OR

    b. 1-FCV-63-4 and 1-FCV-63-175 CLOSED.

11. (#2) **ISOLATE** RHR crossties:
    - **CLOSE** 1-FCV-74-33.
    - **CLOSE** 1-FCV-74-35.

    ENSURE either 1-FCV-74-33 or 1-FCV-74-35 CLOSED.

12. (#3) **ALIGN** charging pump and SI pump supply from RHR:
    - **OPEN** 1-FCV-63-6.
    - **OPEN** 1-FCV-63-7.
    - **ENSURE** 1-FCV-63-177 OPEN.

    ENSURE either 1-FCV-63-6 or 1-FCV-63-7 OPEN.

Step	Action/Expected Response	Response Not Obtained

NOTE 1-FCV-63-8 and 1-FCV-63-11 are interlocked with the SI pump miniflows being full closed.

13. (#4) **ALIGN** RHR discharge to charging pump and SI pump suction:

a. **OPEN** 1-FCV-63-8.

a. **ENSURE** Train B RHR operation:
- Train B RHR pump RUNNING.
- 1-FCV-63-11 OPEN.
- Either 1-FCV-63-6 or 1-FCV-63-7 OPEN.

b. **OPEN** 1-FCV-63-11.

b. **ENSURE** Train A RHR operation:
- Train A RHR pump RUNNING.
- 1-FCV-63-8 OPEN.
- Either 1-FCV-63-6 or 1-FCV-63-7 OPEN.

14. **DO NOT CONTINUE** this Instruction UNTIL Steps 10 thru 13 complete.

Step	Action/Expected Response	Response Not Obtained

CAUTION **If RCS press is greater than 1350 psig, the SI pumps should NOT be restarted because the recirc path is isolated.**

15. **RESTART** any charging pumps and SI pumps as necessary.

CAUTION **If offsite power is lost after SI reset, manual action will be required to restart the SI pumps and RHR pumps due to loss of SI start signal.**

16. (#5) **RESET** SI, and **CHECK** the following:

- SI ACTUATED permissive DARK.
- AUTO SI BLOCKED permissive LIT.

NOTIFY IMs to block Auto SI USING IMI-99.040, Auto SI Block.

17. **IF** offsite power is lost, **THEN**

a. **PLACE** charging pumps in **PULL TO LOCK**.

b. **RESTART** RHR pumps.

c. **RESTART** charging pumps.

d. **IF** RCS press less than 1350 psig, **THEN**

RESTART SI pumps.

Step	Action/Expected Response	Response Not Obtained

CAUTION **ECCS pump discharge flow and motor amps should be monitored WHILE closing the RWST suction valves.**

18. (#6) **ISOLATE** charging pump suction from RWST:

    a. **CLOSE** 1-LCV-62-135.

    b. **CLOSE** 1-LCV-62-136.

    c. **ENSURE** 1-HS-62-135A in A-AUTO (pushed in).

    d. **ENSURE** 1-HS-62-136A in A-AUTO (pushed in).

19. (#7) **ISOLATE** SI pump suction from RWST:

    - **CLOSE** 1-FCV-63-5.

20. (#8) **ISOLATE** RHR suction from RWST:

    a. **ENSURE** power restored to 1-FCV-63-1 USING Appendix A (ES-1.3), 1-FCV-63-1 Breaker Operation.

    b. **CLOSE** 1-FCV-63-1.

Step	Action/Expected Response	Response Not Obtained

CAUTION

- **The containment spray pump MUST stay aligned to the RWST UNTIL the RWST level is less than 8% to ensure sufficient sump inventory for spray pump operation.**
- **If containment pressure is greater than or equal to 2.0 psig, the containment spray pump suction must be aligned and pump restarted within 120 seconds.**

NOTE FRs may now be implemented as required.

21. **ALIGN** cntmt spray RWST suction:

a. **CHECK** spray pumps RUNNING.

a. **NOTIFY** TSC to evaluate starting spray pumps to pump RWST to cntmt sump.

****GO TO** Caution prior to Step 26.

b. **CHECK** RWST level less than 8%.

b. **WHEN** RWST level less than 8%, **THEN**

CONTINUE with Substeps 21c and d through Step 25 of this instruction.

****GO TO** Caution prior to Step 26.

c. **STOP** both cntmt spray pumps, **AND**

PLACE in PULL TO LOCK.

d. **ISOLATE** cntmt spray suction from RWST:

- **CLOSE** 1-FCV-72-22.
- **CLOSE** 1-FCV-72-21.

Step	Action/Expected Response	Response Not Obtained
22.	**ENSURE** ERCW aligned for sump recirc operation: • **REFER TO** Appendix C (ES-1.3), ERCW Operation.	**CONSULT** TSC for ERCW limitations.
23.	**ALIGN** cntmt spray sump suction:	
	a. **OPEN** 1-FCV-72-44 cntmt spray suction from cntmt sump.	a. ENSURE suction from RWST 1-FCV-72-22 FULLY CLOSED.
	b. **OPEN** 1-FCV-72-45 cntmt spray suction from cntmt sump.	b. ENSURE suction from RWST 1-FCV-72-21 FULLY CLOSED.
24.	**MONITOR** cntmt press less than 2.0 psig.	INITIATE cntmt spray: a. START cntmt spray pumps. b. OPEN discharge valves 1-FCV-72-2 and 1-FCV-72-39. c. ENSURE spray flow on 1-FI-72-34 and 1-FI-72-13.
25.	**ENSURE** cntmt spray pumps in A-AUTO.	

Step	Action/Expected Response	Response Not Obtained

CAUTION **Continued ECCS or Containment Spray pump operation following loss of suction will result in pump damage. Loss of suction to RHR pumps will require stopping all ECCS pumps.**

26. **MONITOR** for containment sump blockage.

a. **INITIATE** Appendix D (ES-1.3), Monitoring for Containment Sump Blockage.

b. **CHECK** for indications of cavitation on ECCS or Containment Spray.

b. ****GO TO** Note prior to Step 27.

c. **IF** sump blockage results in loss of suction to ECCS pumps, **THEN**

STOP CCPs, SI pumps and RHR pumps,

PLACE in **PULL TO LOCK**, **AND**

NOTIFY TSC.

d. **IF** sump blockage results in loss of suction to Cntmt Spray pumps, **THEN**

STOP Cntmt Spray pumps,

PLACE in **PULL TO LOCK AND**

NOTIFY TSC.

Step continued on next page

Step	Action/Expected Response	Response Not Obtained

26. (continued)

e. **IF** ECCS or Cntmt Spray flow lost due to sump blockage, **THEN**

****GO TO** ECA-1.1, Loss of RHR Sump Recirculation.

NOTE Time since initiation of event and guidance for transfer to hot leg recirculation is defined in E-1, Loss of Reactor or Secondary Coolant.

27. **VERIFY** that this instruction was entered from E-1.

CONSULT TSC for guidance on when to transfer to hot leg recirculation (ES-1.4).

28. **RETURN TO** Instruction in effect.

End of Section

Appendix A
(Page 1 of 1)

1-FCV-63-1 Breaker Operation

CLOSE the following to restore power to 1-FCV-63-1:

BOARD	COMPT	NOMENCLATURE
480 V Reactor MOV Board 1A1-A	2E1	1-BKR-63-1A RWST TO RHR SUCT (1-FCV-63-1)

Appendix B
(Page 1 of 1)

CCS Operation

1.0 INSTRUCTIONS

This Appendix provides general guidance for the operation of the Component Cooling Water System during the Containment Sump Recirculation phase.

A. If BOTH trains of Shutdown power are available:

- Spent Fuel Pool Cooling heat exchanger should be supplied from Train B or be temporarily isolated to ensure adequate cooling of the RHR heat exchanger.

B. If ONE train of Shutdown power is **NOT** available:

1. If Train A Shutdown power is lost, the Spent Fuel Pool Cooling heat exchanger A should be aligned to CCS heat exchanger A with the 1B-B CCS pump aligned to Train A to provide cooling flow.

2. If Train B Shutdown power is lost the CCS pump C-S should be aligned to the Train A CCS to provide additional flow capacity.

3. Nonessential equipment should be evaluated and CCS flow reduced or isolated if possible. This equipment includes:

   a. Letdown heat exchanger.

   b. Excess letdown heat exchanger.

   c. Spent Fuel heat exchanger.

   d. Reactor Coolant Pumps.

Appendix C
(Page 1 of 1)

ERCW Operation

1.0 INSTRUCTIONS

A. **ENSURE** at least two ERCW pumps running on each train.

B. **ALIGN** ERCW to Train A cntmt spray:

- **OPEN** 1-FCV-67-125, CNTMT SPRAY HX 1A INLET.
- **OPEN** 1-FCV-67-126, CNTMT SPRAY HX 1A RETURN.

C. **ALIGN** ERCW to Train B cntmt spray:

- **OPEN** 1-FCV-67-123, CNTMT SPRAY HX 1B INLET.
- **OPEN** 1-FCV-67-124, CNTMT SPRAY HX 1B RETURN.

D. **IF** supply flow less than 5200 gpm on 1-FI-67-136 CS HX 1A SUP FLOW or 1-FI-67-122 CS HX SUP FLOW,
THEN

ADJUST CCS heat exchanger outlet valves as necessary and **CONSULT** TSC.

Appendix D
(Page 1 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS

NOTE

The following step records initial baseline readings after cold leg recirculation is established to aid in monitoring for sump blockage. This step should be repeated if parameters change due to operator action.

A. **RECORD** the following parameters:

Date _____ Time _____

INDICATOR	READING	CIRCLE ONE
RCS Pressure (ICCM plasma display)		1-M-4 or 1-M-6
Containment Sump Level (1-LI-63-180 or 181)		180 or 181
RHR		
Pump A amps (1-EI-74-5A)		
Pump B amps (1-EI-74-17A)		
Flow to CL 2 & 3 [1-FI-63-91A (NR) or 91B (WR)]		NR or WR
Flow to CL 1 & 4 [1-FI-63-92A (NR) or 92B (WR)]		NR or WR
Pump A Discharge Press (1-PI-74-13)		
Pump B Discharge Press (1-PI-74-26)		
CCP		
Pump A amps (1-EI-62-108A)		
Pump A amps (1-EI-62-104A)		
Charging Flow (1-FI-62-93A)		
Charging Header Press (1-PI-62-92A)		
BIT flow (1-FI-63-170)		

Appendix D
(Page 2 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

INDICATOR	READING	CIRCLE ONE
SIP		
Pump A flow (1-FI-63-151)		
Pump B flow (1-FI-63-20)		
Pump A amps (1-EI-63-12A)		
Pump B amps (1-EI-63-16A)		
Pump A Discharge Press (1-PI-63-150)		
Pump B Discharge Press (1-PI-63-19)		
Containment Spray		
Pump A amps (1-EI-72-26A)		
Pump A flow (1-FI-72-34)		
Pump B amps (1-EI-72-12A)		
Pump B flow (1-FI-72-13)		

Appendix D
(Page 3 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

NOTE

The following step records baseline readings after RHR spray has been initiated. If RHR spray is initiated the data recorded in Step 1.0B should be used in place of the RHR data previously recorded in Step 1.0A for monitoring for containment sump blockage.

B. **IF** RHR spray is placed in service,
THEN

RECORD the following parameters:

Date _____ Time _____

INDICATOR	READING	CIRCLE ONE
RHR		
Pump A amps (1-EI-74-5A)		
Pump B amps (1-EI-74-17A)		
Pump flow to CL 2 & 3 [1-FI-63-91A (NR) or 91B (WR)]		NR or WR
Pump flow to CL 1 & 4 [1-FI-63-92A (NR) or 92B (WR)]		NR or WR
Pump A Discharge Press (1-PI-74-13)		
Pump B Discharge Press (1-PI-74-26)		

Appendix D
(Page 4 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

NOTE

TSC assistance should be requested, if necessary, in evaluating the effect of RCS pressure raises on ECCS flow.

C. **MONITOR** for containment sump blockage:

1. **CHECK** for any of the following indications.

ECCS pump	Flow / Amps/ Discharge Press
RHR / CCP / SIP (flow/amps/discharge press)	Erratic or gradually dropping (unexplained)

Containment Spray	Flow / Amps
CS Pump	Erratic or gradually dropping

2. **IF** any indications of sump blockage are observed,
THEN

NOTIFY TSC to evaluate indications.

NOTE

Containment sump level dropping indicates potential loss of sump inventory due to leakage or clogging of drain paths inside containment.

D. **MONITOR** containment sump level:

1. **IF** containment sump level is dropping,
THEN

NOTIFY TSC to evaluate the following.

a. Indications of dropping containment sump level,

b. Need for RWST refill.

Appendix D
(Page 5 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

NOTE

Reducing Containment Spray flow and ECCS flow to single train operation may reduce the rate of debris accumulation on the sump screen and will reduce pressure drop across screens. Pumps should only be stopped in the following step if TSC approval has been obtained.

E. **IF** indications of sump blockage continue to worsen,
THEN

PERFORM the following:

1. **IF** both trains of Containment Spray running,
THEN

   EVALUATE stopping one train of Containment Spray.

2. **IF** both trains of ECCS pumps running,
THEN

   EVALUATE stopping ECCS pumps on one train.

3. **INITIATE** makeup to RWST:

   - **REFER TO** SOI-62.02, Boron Concentration Control.

4. **NOTIFY** TSC to evaluate transferring water to RWST from the following,

   - Spent fuel pit
   - Holdup tank

Appendix D
(Page 6 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

NOTE

The following step records baseline readings after hot leg recirculation is established. If hot leg recirculation is initiated data recorded in Step 1.0F should be used in place of data previously recorded in Step 1.0A.

F. **WHEN** ES-1.4, Hot Leg Recirculation COMPLETE,
THEN

RECORD the following parameters:

Date _____ Time _____

INDICATOR	READING	CIRCLE ONE
RCS Pressure (ICCM plasma display)		1-M-4 or 1-M-6
Containment Sump Level (1-LI-63-180 or 181)		180 or 181
RHR		
Pump A amps (1-EI-74-5A)		
Pump B amps (1-EI-74-17A)		
Flow to HL 1 & 3 (1-FI-63-173A)		
Pump A Discharge Press (1-PI-74-13)		
Pump B Discharge Press (1-PI-74-26)		
CCP		
Pump A amps (1-EI-62-108A)		
Pump A amps (1-EI-62-104A)		
Charging Flow (1-FI-62-93A)		
Charging Header Press (1-PI-62-92A)		
BIT flow (1-FI-63-170)		

Appendix D
(Page 7 of 7)

Monitoring for Containment Sump Blockage

1.0 INSTRUCTIONS (continued)

INDICATOR	READING	CIRCLE ONE
SIP		
Pump A flow (1-FI-63-151)		
Pump B flow (1-FI-63-20)		
Pump A amps (1-EI-63-12A)		
Pump B amps (1-EI-63-16A)		
Pump A Discharge Press (1-PI-63-150)		
Pump B Discharge Press (1-PI-63-19)		
Containment Spray		
Pump A amps (1-EI-72-26A)		
Pump A flow (1-FI-72-34)		
Pump B amps (1-EI-72-12A)		
Pump B flow (1-FI-72-13)		

Watts Bar Nuclear Plant

NRC EXAM 2013-302

System JPM **C**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
C
NRC EXAM 2013-302

EVALUATION SHEET

Task: Return N43 Power Range To Service.

Alternate Path: n/a

Facility JPM #: 3-OT-JPMR108A, Modified. (Added DCS actions to restore N43 PRM, converted to standard JPM by removing transient after rods returned to auto).

Safety Function: 7 **Title:** Instrumentation

K/A 015 A4.02 Ability to manually operate and/or monitor in the control room: NIS indicators

Rating(s): 3.9/3.9 **CFR:** 41.7 / 45.5 to 45.8

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: 1-AOI-4, "Nuclear Instrumentation Malfunctions," Rev. 0
1-SOI-98.01, "Distributed Control System," Rev. 0

Task Number: RO-092-AOI-4-002 **Title:** Respond to a failure of the power range nuclear instrumentation.

Task Standard: The applicant :

1.) Returns the following switches from the N43 position to the NORMAL.

a. DETECTOR CURRENT COMPARATOR switch for UPPER SECTION

b. DETECTOR CURRENT COMPARATOR switch for LOWER SECTION.

c. COMPARATOR CHANNEL DEFEAT

2.) Returns the following switches from the N43 position to the OPERATE position:

a. ROD STOP BYPASS,

b. POWER MISMATCH BYPASS.

3.) Performs actions of SOI-98.01, "DISTRIBUTED CONTROL SYSTEM," to RESTORE 1LPY0920412R from BYPASS to NORMAL.

Validation Time: 20 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

WATTS BAR NUCLEAR PLANT
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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**

2. **Right click on 307 and then select RESET.**

3. **Enter the password.**

4. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**

5. **Place simulator in RUN and acknowledge any alarms.**

7. **ENSURE N43 POWER RANGE is defeated on the DETECTOR CURRENT COMPARATOR, MISCELLANEOUS CONTROL AND INDICATION, and COMPARATOR AND RATE Sections of 1-M-13.**

8. **ENSURE LPY0920412R is BYPASSED (yellow BYP present) on the DCS BYPASSED TRANSMITTERS screen.**

9. **Place simulator in FREEZE until Examiner cue is given.**

10. **ENSURE 6 "clean" copies of 1-SOI-98.01, "Distributed Control System," Rev. 0, are available to replace copies marked by applicants**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
C
NRC EXAM 2013-302

READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **Unit at 100% RTP**
2. **PRM N43 failed during last shift.**
3. **PRM N43 has been defeated in the NIS racks.**
4. **1LPY0920412R has been bypassed using the DCS terminal.**
5. **Work Control has notified the MCR that repairs to PRM N43 are complete and the instrument is ready to be returned to service.**
6. **You are the Operator at the Controls.**

INITIATING CUES:

The Unit Supervisor has directed you to complete the return of PRM N43 and 1LPY0920412R to service.

Inform the Unit Supervisor when 1-AOI-4,"Nuclear Instrumentation Malfunctions" is complete.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 16. **WHEN** PRM is to be restored, **THEN**: b. **PERFORM** the appropriate attachment for returning PRM to service: • **REFER TO** Attachment 1, Defeat N-41 PRM Function At NIS Rack, Step B. • **REFER TO** Attachment 2, Defeat N-42 PRM Function At NIS Rack, Step B. • **REFER TO** Attachment 3, Defeat N-43 PRM Function At NIS Rack, Step B. • **REFER TO** Attachment 4, Defeat N-44 PRM Function At NIS Rack, Step B. STANDARD: Applicant selects Attachment 3, Defeat N-43 PRM Functions at NIS Rack, Step B to return PRM N43 to service. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
EXAMINER: The following actions are taken from 1-AOI-4, "Nuclear Instrumentation Malfunctions," Attachment 3, "Defeat N-43 PRM Functions At NIS Rack."	
STEP 2: B. **WHEN** PRM is ready for return to service, **THEN PERFORM** the following Steps: 1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION in NORMAL. STANDARD: _____Detector Current Comparator Upper Section switch placed to "NORMAL" from the "N43" position (Miscellaneous Control & Indication Panel,1-IDWR-92-N50-G IV) **Step is critical for proper restoration of N43 upper power detector input to the current comparator.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 3: 2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION in NORMAL. STANDARD: _____Detector Current Comparator Lower Section switch placed to "NORMAL" from the "N43" position (Miscellaneous Control & Indication Panel, 1-IDWR-92-N50-G IV). **Step is critical for proper restoration of the N43 lower power detector input to current comparator.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
NOTE **On the following step, annunciator window 68-C, N-43 OVERPOWER ROD STOP BYPASSED, will clear.**	
STEP 4: 3. **PLACE** ROD STOP BYPASS switch in OPERATE. STANDARD: _____Rod Stop Bypass switch is positioned from "N43" to "OPERATE" (Miscellaneous Control & Indication Panel,1-IDWR-92-N50-G IV) **Step is critical for proper restoration to enable rod stop interlock protection from channel N43.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 5: 4. **PLACE** POWER MISMATCH BYPASS switch in OPERATE. STANDARD: _____Power Mismatch Bypass switch is positioned from "N43" to "OPERATE" (Miscellaneous Control & Indication Panel, 1-IDWR-92-N50-G IV) **Step is critical to restore channel N43 input to high auctioneering circuit and power mismatch circuits.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE **On the following step, annunciator window 82-E, NIS CHANNEL IN TEST, will clear.**	

STEP/STANDARD	SAT/UNSAT
STEP 6: 5. **PLACE** COMPARATOR CHANNEL DEFEAT switch in NORMAL. STANDARD: _____Comparator Channel Defeat Switch is positioned to "NORMAL" from the "N43" position (Comparator & Rate Panel, Comparator N37, 1-IDWR-92-N37 IV). **Step is critical to restore channel input to channel comparator alarm circuits.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE **On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.**	
STEP 7: 6. **IF** POSITIVE RATE TRIP is LIT, **THEN RESET** RATE MODE switch. STANDARD: Positive Rate Trip light on Power Range Upper N41A, 1-IDWR-92-42A II, is checked and determines light is NOT LIT and continues to next step. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8: 7. **ENSURE** N-43 PRM channel RESTORED from Bypass in DCS per 1-SOI-98.01. STANDARD: Applicant locates 1-SOI-98.01, "DISTRIBUTED CONTROL SYSTEM (DCS)," Section 8.7, "Restoring Instrument Loop After Auto or Manual Bypass." COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
EXAMINER: The following actions are taken from 1-SOI-98.01, "DISTRIBUTED CONTROL SYSTEM," Section 8.7, "Restoring Instrument Loop After Auto or Manual Bypass."	
NOTE **This section is Continuous Use.**	
STEP 9: [1] **RECORD** instrument(s) to be RESTORED. Instrument UNID(s): _____ STANDARD: Applicant enters 1LPY0920412R as the instrument to be restored. COMMENTS:	___ SAT ___ UNSAT
STEP 10: [2] **NOTIF**Y SRO of instrument to be RESTORED. STANDARD: Applicant informs the Unit Supervisor/Examiner that 1LPY0920412R will be restored. COMMENTS:	___ SAT ___ UNSAT
CAUTION **Certain Eagle Rack failures will trip bistables, but freeze the inputs to DCS. DCS will NOT AUTO-BYPASS channels with this type of failure. The DCS input will be considered as "good".**	

STEP/STANDARD	SAT/UNSAT
STEP 11: [3] **IF** instrument has redundant channels on 1-XX-55-6B, RX Trip - Status Panel, **THEN ENSURE** bistable windows for redundant instrument channels on 1-XX-55-6B, RX Trip - Status Panel are **NOT** LIT. STANDARD: Applicant determines that no bistable windows are lit on 1-XX-55-6B, RX Trip - Status Panel. COMMENTS:	___ SAT ___ UNSAT
STEP 12: [4] **IF** any bistables associated with redundant channels are LIT, **THEN** [4.1] **NOTIFY** Unit SRO of bistable conflict. [4.2] **DO NOT** continue until bistable conflict has been RESOLVED. STANDARD: Applicant determines that this step is not applicable, and enters "N/A" for the step. COMMENTS:	___ SAT ___ UNSAT

NOTE

If both instrument channels of steam flow OR feedwater flow on a single loop are out of service AND a large change in flow has occurred, (for example, a startup at low power or a large power change) SG Level perturbations may be reduced, by manually forcing 1 ELEMENT CONTROL prior to restoring the BYPASSED channel.

STEP/STANDARD	SAT/UNSAT
STEP 13: [5] **IF** reducing SG Level perturbations, **THEN PERFORM** Section 8.1 to FORCE 1 ELEMENT CONTROL. STANDARD: Applicant determines that SG level perturbations are not occurring and enters "N/A" for the step. COMMENTS:	___ SAT ___ UNSAT
STEP 14: [6] **SELECT** Display Screen for instrument loop to be RESTORED (Ref. App. A or use BYPASSED TRANSMITTERS screen). STANDARD: Applicant selects "BYPASSED TRANSMITTERS" screen on the DCS computer terminal. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15: [7] **SELECT** data point for instrument recorded in Step 8.7[1]. STANDARD: _____Applicant selects 1LPY0920412R, which currently is displayed with a yellow "BYPASSED" tag. **Step is critical to restore the correct device to service.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 16: [8] **IF** instrument is displayed with its MAINT BYP SIGNAL button indicating BYPASSED (red), **THEN** [8.1] **SELECT** MAINT BYP SIGNAL button for instrument loop. [8.2] **CHECK** status color changes from red to gray. STANDARD: _____Applicant locates 1LPY0920412R MAINT BYP SIGNAL D button on the DCS screen and selects the button with the cursor, then "clicks" on the button. Applicant observes the MAINT BYP SIGNAL D button change from RED to GRAY. **Step is critical to restore channel input to SG level program circuits.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 17: [9] **SELECT** RESTORE SIGNAL button. STANDARD: _____Applicant locates the RESTORE SIGNAL D button, and selects the button with the cursor, then "clicks" on the button. **Step is critical to restore channel input to SG level program circuits.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 18: [10] **CHECK** yellow BYP is **NOT** displayed above associated instrument column to indicate instrument status change. STANDARD: Applicant observes the yellow BYP indication no longer appears above 1LPY0900412R. COMMENTS:	___ SAT ___ UNSAT

NOTE

When instrument is BYPASSED, XMTR BYP will be displayed in yellow on the overlay screen for that instrument.

STEP/STANDARD	SAT/UNSAT
STEP 19: [11] **IF** ALL FW (feedwater) instruments have been restored, **THEN CHECK** XMTR BYP is **NOT** displayed in yellow for the associated instrument (Ref. App A or use BYPASSED TRANSMITTERS screen). STANDARD: Applicant determines that there are NO bypassed transmitters indicated in yellow on the BYPASSED TRANSMITTERS screen. COMMENTS:	___ SAT ___ UNSAT
STEP 20: [12] **NOTIFY** SRO that instrument is RESTORED. STANDARD: Applicant informs the Unit Supervisor that Power Range N43 has been restored. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 21: [13] **IF** action due to IM request, **THEN NOTIFY** IM instrument channel is RESTORED. STANDARD: Applicant determines that step is not applicable, and marks the step "N/A." COMMENTS:	___ SAT ___ UNSAT
STEP 22: [14] **MONITOR** system parameters for effect of instrument restoration. STANDARD: Applicant monitors SG 3 level for possible perturbations and determines that none are occurring. COMMENTS:	___ SAT ___ UNSAT
STEP 23: [15] **IF** 1 ELEMENT CONTROL was forced in Step 8.7[5], **THEN GO TO** Step 8.1[10] to restore 3 ELEMENT CONTROL. . STANDARD: Applicant determines that step is not applicable, and marks the step "N/A." COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
EXAMINER: The following actions are taken from 1-AOI-4, "Nuclear Instrumentation Malfunctions," Section 3.4, "	
STEP 24: 16. **WHEN** PRM is to be restored, **THEN**: c. **ENSURE** TAVG and TREF within 1°F. STANDARD: Applicant determines that TAVG and TREF are within 1°F. COMMENTS:	___ SAT ___ UNSAT
STEP 25: 16. **WHEN** PRM is to be restored, **THEN**. d. **ENSURE** zero demand on control rod position indication [1-M-4]. STANDARD: Applicant determines that there is zero demand on CERPI MONITOR 1 or 2 PASSIVE SUMMER DEMAND INDICATORS. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 26: 16. **WHEN** PRM is to be restored, **THEN**: e. **IF** auto rod control desired, **PLACE** control rods in AUTO. STANDARD: Applicant locates 1-RBSS, ROD BANK SELECTOR and rotates the handswitch from the “MAN” position to the right to the “AUTO” position. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

C

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **Unit at 100% RTP**
2. **PRM N43 failed during last shift.**
3. **PRM N43 has been defeated in the NIS racks.**
4. **1LPY0920412R has been bypassed using the DCS terminal.**
5. **Work Control has notified the MCR that repairs to PRM N43 are complete and the instrument is ready to be returned to service.**
6. **You are the Operator at the Controls.**

INITIATING CUES:

The Unit Supervisor has directed you to complete the return of PRM N43 and 1LPY0920412R to service.

Inform the Unit Supervisor when 1-AOI-4,"Nuclear Instrumentation Malfunctions" is complete.

Watts Bar Nuclear Plant

Unit 1

Abnormal Operating Instruction

1-AOI-4

Nuclear Instrumentation Malfunctions

Revision 0000

Quality Related

Level of Use: Continuous Use

Effective Date: 09-23-2012

Responsible Organization: OPS, Operations

Prepared By: John Killian

Approved By: Steven R Smith

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0	09/23/12	ALL	Revision implements changes made by the Distributed Control System under DCN 52853. Minor/editorial changes: • Revision prepared using Rev 30 of AOI-4. • Added Unit 1 designator to procedure number and reset revision to 0000. • Updated procedures referenced in body of procedure to reflect Unit 1, Unit 2, and Common 0 designations, iaw ODM 23, in preparation for two unit operation. • Standardized use of T_{AVG} vs Tave and T_{REF}. • Updated performance references in Section 5.1. • PCR #5921 split Attachment 1 into four Attachments in an effort to reduce potential errors when defeating PRM and RTS. One Attachment for each PRM. • Re-defined discussion in Section 4.3 concerning PRM input to SG level setpoint.

1.0 PURPOSE

This Instruction provides instructions to respond to a loss of Source Range, Intermediate Range or Power Range NIS monitors.

2.0 SYMPTOMS

2.1 Alarms

A. CHANNEL I SOURCE/INTERMEDIATE RANGE TROUBLE [81-A].

B. SOURCE RANGE HI FLUX AT SHUTDOWN [81-B].

C. CHANNEL II SOURCE/INTERMEDIATE RANGE TROUBLE [82-A].

D. INTERM RANGE HI FLUX ROD WD STOP [82-B].

E. POWER RANGE OVERPOWER ROD WD STOP [83-A].

F. POWER RANGE UPR DETECTOR FLUX DEVN [83-B].

G. POWER RANGE LWR DETECTOR FLUX DEVN [83-C].

H. PLANT COMPUTER GENERATED ALARM (SEE ICS) [83-D].

I. POWER RANGE CHANNEL DEVIATION [83-E].

J. DCS TROUBLE [82-F]

2.2 Indications

A. Source Range Monitor (SRM) malfunction:

1. Audio count rate **NOT** operating.

2. Erratic or loss of indication.

3. INSTRUMENT POWER ON and/or CONTROL POWER ON lights at NIS racks DARK [1-M-13].

4. Both startup rate channels **NOT** indicating same startup rate.

5. NON-OPERATE light LIT [1-M-13].

2.2 Indications (continued)

B. Intermediate Range Monitor (IRM) malfunction:

1. Erratic or loss of indication.

2. INSTRUMENT POWER ON and/or CONTROL POWER ON lights at NIS racks DARK [1-M-13].

3. Both startup rate channels **NOT** indicating same startup rate.

4. SRM does **NOT** energize during shutdown.

5. NON-OPERATE light LIT [1-M-13].

C. Power Range Monitor (PRM) malfunction:

1. Erratic or loss of indication.

2. Delta flux meter failed high, low, or giving erratic indications.

3. CONTROL POWER ON and/or INSTRUMENT POWER ON lights at NIS racks DARK [1-M-13].

2.3 Automatic Actions

A. Source Range Monitor failure:

1. Possible source range monitor high flux Rx trip at 10^5 cps if SRM **NOT** blocked.

2. Possible Cntmt evacuation alarm at 0.5 decade above background.

B. Intermediate Range Monitor failure:

1. Intermediate range monitor 20% high flux rod stop (if **NOT** blocked above P-10).

2. Intermediate range monitor 25% high flux Rx trip (if **NOT** blocked above P-10).

3. Possible loss of P-6 block if intermediate range monitor greater than 1.66×10^{-4}% power and intermediate range monitor fails low.

2.3 Automatic Actions (continued)

C. Power Range Monitor failure:

1. Possible 103% power rod stop.

2. Possible actuation or loss of P-8, P-9, or P-10.

3. Temporary rod insertion if channel fails high with rods in AUTO.

3.0 OPERATOR ACTIONS

3.1 Diagnostics

IF	GO TO Subsection	PAGE
Source Range Monitor malfunction	3.2	7
Intermediate Range Monitor malfunction	3.3	12
Power Range Monitor malfunction	3.4	14

Step	Action/Expected Response	Response Not Obtained

3.2 Source Range Monitor (SRM) Failure

1. **STOP** positive reactivity changes or core alterations.

2. **IF** both SRMs required and failed,
THEN
OPEN Rx trip breakers

3. **INITIATE** performance of 1-SI-0-10, Shutdown Margin.

4. **IF** SOURCE RANGE HI FLUX AT SHUTDOWN alarm occurs [81-B],
THEN:

   a. **CHECK** alarm valid.

   a. **IF** a spurious alarm occurs,
   THEN:

      1) **CHECK** by other SRM that alarm was false.

      2) **ENSURE** shutdown monitors reset [1-M-13].

      3) **ANNOUNCE** false alarm over PA.

      4) ** **GO TO** Step 5.

   b. **ENSURE** Cntmt is evacuated.

   c. **CHECK** Rx power STABLE.

   c. **IF** uncontrolled positive reactivity insertion,
   THEN
   ** **GO TO** 1-AOI-34, Immediate Boration.

Step	Action/Expected Response	Response Not Obtained

3.2 Source Range Monitor (SRM) Failure (continued)

NOTE Placing the affected channel in bypass will cause either window 64A or 65A to alarm.

5. **PLACE** failed channel LEVEL TRIP switch to BYPASS [1-M-13].

6. **PLACE** failed channel HIGH FLUX AT SHUTDOWN switch to BLOCK [1-M-13].

7. **ENSURE** 1-NR-92-145 recording an operable source range channel [1-M-4].

8. **IF** in MODE 2,
THEN

REFER TO the following TECH Specs.

- 3.3.1, Reactor Trip System Instrumentation
- 3.3.3, PAM Instruments
- 3.3.4, Remote Shutdown System

Step	Action/Expected Response	Response Not Obtained

3.2 Source Range Monitor (SRM) Failure (continued)

9. **IF** in MODE 3, 4, or 5,
THEN:

• **CHECK** audio count rate audible in control room.	• **PLACE** audio count rate CHANNEL SELECTOR switch to operable channel [1-M-13].

• **REFER TO** the following Tech Specs:
  • 3.3.1,Reactor Trip System Instrumentation,
  • 3.3.3, PAM Instruments,
  • 3.3.4, Remote Shutdown System.	

10. **IF** in MODE 6,
THEN:

• **CHECK** audio count rate audible in control room.	• **IF** audible audio count rate is **NOT** being received in the control room, **THEN** **PLACE** audio count rate CHANNEL SELECTOR switch to an operable channel [1-M-13].
• **CHECK** audio count rate audible in Cntmt.	**IF** audible audio count rate is **NOT** being received in Cntmt, **THEN**: a. **TURN** AMPLIFIER SELECT switch to A1 [1-M-13 switch on rear of amplifier]. b. **CHECK** an audible count rate in Cntmt.
• **REFER TO** Tech Spec 3.9.3, Nuclear Instrumentation.	

Step	Action/Expected Response	Response Not Obtained

3.2 Source Range Monitor (SRM) Failure (continued)

11. **NOTIFY** Operations Duty Manager and Rx Engineering of failed channel.

12. **INITIATE** repair of SRM.

13. **DO NOT CONTINUE** UNTIL SRM repair complete.

14. **CHECK** SRM operable:

- **CHECK** INSTRUMENT POWER ON and CONTROL POWER ON lights LIT at NIS racks [1-M-13].
- **CHECK** NON-OPERATE light DARK [1-M-13].
- **CHECK** audio count rate operating in control room for MODES 2 through 6.
- **CHECK** audio count rate operating in Cntmt for MODE 6.
- **COMPARE** channel output.

Step	Action/Expected Response	Response Not Obtained

3.2 Source Range Monitor (SRM) Failure (continued)

15. **IF** shutdown monitor required,
THEN:

    a. **RESET** shutdown monitor:

        1) **ENSURE** power switch on Shutdown Monitor is ON.

        2) **RESET** the Alarm Setpoint with the black pushbutton to the right of the display.

        3) **RESET** the Alarm with the black pushbutton to the right of the "alarm" light.

    b. **PLACE** HIGH FLUX AT SHUTDOWN switch in NORMAL.

16. **PLACE** LEVEL TRIP switch in NORMAL [1-M-13].

17. **IF** refueling activities were stopped due to source range monitor problems,
THEN
OBTAIN Plant Manager approval prior to resuming refueling activities.

18. **RETURN TO** Instruction in effect.

End of Section

Step	Action/Expected Response	Response Not Obtained

3.3 Intermediate Range Monitor (IRM) Failure

1. **IF** greater than P-6 and less then P-10 with BOTH IRM channels failed,
THEN
STOP positive reactivity changes.

NOTE Placing the affected channel in bypass will cause either window 64B or 65B to alarm.

2. **PLACE** failed channel LEVEL TRIP switch to BYPASS [1-M-13].

3. **ENSURE** 1-NR-92-145 recording an operable IRM.

4. **REFER TO** Tech Spec 3.3.1, Rx Trip System Instrumentation and 3.3.3, PAM Instruments.

5. **NOTIFY** Operations Duty Manager and Rx Engineering of any failed channel.

6. **INITIATE** repair of IRM.

7. **DO NOT CONTINUE** UNTIL repairs are complete.

Step	Action/Expected Response	Response Not Obtained

3.3 Intermediate Range Monitor (IRM) Failure (continued)

8. **CHECK** intermediate range monitor operable:

   - **CHECK** INSTRUMENT POWER ON and CONTROL POWER ON lights LIT at NIS racks [1-M-13].

   - **CHECK** NON-OPERATE light DARK [1-M-13].

   - **COMPARE** channel output.

9. **PLACE** failed channel LEVEL TRIP switch in NORMAL [1-M-13].

10. **RETURN TO** Instruction in effect.

End of Section

Step	Action/Expected Response	Response Not Obtained

3.4 Power Range Monitor (PRM) Failure

NOTE Steps 1and 2 are **IMMEDIATE ACTION** steps

1.	**PLACE** control rods in MANUAL.	
2.	**CHECK** rod motion STOPPED.	(ρ) **TRIP** Rx. ** **GO TO** 1-E-0, Reactor Trip or Safety Injection.
3.	**CHECK** S/G levels NORMAL	**ENSURE** affected S/G level controls in Manual **AND** **CONTROL** S/G levels on program. (ρ) **IF** S/G level RISING **OR** **DROPPING** uncontrolled, **THEN** **TRIP** reactor, and **GO TO** 1-E-0, Reactor Trip or Safety Injection.

Step	Action/Expected Response	Response Not Obtained

3.4 Power Range Monitor (PRM) Failure (continued)

NOTE Control rod withdrawal may **NOT** be possible if a PRM has failed high due to the 103% Rod Withdrawal Stop (C-2) until PRM is defeated. (Annunciator window 83-A).

4. **MAINTAIN** T_{AVG} and T_{REF} within 3°F.

5. **DEFEAT** failed PRM functions using the appropriate attachment:

   - **REFER TO** Attachment 1, Defeat N-41 PRM Function At NIS Rack.
   - **REFER TO** Attachment 2, Defeat N-42 PRM Function At NIS Rack.
   - **REFER TO** Attachment 3, Defeat N-43 PRM Function At NIS Rack.
   - **REFER TO** Attachment 4,Defeat N-44 PRM Function At NIS Rack.

6. **ENSURE** 1-NR-92-145 recording an operable PRM.

Step	Action/Expected Response	Response Not Obtained

3.4 Power Range Monitor (PRM) Failure (continued)

NOTE Inputs to 1-TR-68-2A include power range monitor, pressurizer pressure, ΔT and T_{AVG}. Selection of an operable channel should consider other failures in addition to the failed power range monitor channel.

7. **ENSURE** 1-TR-68-2A placed to operable ΔT/OTΔT/OPΔT channel using 1-XS-68-2B, ΔT RCDR TR-68-2A LOOP SELECT [1-M-5].

8. **INITIATE** Repair on failed equipment.

CAUTION **Allowing at least 5 minutes between any rod control input (i.e., T_{AVG}, T_{REF}, or NIS) changes and placing rods in AUTO, will help prevent undesired control rod movement.**

9. **WHEN** AUTO rod control desired, **THEN**:

   a. **ENSURE** T_{AVG} and T_{REF} within 1°F.

   b. **ENSURE** zero demand on control rod position indication [1-M-4].

   c. **PLACE** control rods in AUTO.

Step	Action/Expected Response	Response Not Obtained

3.4 Power Range Monitor (PRM) Failure (continued)

10. **NOTIFY** Work Control to have IM trip failed channel bistables.

11. **REFER TO** Tech Specs:
    - 3.3.1, Rx Trip System (RTS) Instrumentation, table for minimum channels.
    - 3.2.4, Quadrant Power Tilt Ratio (QPTR).
    - SR 3.2.4.2 for loss of one channel may require performance of 1-SI-0-22, Incore QPTR.

CAUTION **Power fuses should NOT be removed during the performance of IMI-160 until affected PRM channel is in DCS BYPASS.**

12. **WHEN** notified bistables are tripped, **THEN** **CHECK** lights and alarms referenced in Appendix A are LIT.

    CONTACT Work Control to have IMs immediately troubleshoot the problem.

13. **NOTIFY** Operations Duty Manager and Rx Engineering of failed channel.

14. **DO NOT CONTINUE** with this Instruction UNTIL failed PRM repair is completed.

15. **CHECK** failed channel trip status lights and associated alarms in Appendix A are CLEAR.

    NOTIFY Work Control to have IM troubleshoot problem.

    ENSURE trip status lights DARK before continuing this Instruction.

Step	Action/Expected Response	Response Not Obtained

3.4 Power Range Monitor (PRM) Failure (continued)

CAUTION **Allowing at least 5 minutes between any rod control input (i.e., T_{AVG}, T_{REF}, or NIS) changes and placing rods in AUTO, will help prevent undesired control rod movement.**

16. **WHEN** PRM is to be restored, **THEN**:

    a. **PLACE** control rods in MANUAL.

    b. **PERFORM** the appropriate attachment for returning PRM to service:

    - **REFER TO** Attachment 1, Defeat N-41 PRM Function At NIS Rack, Step B.
    - **REFER TO** Attachment 2, Defeat N-42 PRM Function At NIS Rack, Step B.
    - **REFER TO** Attachment 3, Defeat N-43 PRM Function At NIS Rack, Step B.
    - **REFER TO** Attachment 4, Defeat N-44 PRM Function At NIS Rack, Step B.

    c. **ENSURE** T_{AVG} and T_{REF} within 1°F.

    d. **ENSURE** zero demand on control rod position indication [1-M-4].

    e. **IF** auto rod control desired, **PLACE** control rods in AUTO.

17. **RETURN TO** Instruction in effect.

End of Section

4.0 DISCUSSION

4.1 Source Range Failure

SRM channels N131 & N132 are blocked manually above P-6. SRM channel indications are automatically removed above P-10. SRM channel failure may be evidenced by various alarms caused by loss of supply voltage, or the channel indicating high, low, and/or erratic. If one SRM channel fails high, Rx will trip at 10^5 cps unless the SRM trip is blocked. Audio count rate is required in Cntmt and in the Control Room when refueling operations are being conducted, and should be operating in the Control Room at all times when the source range channels are in service.

4.2 Intermediate Range Failure

Malfunction of an IRM channel N135 or N136 may be evidenced by erratic or loss of indication, various alarms caused by loss of supply voltage, or by the channel indicating high, low, or erratic. One of two IRMs indicating greater than 25% power (and **NOT** blocked) will cause an Rx trip.

4.3 Power Range Failure

PRM channel malfunction may be evidenced by erratic or loss of indication, various alarms caused by loss of supply voltage, or the channel indicating high, low, or erratic. Greater than one PRM must fail high before Rx will trip on high flux.

DCS median signal selector will select the high-median value of the 4 PRM channels as NIS power to the S/G level setpoint for all four S/Gs. If two channels fail (one high and one low) the S/G level setpoint is defaulted to the Last Good Value (LGV).

The failure of one PRM to a value greater than 103% will result in an Auto/Manual Rod withdrawal block.

The rod control circuitry contains multiple lead/lag modules. Even with T_{AVG}/T_{REF} matched within 1 °F, rod movement could occur when the rods are returned to AUTO if rod control inputs change while rods were in MANUAL.

- Decay time for T_{AVG} lead/lag modules is approximately 3 minutes.
- Decay time for T_{REF} lead/lag modules and NIS lead/lag modules is approximately 5 minutes.

Allow at least 5 minutes between any change to rod control inputs (i.e., T_{AVG}, T_{REF}, or NIS) and placing rods in AUTO, this will help prevent undesired control rod movement.

Ensuring zero demand on the CERPI monitors in the main control room will also help prevent undesired control rod movement.

5.0 REFERENCES

5.1 Performance

A. 1-E-0, Reactor Trip or Safety Injection.

B. 1-AOI-34, Immediate Boration.

C. 1-SI-0-10, Shutdown Margin.

D. 1-SI-0-22, Incore QPTR.

E. 1-SOI-98.01, Distributed Control System.

5.2 Developmental

A. IMI-160.001, Removal of Reactor Protection System Channel I From Service.

B. IMI-160.002, Removal of Reactor Protection System Channel II From Service.

C. IMI-160.003, Removal of Reactor Protection System Channel III From Service.

D. IMI-160.004, Removal of Reactor Protection System Channel IV From Service.

5.3 Technical Specifications (Tech Specs)

A. 3.3.1, Reactor Trip System (RTS) Instrumentation.

B. 3.3.3 Post Accident Monitoring (PAM) Monitoring

C. 3.3.4 Remote Shutdown System

D. 3.2.4, Quadrant Power Tilt Ratio (QPTR), SR 3.2.4.2 for loss of one channel.

E. 3.9.3, Nuclear Instrumentation.

Appendix A
(Page 1 of 4)

Power Range Failure

N41 Power Range Failure

COMPARATOR	R PANEL	STATUS LIGHT	ANNUNCIATOR
TB-411C (overtemp delta t trip)	R-2	[1-XX-55-5, window 10] LOOP 1 OT∆T TRIP TS-68-2D	[123-C] OVERTEMP ∆T TRIP ALERT
TB-411D (overtemp turb rbk & blk rod withdrawal)	R-2	[1-XX-55-5, window 15] LOOP 1 OT∆T RUN BACK TS-68-2E	[123-D] OVERTEMP ∆T TURB RUNBACK & C-3 ROD BLOCK
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 7] PR FLUX HI NC41R	[115-C] POWER RANGE FLUX HI
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 8] PR HI RATE NC41U/K	[115-E] POWER RANGE FLUX RATE HI

Appendix A
(Page 2 of 4)

Power Range Failure

N42 Power Range Failure

COMPARATOR	R PANEL	STATUS LIGHT	ANNUNCIATOR
TB-421C (overtemp delta t trip)	R-6	[1-XX-55-5, window 30] LOOP 2 OT∆T TRIP TS-68-25D	[123-C] OVERTEMP ∆T TRIP ALERT
TB-421D (overtemp turb rbk & blk rod withdrawal)	R-6	[1-XX-55-5, window 35] LOOP 2 OT∆T RUN BACK TS-68-25E	[123-D] OVERTEMP ∆T TURB RUNBACK & C-3 ROD BLOCK
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 27] PR FLUX HI NC42R	[115-C] POWER RANGE FLUX HI
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 28] PR HI RATE NC42U/K	[115-E] POWER RANGE FLUX RATE HI

Appendix A
(Page 3 of 4)

Power Range Failure

N43 Power Range Failure

COMPARATOR	R PANEL	STATUS LIGHT	ANNUNCIATOR
TB-431C (overtemp delta t trip)	R-10	[1-XX-55-5, window 50] LOOP 3 OT∆T TRIP TS-68-44D	[123-C] OVERTEMP ∆T TRIP ALERT
TB-431D (overtemp turb rbk & blk rod withdrawal)	R-10	[1-XX-55-5, window 55] LOOP 3 OT∆T RUN BACK TS-68-44E	[123-D] OVERTEMP ∆T TURB RUNBACK & C-3 ROD BLOCK
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 47] PR FLUX HI NC43R	[115-C] POWER RANGE FLUX HI
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 48] PR HI RATE NC43U/K	[115-E] POWER RANGE FLUX RATE HI

Appendix A
(Page 4 of 4)

Power Range Failure

N44 Power Range Failure

COMPARATOR	R PANEL	STATUS LIGHT	ANNUNCIATOR
TB-441C (overtemp delta t trip)	R-13	[1-XX-55-5, window 70] LOOP 4 OT∆T TRIP TS-68-67D	[123-C] OVERTEMP ∆T TRIP ALERT
TB-441D (overtemp turb rbk & blk rod withdrawal)	R-13	[1-XX-55-5, window 75] LOOP 4 OT∆T RUN BACK TS-68-67E	[123-D] OVERTEMP ∆T TURB RUNBACK & C-3 ROD BLOCK
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 67] PR FLUX HI NC44R	[115-C] POWER RANGE FLUX HI
N/A	1-M-13 when fuses pulled	[1-XX-55-5, window 68] PR HI RATE NC44U/K	[115-E] POWER RANGE FLUX RATE HI

Attachment 1
(Page 1 of 3)

Defeat N-41 PRM Function At NIS Rack

1.0 INSTRUCTIONS

NOTE

The following annunciators may be affected by defeating N-41 PRM channel:

- [66-C] N-41 OVERPOWER ROD STOP BYPASSED.
- [82-E] NIS CHANNEL IN TEST.
- [83-A] POWER RANGE OVERPOWER ROD WD STOP.
- [83-E] POWER RANGE CHANNEL DEVIATION.
- [115-C] POWER RANGE FLUX HI.
- [115-E] POWER RANGE FLUX RATE HI.

A. **PERFORM** the following steps for N-41 PRM:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to **PRN41**. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to **PRN41**. ☐

NOTE

On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 66-C, N-41 OVERPOWER ROD STOP BYPASSED, will come into alarm.

3. **PLACE** ROD STOP BYPASS switch to **BYPASS PR N41**. ☐

4. **PLACE** POWER MISMATCH BYPASS switch to **BYPASS PR N41**. ☐

Attachment 1
(Page 2 of 3)

Defeat N-41 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

NOTE

On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch to **N41**. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
   THEN
   RESET RATE MODE switch. ☐

7. **PLACE** N-41 in Maintenance Bypass using DCS Operator Display:

   a. **SELECT** “BYPASSED TRANSMITTERS" from the BOP MENU. ☐

   b. **SELECT** 1LPY0920412P. ☐

   c. **SELECT** “MAINT BYP SIGNAL A for 1LPY0920412P. ☐

   d. **CONFIRM** “MAINT BYP SIGNAL A” changes from gray to red. ☐

   e. **VERIFY** yellow “BYP” displayed above column A. ☐

Attachment 1
(Page 3 of 3)

Defeat N-41 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

B. **WHEN** PRM is ready for return to service,
THEN
PERFORM the following Steps:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION in NORMAL. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION in NORMAL. ☐

NOTE

On the following step, annunciator window 66-C, N-41 OVERPOWER ROD STOP BYPASSED, will clear.

3. **PLACE** ROD STOP BYPASS switch in OPERATE. ☐

4. **PLACE** POWER MISMATCH BYPASS switch in OPERATE. ☐

NOTE

On the following step, annunciator window 82-E, NIS CHANNEL IN TEST, will clear.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch in NORMAL. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
THEN
RESET RATE MODE switch. . ☐

7. **ENSURE** N-41 PRM channel RESTORED from Bypass in DCS per 1-SOI-98.01. ☐

Attachment 2
(Page 1 of 3)

Defeat N-42 PRM Function At NIS Rack

1.0 INSTRUCTIONS

NOTE

The following annunciators may be affected by defeating N-42 PRM channel:

- [67-C] N-42 OVERPOWER ROD STOP BYPASSED.
- [82-E] NIS CHANNEL IN TEST.
- [83-A] POWER RANGE OVERPOWER ROD WD STOP.
- [83-E] POWER RANGE CHANNEL DEVIATION.
- [115-C] POWER RANGE FLUX HI.
- [115-E] POWER RANGE FLUX RATE HI.

A. **PERFORM** the following steps for N-42 PRM:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to **PRN42**. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to **PRN42**. ☐

NOTE

On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 67-C, N-42 OVERPOWER ROD STOP BYPASSED, will come into alarm.

3. **PLACE** ROD STOP BYPASS switch to **BYPASS PR N42**. ☐

4. **PLACE** POWER MISMATCH BYPASS switch to **BYPASS PR N42**. ☐

Attachment 2
(Page 2 of 3)

Defeat N-42 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

NOTE

On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch to **N42**. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
   THEN
   RESET RATE MODE switch. ☐

7. **PLACE** N-42 in Maintenance Bypass using DCS Operator Display:

   a. **SELECT** “BYPASSED TRANSMITTERS" from the BOP MENU. ☐

   b. **SELECT** 1LPY0920412Q. ☐

   c. **SELECT** “MAINT BYP SIGNAL B for 1LPY0920412Q. ☐

   d. **CONFIRM** “MAINT BYP SIGNAL B” changes from gray to red. ☐

   e. **VERIFY** yellow “BYP” displayed above column B. ☐

Attachment 2
(Page 3 of 3)

Defeat N-42 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

B. **WHEN** PRM is ready for return to service,
THEN
PERFORM the following Steps:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION in NORMAL. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION in NORMAL. ☐

NOTE

On the following step, annunciator window, 67-C, N-42 OVERPOWER ROD STOP BYPASSED, will clear.

3. **PLACE** ROD STOP BYPASS switch in OPERATE. ☐

4. **PLACE** POWER MISMATCH BYPASS switch in OPERATE. ☐

NOTE

On the following step, annunciator window 82-E, NIS CHANNEL IN TEST, will clear.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch in NORMAL. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
THEN
RESET RATE MODE switch. ☐

7. **ENSURE** N-42 PRM channel RESTORED from Bypass in DCS per 1-SOI-98.01. ☐

Attachment 3
(Page 1 of 3)

Defeat N-43 PRM Function At NIS Rack

1.0 INSTRUCTIONS

NOTE

The following annunciators may be affected by defeating N-43 PRM channel:

- [68-C] N-43 OVERPOWER ROD STOP BYPASSED.
- [82-E] NIS CHANNEL IN TEST.
- [83-A] POWER RANGE OVERPOWER ROD WD STOP.
- [83-E] POWER RANGE CHANNEL DEVIATION.
- [115-C] POWER RANGE FLUX HI.
- [115-E] POWER RANGE FLUX RATE HI.

A. **PERFORM** the following steps for N-43 PRM:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to **PRN43**. ☒

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to **PRN43**. ☒

NOTE

On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 68-C, N-43 OVERPOWER ROD STOP BYPASSED, will come into alarm.

3. **PLACE** ROD STOP BYPASS switch to **BYPASS PR N43**. ☒

4. **PLACE** POWER MISMATCH BYPASS switch to **BYPASS PR N43**. ☒

Attachment 3
(Page 2 of 3)

Defeat N-43 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

NOTE

On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch to **N43**. ☒

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
THEN
RESET RATE MODE switch. ☒

7. **PLACE** N-43 in Maintenance Bypass using DCS Operator Display:

   a. **SELECT** “BYPASSED TRANSMITTER" from the BOP MENU. ☒

   b. **SELECT** 1LPY0920412R. ☒

   c. **SELECT** “MAINT BYP SIGNAL D” for 1LPY0920412R. ☒

   d. **CONFIRM** “MAINT BYP SIGNAL D” changes from gray to red. ☒

   e. **VERIFY** yellow “BYP” displayed above column D. ☒

Attachment 3
(Page 3 of 3)

Defeat N-43 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

B. **WHEN** PRM is ready for return to service,
THEN
PERFORM the following Steps:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION in NORMAL. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION in NORMAL. ☐

NOTE

On the following step, annunciator window 68-C, N-43 OVERPOWER ROD STOP BYPASSED, will clear.

3. **PLACE** ROD STOP BYPASS switch in OPERATE. ☐

4. **PLACE** POWER MISMATCH BYPASS switch in OPERATE. ☐

NOTE

On the following step, annunciator window 82-E, NIS CHANNEL IN TEST, will clear.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch in NORMAL. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
THEN
RESET RATE MODE switch. ☐

7. **ENSURE** N-43 PRM channel RESTORED from Bypass in DCS per 1-SOI-98.01. ☐

Attachment 4
(Page 1 of 3)

Defeat N-44 PRM Function At NIS Rack

1.0 INSTRUCTIONS

NOTE

The following annunciators may be affected by defeating N-44 PRM channel:

- [69-C] N-44 OVERPOWER ROD STOP BYPASSED.
- [82-E] NIS CHANNEL IN TEST.
- [83-A] POWER RANGE OVERPOWER ROD WD STOP.
- [83-E] POWER RANGE CHANNEL DEVIATION.
- [115-C] POWER RANGE FLUX HI.
- [115-E] POWER RANGE FLUX RATE HI.

A. **PERFORM** the following steps for N-44 PRM:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION to **PRN44**. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION to **PRN44**. ☐

NOTE

On the following step, annunciator window 83-A, POWER RANGE OVERPOWER ROD WD STOP will clear (if channel failure was high) and window 69-C, N-44 OVERPOWER ROD STOP BYPASSED, will come into alarm.

3. **PLACE** ROD STOP BYPASS switch to **BYPASS PR N44**. ☐

4. **PLACE** POWER MISMATCH BYPASS switch to **BYPASS PR N44**. ☐

Attachment 4
(Page 2 of 3)

Defeat N-44 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

NOTE

On the following step, annunciator window 83-E, POWER RANGE CHANNEL DEVIATION, will clear and annunciator window 82-E, NIS CHANNEL IN TEST, will come into alarm.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch to **N44**. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
   THEN
   RESET RATE MODE switch. ☐

7. **PLACE** N-44 in Maintenance Bypass using DCS Operator Display:

   a. **SELECT** “BYPASSED TRANSMITTER" from the BOP MENU. ☐

   b. **SELECT** 1LPY0920412S. ☐

   c. **SELECT** “MAINT BYP SIGNAL E” for 1LPY0920412S. ☐

   d. **CONFIRM** “MAINT BYP SIGNAL E” changes from gray to red. ☐

   e. **VERIFY** yellow “BYP” displayed above column E. ☐

Attachment 4
(Page 3 of 3)

Defeat N-44 PRM Function At NIS Rack

1.0 INSTRUCTIONS (continued)

B. **WHEN** PRM is ready for return to service,
THEN
PERFORM the following Steps:

1. **PLACE** DETECTOR CURRENT COMPARATOR switch for UPPER SECTION in NORMAL. ☐

2. **PLACE** DETECTOR CURRENT COMPARATOR switch for LOWER SECTION in NORMAL. ☐

NOTE

On the following step, annunciator window 69-C, N-44 OVERPOWER ROD STOP BYPASSED, will clear.

3. **PLACE** ROD STOP BYPASS switch in OPERATE. ☐

4. **PLACE** POWER MISMATCH BYPASS switch in OPERATE. ☐

NOTE

On the following step, annunciator window 82-E, NIS CHANNEL IN TEST, will clear.

5. **PLACE** COMPARATOR CHANNEL DEFEAT switch in NORMAL. ☐

NOTE

On the following step, annunciator window 115-E, POWER RANGE FLUX RATE HI, will clear if the positive rate trip light is LIT.

6. **IF** POSITIVE RATE TRIP is LIT,
THEN
RESET RATE MODE switch. ☐

7. **ENSURE** N-44 PRM channel RESTORED from Bypass in DCS per 1-SOI-98.01. ☐

Watts Bar Nuclear Plant

NRC EXAM 2013-302

System JPM **D**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE

D

NRC EXAM 2013-302

EVALUATION SHEET

Task: Establish Manual Makeup to the VCT.

Alternate Path: When manual makeup is begun, 1-FCV-62-140, BA TO BLENDER and 1-FCV-62-128, MAKEUP TO VCT INLET or 1-FCV-62-144, MAKEUP TO VCT OUTLET fail open and cannot be closed. 1-FC-62-139, BA TO BLENDER FCV-62-140 CONTROL fails, causing boric acid flow rate to go to maximum. Requires stopping of the boric acid transfer pumps to terminate the boration.

Facility JPM #: 3-OT-JPMR050A (Modified to add Alternate Path.)

Safety Function: 2 **Title:** Inventory Control

K/A 004 A1.12 Ability to manually operate and/or monitor in the control room: Boration/dilution batch control.

Rating(s): 3.8/3.3 **CFR:** 41/7 / 45.5 to 45.8

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: SOI-62.02, "Boron Concentration Control," Rev. 56.
AOI-3, "Malfunction of Reactor Makeup Control," Rev. 29.

Task Number: RO-062-SOI-62-017 **Title:** Perform manual makeup to the Volume Control Tank.

Task Standard: The applicant

1.) Aligns the makeup control system to perform a MANUAL makeup of 97 gallons, and raises VCT level from 35% to approximately 40%.

2.) After the controls fail, terminates the boration by placing 1-HS-62-230A BA PMP A and 1-HS-62-232A BA PMP B in the STOP position per AOI-3.

Validation Time: 20 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
D
NRC EXAM 2013-302

SIMULATOR OPERATOR INSTRUCTIONS:

6

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 308 by performing the following actions:**
   a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   b. **Locate IC 308.**
   c. **Right "click" on IC 308.**
   d. **Select Reset on the drop down menu.**
   e. **Right "click" on RESET.**
   f. **Enter the password for IC 308.**
   g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   h. **Perform SWITCH CHECK.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	hs-62-140b	hs-62-140b cvcs makeup mode selector sw	O		00:00:00	00:00:00	00:00:00		man	altdil
	hs-62-128	hs-62-128 boric acid blender to vct inlet sw	O	29	00:00:00		00:00:00		open	auto
	hs-62-140d	hs-62-140d boric acid to blender flow control sw	O	30	00:00:00		00:00:00		open	auto
	hs-62-130	26070 boric acid flow to blender	O	30	00:00:00		00:00:00		4	0
	hs-62-144	hs-62-144makeup injection valve control sw	O	28	00:00:00		00:00:00		open	auto

4. **ENSURE Events 28, 29 and 30 are loaded. [(Event 28: cvfcv62144>0) (Event 29: cvfcv62128>0) (Event 30: cvfcv62128>0 │ cvfcv62144>0)]**
5. **Place simulator in RUN and acknowledge any alarms. ENSURE VCT level is 35% on 1-LI-62-129A, VCT LEVEL.**
6. **ENSURE copies of SOI-62.02, "Boron Concentration Control," Section 6.5, "Manual Makeup" and REACTW data sheets for the VCT level change are available to the Examiner.**
7. **ENSURE "Extra Operator" is present in the simulator.**
8. **Place simulator in FREEZE until Examiner cue is given.**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
D
NRC EXAM 2013-302

READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is at 100% RTP.**
2. **Auto Make-up from the Blender is out-of-service.**
3. **The STA has completed Appendix C, "Calculation Of Boric Acid And Primary Water Integrator Setting For Manual Makeup," using REACTINW to raise VCT level from 35% to 40%.**

INITIATING CUES:

The Unit Supervisor directs you to increase VCT level from 35% to 40%, using 1-SOI-62.02, "Boron Concentration Control," Section 6.5, "Manual Makeup," and the Appendix C/REACTINW data provided.

Notify the Unit Supervisor when the level increase has been completed.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

CAUTION

When maintaining VCT level using Manual, level must be monitored closely to avoid charging pump suction auto swap over to RWST.

NOTES

1) Manual is used when auto makeup is unavailable or if desired due to special operating conditions. As RCS CB is changed during load follow, the Manual blended solution setpoints must be adjusted. Controls are on 1-M-6.
2) RCS CB may be slightly changed during blended makeup because of the inaccuracy in flow controller settings. When this occurs, small RCS temperature changes will be seen and control rod adjustments may be required to compensate for the temperature change.
3) If batching to the VCT, use several small batches, (rather than one large batch) to allow time to evaluate possible reactivity effects between batches. A maximum batch of 100 gallons at a time is allowed

EXAMINER: Ensure that the applicant has been provided the REACTINW sheet for the level increase to 40%.

STEP 1: [1] **PERFORM** Appendix C, Calculation Of Boric Acid And Primary Water Integrator Setting For Manual Makeup OR USE Appendix B for Blending at greater than 2500 ppm. STANDARD: Applicant determines that Appendix C is complete based on INITIAL CONDITION 3 and utilizes the REACTINW printout provided. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 2: [2] **PLACE** controllers in MANUAL, **AND CLOSE** the following: [2.1] 1-FC-62-139, BA TO BLENDER. [2.2] 1-FC-62-142, PW TO BLENDER. STANDARD: Applicant locates 1-FC-62-139, BA TO BLENDER and moves the toggle switch from the AUTO (down, mid-position) to the MANUAL (up, in the slot) position, and lowers demand to zero. Applicant locates 1-FC-62-142, PW TO BLENDER and moves the toggle switch from the AUTO (down, mid-position) to the MANUAL (up, in the slot) position, and lowers demand to zero. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 3: [3] **ADJUST** Batch Counters for the desired quantity of boric acid and primary water using values from Appendix B or C: [3.1] 1-FQ-62-139, BA BATCH COUNTER. [3.2] 1-FQ-62-142, PW BATCH COUNTER. STANDARD: ___The applicant locates 1-FQ-62-139 BA BATCH COUNTER, and performs the following actions: 1. Depresses and holds the black pushbutton. 2. While holding the pushbutton, the applicant raises the red translucent cover. 3. While still holding the pushbutton, the applicant enters **"000012"** in the display. 4. While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton. 5. Observes the value displayed after the red translucent cover is lowered remained at "000012." ___The applicant locates 1-FQ-62-142, PW BATCH COUNTER. and performs the following actions: 1. Depresses and holds the black pushbutton. 2. While holding the pushbutton, the applicant raises the red translucent cover. 3. While still holding the pushbutton, the applicant enters **"000085"** in the display. 4. While still holding the pushbutton, the applicant lowers the red translucent cover, and then releases the pushbutton. 5. Observes the value displayed after the red translucent cover is lowered remained at "000085." COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 4: [4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in MAN. STANDARD: ___Applicant locates 1-HS-62-140B, VCT MAKEUP MODE, and determines that the handswitch is in the MAN position. COMMENTS:	___ SAT ___ UNSAT
STEP 5: [5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START, [5.1] **CHECK** Red light is LIT. STANDARD: ___Applicant locates 1-HS-62-140A, VCT MAKEUP CONTROL and rotates the handswitch to the right to the START position. The applicant observes the GREEN light is DARK and the RED light is LIT. **Step is critical since this action is required to initiate manual makeup.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

NOTE

When blending to VCT through 1-FCV-62-128, Chemistry cannot get a representative sample of the blender outlet.

EXAMINER: When the applicant opens either 1-HS-62-128, MAKEUP TO VCT INLET or 1-HS-62-144, MAKEUP TO VCT OUTLET, the selected valve will fail open; 1-FCV-62-140D, BA TO BLENDER will fail OPEN; and 1-FC-62-139, BA TO BLENDER FCV-62-140 CONTROL will fail.

This combination of malfunctions will require the applicant to stop the boric acid pumps to terminate the boration.

STEP/STANDARD	SAT/UNSAT
STEP 6: [6] **IF** Borating OR Blending, **THEN PERFORM** the following: [6.1] **OPEN** 1-FCV-62-128, MAKEUP TO VCT INLET, **OR** 1-FCV-62-144, MAKEUP TO VCT OUTLET. STANDARD: ___The applicant locates 1-FCV-62-128, MAKEUP TO VCT INLET, and rotates the handswitch from the "P AUTO" position to the "OPEN" position **OR** ___The applicant locates 1-FCV-62-144, MAKEUP TO VCT OUTLET., and rotates the handswitch from the "P AUTO" position to the "OPEN" position **Step is critical since this establishes a flow path to fill the VCT.** ***CUE: If asked by applicant which makeup path to use, ask applicant which one they would recommend. When the applicant chooses, then state that the Unit Supervisor agrees with the path recommended.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

EXAMINER: The applicant may stop the boric acid transfer pumps prior to entry into AOI-3, "Malfunction of Reactor Makeup Controls."

TI-12.04, User's Guide For Abnormal And Emergency Operating Instructions," states "Operators are expected to take manual control of equipment that is not responding properly in Auto due to equipment malfunction."

If the applicant exercises this path, go to JPM STEP 13.

STEP/STANDARD	SAT/UNSAT
EXAMINER: The following actions are taken from AOI-3, "Malfunction of Reactor Makeup Controls."	
STEP 7: 1. **ENSURE** 1-FCV-62-138, Emerg Borate, CLOSED. STANDARD: Applicant locates and determines that 1-FCV-62-138, Emerg Borate, is CLOSED by observing the GREEN light LIT, RED light DARK on 1-HS-62-138 EMERG BORATE. COMMENTS:	___ SAT ___ UNSAT
STEP 8: 2. **CHECK** 1-FI-62-137A, Emerg Borate Flow, ZERO. STANDARD: Applicant locates and observes zero flow on 1-FI-62-137A, EMER BORATE FLOW. COMMENTS:	___ SAT ___ UNSAT
STEP 9: 3. **CHECK** VCT level greater than 20%: • 1-LI-62-129A. STANDARD: Applicant locates and observes VCT level approximately 27% on 1-LI-62-129A, VCT LEVEL. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10: 4. **CHECK** VCT aligned to charging pump suction: • 1-LCV-62-132 OPEN. • 1-LCV-62-133 OPEN. • 1-LCV-62-135 CLOSED. • 1-LCV-62-136 CLOSED. STANDARD: Applicant locates and observes the following: 1-HS-62-132, VCT TO CHARGING PUMPS SUCTION, RED light LIT, GREEN light DARK. 1-HS-62-133 OPEN, VCT TO CHARGING PUMPS SUCTION, RED light LIT, GREEN light DARK. 1-HS-62-135, RWST TO CHARGING PUMPS SUCTION, RED light DARK, GREEN light LIT. 1-HS-62-136, RWST TO CHARGING PUMPS SUCTION, RED light DARK, GREEN light LIT. COMMENTS:	___ SAT ___ UNSAT
STEP 11: 5. **CHECK** 1-FI-62-139, BA To Blender Flow, ZERO. STANDARD: If applicant has stopped the Boric Acid Transfer pumps PRIOR to performing this step, then the applicant observes flow ZERO flow on 1-FI-62-139, BA TO BLENDER FLOW. If applicant has NOT stopped the Boric Acid Transfer pumps PRIOR to performing this step, then the applicant observes flow on 1-FI-62-139, BA TO BLENDER FLOW. Step 5 **RESPONSE NOT OBTAINED** actions would then be taken. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
EXAMINER: The actions of Step 5 RESPONSE NOT OBTAINED are provided, but are only applicable if the applicant has NOT stopped the Boric Acid Pumps.	
STEP 11: 5. **RESPONSE NOT OBTAINED** Locally **CLOSE** 1-ISV-62-927, Blend Acid Supply [A4U/713]. STANDARD: If applicant has NOT stopped the Boric Acid Transfer pumps PRIOR to performing this step, then the applicant observes flow on 1-FI-62-139, BA TO BLENDER FLOW. COMMENTS:	___ SAT ___ UNSAT
STEP 12: 6. **ENSURE** 1-FCV-62-140, Boric Acid To Blender, CLOSED. STANDARD: Applicant locates and determines that 1-HS-62-140D, BA TO BLENDER is OPEN by the RED light LIT and GREEN light DARK. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 13: [6] **RESPONSE NOT OBTAINED** **STOP** boric acid transfer pumps. STANDARD: Applicant locates 1-HS-62-230A BA PMP A and rotates the handswitch to the LEFT to the STOP position. Applicant observes GREEN light LIT and RED light DARK. Applicant may place the STOP-PULL-TO-LOCK position. Applicant locates 1-HS-62-232A BA PMP B and rotates the handswitch to the LEFT to the STOP position. Applicant observes GREEN light LIT and RED light DARK. Applicant may place the STOP-PULL-TO-LOCK position. **Step is critical since this terminates the uncontrolled boration in progress.** ***Cue: When the applicant has stopped the boric acid transfer pumps, state "another operator will continue from this point."*** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME _____

D

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **The Unit is at 100% RTP.**
2. **Auto Make-up from the Blender is out-of-service.**
3. **The STA has completed Appendix C, "Calculation Of Boric Acid And Primary Water Integrator Setting For Manual Makeup," using REACTINW to raise VCT level from 35% to 40%.**

INITIATING CUES:

The Unit Supervisor directs you to increase VCT level from 35% to 40%, using 1-SOI-62.02, "Boron Concentration Control," Section 6.5, "Manual Makeup," and the Appendix C/REACTINW data provided.

Notify the Unit Supervisor when the level increase has been completed.

Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

SOI-62.02

Boron Concentration Control

Revision 0056

Quality Related

Level of Use: Continuous Use

YFU
Today
DAH

Effective Date: 06-27-2013

Responsible Organization: OPS, Operations

Prepared By: P.R. Neu

Approved By: R.B. Nessell

Revision Log

Rev or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
51	10/01/10	2, 4, 7, 9-12, 14-17, 19, 21, 23-29, 31-33, 35, 38, 40-44, 57	Minor/editorial revision: Added signoffs to Steps 8.1[22] through 8.1[25] (PCR 4637). Added (ρ) notation for direct reactivity steps. Reformatted source notes, added section end identification and created external attachments for all checklists.
UC-1	12/31/10	2, 33, 35-39	Added steps to section 8.2 to prevent invalid data being sent to the BEACON core monitoring software [SR 303078] [DCN 52277]. Minor/ Editorial and administrative changes to correct step number in NOTE in section 8.1, change branching steps to IF/THEN logic and reformatted a step for ease of use.
52	01/11/11	2, 33, 35, 36, 38, 39	Incorporate UC-1
53	07/14/11	2, 7	Minor Editorial change. PER 367518: Revise Section 3.0.B to state pressurizer boron concentration should be within 50 ppm of RCS boron concentration.
54	07/16/12	2, 7, 35, 50, 51	Added P&L to show overflow volume of the RWST [PER 522766] Corrected formulas to use subscripts for better formula formatting [PCR 5826] Corrected Cross References in Appendix C section 2.0 [PCR 5964]
UC-1	08/29/12	2, 26, 27	Removed notes defining minor boration and dilution from section 6.6 and 6.7.
55	09/04/12	2, 26, 27	Incorporated UC-1.
56	06/27/13	2, 18, 40	Updated procedure steps for Boron Concentration Control [PER708518-001]

Table of Contents

Table of Contents (continued)

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose

To provide instructions for operation of the CVCS Boron Concentration Control System.

1.2 Scope

This Instruction includes the following operations:

A. Startup (Standby Readiness)

B. Automatic Makeup

C. Dilution

D. Alternate Dilution

E. Boration

F. Manual Makeup

G. Minor Dilution

H. Minor Boration

I. RWST Makeup Using Blender

J. Batching to Holdup Tank A Prior to Pumping Transfer Canal

K. Major and Minor Boration with Boric Acid Integrator out of service

L. VCT Level Reduction

2.0 REFERENCES

2.1 Performance References

A. 1-TRI-62-3, Boric Acid Flow Paths: Valve Position Verification

B. NUPOP, Nuclear Parameters and Operations Package

C. SOI-62.01, CVCS-Charging and Letdown

D. SOI-62.05, Boric Acid Batching, Transfer and Storage

E. SOI-62.06, Boron Disposal System

F. SOI-78.01, Spent Fuel Pit Cooling and Cleaning System

G. SOI-81.01, Primary Makeup Water Systems

H. SOI-236.01, 125V DC Vital Battery Board I

I. TI-4 PART II, Pant Curve Book, Tank Curves, Turbine Curves

J. Tech Requirements Fig 3.1.6, Boric Acid Tank Limits

K. Computer Program REACTW and REACTW Computer Program User's Guide.

L. Computer Program REACTINW and REACTINW Computer Program User's Guide

M. TI-59, Boration Tables

2.2 Developmental References

A. Tech Spec Section 3.1, Reactivity Control Systems

B. System Description N3 62 4001, Chemical and Volume Control System

C. TVA Drawings:

1. 47W610-62-3
2. 47W611-62-2
3. 47W809-2
4. 47W812-1
5. 47W855-1

3.0 PRECAUTIONS AND LIMITATIONS

A. At least one Reactor Coolant Pump (RCP) or one Residual Heat Removal (RHR) Pump will be in operation during boron concentration (C_B) changes. [C.1][C.2][C.3]

B. Pressurizer (Pzr) C_B should be within 50 ppm of RCS C_B.

C. Axial Offset should be maintained in Target Band during C_B changes.

D. Normally the reactor will **NOT** be made critical by boron dilution.

E. Boric Acid Tank (BAT) level should be monitored during makeup or boration to avoid violating Tech Requirement (TR) 3.1.6 level limits, and consideration of the other requirements of TR 3.1.5 and 3.1.6 should be evaluated, particularly in sections which use the in-service BAT.

F. TI-59 Boration Tables were calculated using 70 gpm Primary Water flow up to 2500 ppm. For blending at concentrations greater than 2500 ppm, primary water flow will need to be adjusted downward per Appendix B while Boric Acid flow is maintained at 40 gpm (e.g. 100% on 1-FC-62-142)

G. Expect a delay between time boration/dilution is started until effect is seen in RCS.

H. When subcritical, Boration/Dilution effects are monitored by Source Range counts. Unexplained change in count rate requires the operation to be stopped.

I. At power, Boration/Dilution effects are monitored by Rod movement and T_{avg}. Operation must be stopped if Rods move in the wrong direction or T_{avg} change is unexplained.

J. The following should be evaluated as potential Reactivity Management issues: unanticipated

1. power change >0.5%,
2. rod motion > 5 steps,
3. T_{avg} change >1°F.

K. During refueling operations, boron concentration changes can affect Mansell readings. If Mansell is in service for RCS level indication, and RCS boron concentration is changed, the Boron Concentration Input value to Mansell should be adjusted.

L. The overflow volume for the RWST is 380,000 gallons. Overflow is through an 8" line which drains back into the pipe tunnel that connects with the auxiliary building.

Date Today Initials

4.0 PREREQUISITE ACTIONS

4.1 Preliminary Actions

NOTES

1) Throughout the Instruction where an **IF/THEN** statement occurs, the step should be **N/A** if stated condition does **NOT** exist.
2) Signoffs/information in unused Sections may be left blank.

[1] **INDICATE** Section to be performed, and reason for use:

5.0	Startup	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	6.5	8.0	Infrequent Operations	N/A

Section/ Reason/ Remarks: Raise VCT level from 35% to 40% using manual makeup.

4.2 Field Preparations

[1] **ENSURE** Section 3.0, Precautions, and Limitations, REVIEWED. DAH

[2] **CHECK** Primary Water System IN SERVICE (ref SOI-81.01). DAH

[3] **ENSURE** Refuel Water Storage Tank (RWST) and Boric Acid Tank(s) AVAILABLE. DAH

[4] **CHECK** Boric Acid Pump(s) IN OPERATION (ref SOI-62.05). DAH

4.3 Approvals and Notifications

[1] **COORDINATE** performance with US and UO. DAH

Date Today Initials

6.5 Manual Makeup

CAUTION

When maintaining VCT level using Manual, level must be monitored closely to avoid charging pump suction auto swap over to RWST.

NOTES

1) Manual is used when auto makeup is unavailable or if desired due to special operating conditions. As RCS CB is changed during load follow, the Manual blended solution setpoints must be adjusted. Controls are on 1-M-6.
2) RCS C_B may be slightly changed during blended makeup because of the inaccuracy in flow controller settings. When this occurs small RCS temperature changes will be seen and control rod adjustments may be required to compensate for the temperature change.
3) If batching to the VCT, use several small batches, (rather than one large batch) to allow time to evaluate possible reactivity effects between batches. A maximum batch of 100 gallons at a time is allowed.

[1] **PERFORM** Appendix C, Calculation Of Boric Acid And Primary Water Integrator Setting For Manual Makeup OR USE Appendix B for Blending at greater than 2500 ppm. ☑

[2] **PLACE** controllers in MANUAL, **AND**

CLOSE the following: ☐

[2.1] 1-FC-62-139, BA TO BLENDER. ☐

[2.2] 1-FC-62-142, PW TO BLENDER. ☐

[3] **ADJUST** Batch Counters for the desired quantity of boric acid and primary water using values from Appendix B or C:

[3.1] 1-FQ-62-139, BA BATCH COUNTER. ☐

[3.2] 1-FQ-62-142, PW BATCH COUNTER. ☐

[4] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in MAN. ☐

[5] **TURN** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. ☐

[5.1] **CHECK** Red light is LIT. ☐

Date_____ Initials

6.5 Manual Makeup (continued)

NOTE

When blending to VCT through 1-FCV-62-128, Chemistry cannot get a representative sample of the blender outlet.

[6] **IF** Borating OR Blending, **THEN**

PERFORM the following:

[6.1] **(ρ) OPEN** 1-FCV-62-128, MAKEUP TO VCT INLET, **OR** 1-FCV-62-144, MAKEUP TO VCT OUTLET. ☐

[6.2] **MANUALLY ADJUST** 1-FC-62-139, BA TO BLENDER, and 1-FC-62-142, PW TO BLENDER, to desired flow(s) using blending flowrates from Appendix C, OR Appendix B for Blending at greater than 2500 ppm. ☐

CAUTIONS

1) 1-FC-62-142 should be maintained above 10% due to potential for controller oscillations.
2) If 1-FCV-62-128, MAKEUP TO VCT INLET and FCV-62-144, MAKEUP TO VCT OUTLET are **NOT** closed, boric acid will feed to the VCT through 1-FCV-62-140, BA TO BLENDER. [C.5]

NOTE

When blending to VCT through 1-FCV-62-128, Chemistry cannot get a representative sample of the blender outlet.

[7] **IF** Diluting, **THEN**

PERFORM the following:

[7.1] **(ρ) OPEN** 1-FCV-62-128, MAKEUP TO VCT INLET. ☐

[7.2] **ADJUST** 1-FC-62-142, PW TO BLENDER, to desired flow. ☐

Date_____ Initials

6.5 Manual Makeup (continued)

[8] **IF** Alternate Diluting, **THEN**

PERFORM the following:

[8.1] **(ρ) OPEN** 1-FCV-62-144, MAKEUP TO VCT OUTLET and 1-FCV-62-128, MAKEUP TO VCT INLET. ☐

[8.2] **ADJUST** 1-FC-62-142, PW TO BLENDER, to desired flow. ☐

[9] **IF** RCS C_B is being changed, **THEN**

ENSURE 1-HS-68-341H, BACKUP HEATER C [1-M-4], is ON to equalize RCS-Pzr C_B. ☐

[10] **MONITOR** parameters listed below:

Instrument	Location	Parameters
1-PI-62-122	1-M-6	VCT PRESS
1-LI-62-129A	1-M-6	VCT LEVEL
1-FI-62-139	1-M-6	BA TO BLENDER FLOW
1-FQ-62-139	1-M-6	BA BATCH COUNTER
1-FI-62-142	1-M-6	PW TO BLENDER FLOW
1-FQ-62-142	1-M-6	PW BATCH COUNTER
1-LI-62-238	1-M-6	BAT A LEVEL
1-LI-62-242	1-M-6	BAT C LEVEL

[11] **IF** 1-LI-62-129A, VCT LEVEL, rises to 63% **THEN**

ENSURE 1-FCV-62-118A, LETDOWN DIVERT TO HUT, diverts to the HUT. ☐

[12] **WHEN** 1-LI-62-129A, VCT LEVEL, is at desired level, **THEN**

PERFORM the following:

[12.1] **PLACE** 1-HS-62-140A, VCT MAKEUP CONTROL, to STOP. ☐

[12.2] **CLOSE** 1-FCV-62-128, MAKEUP TO VCT INLET. ☐

[12.3] **CLOSE** 1-FCV-62-144, MAKEUP TO VCT OUTLET. ☐

Date_____ Initials

6.5 **Manual Makeup (continued)**

[13] **IF** used for Boration **AND** flushing is required, **THEN**

FLUSH per Section 6.3. ☐

[14] **IF** batch is greater than or equal to 500 gal, **THEN**

NOTIFY Chemistry to sample RCS C_B. ☐

[15] **IF** maintaining VCT level with Manual Makeup, **THEN**

REPEAT Steps 6.5[1] thru 6.5[14] as needed. ☐

[16] **ENSURE** Steps 6.5[1] thru 6.5[14] COMPLETE. _____

[17] **WHEN** Auto Makeup can be RESTORED, **THEN**

PERFORM the following to REALIGN makeup to AUTO:

[17.1] **ENSURE** 1-FC-62-142, PW TO BLENDER, dial set to 35% (70 gpm), **THEN**

PLACE Manual-Auto toggle switch in AUTO. _____

[17.2] **ADJUST** 1-FC-62-139, BA TO BLENDER dial to new RCS C_B, **THEN**
PLACE Manual-Auto toggle switch in Auto. _____

[17.3] **PLACE** 1-HS-62-140B, VCT MAKEUP MODE, in AUTO. _____

[17.4] **PLACE** 1-HS-62-140A, VCT MAKEUP CONTROL, to START. _____

A. **CHECK** Red light is LIT. _____

[17.5] **ENSURE** 1-HS-62-128, MAKEUP TO VCT INLET, is in P-AUTO. [1-M-6] _____

[17.6] **ENSURE** 1-HS-62-144, MAKEUP TO VCT OUTLET, is in P-AUTO. [1-M-6] _____

End of Section

Appendix C
(Page 1 of 4)

CALCULATION OF BORIC ACID AND PRIMARY WATER INTEGRATOR SETTING FOR MANUAL MAKEUP TO VCT (RCS)

Date Today **Initials**

NOTES

1) Use page 1 of this appendix when using "VCT MAKEUP CALCULATION" program in REACTINW, otherwise use pages 2 and 3 when performing Hand Calculations.

2) The computer code named REACTINW (VCT MAKEUP CALCULATION) when used from the Y: server is a verified and validated program. The methodology used is based on the equations:

$V_1C_1 + V_2C_2 = V_3C_3$ & $V_1 + V_2 = V_3$

1.0 REACTINW "VCT MAKEUP CALCULATION"

[1] **OBTAIN** the following data for input to the REACTINW program: DAH

[1.1]	Current RCS Boric Acid Concentration.	845	PPM
[1.2]	Current BAT Boric Acid Concentration.	6820	PPM
[1.3]	B-10 Depletion Value from Reactivity Management Briefing Sheet	0	PPM
[1.4]	Current VCT Level	35	%
[1.5]	Desired VCT Level	40 DAH	%

[2] **RUN** REACTINW calculation "VCT Makeup Calculation". DAH

[3] **PRINT** the output file: "VCT MAKEUP INTEGRATOR SETTINGS CALCULATION" DAH

[4] **SIGN** and DATE output sheets. DAH

[5] **OBTAIN** independent verification and approval by an SRO on output sheets. DAH

[REACTW - VERS WB3.5]

VCT MAKEUP INTEGRATOR SETTINGS CALCULATION
WATTS BAR UNIT 1 CYCLE 12

INPUT DATA

[1]	CURRENT RCS BORIC ACID CONCENTRATION	845. PPM
[2]	CURRENT BAT BORIC ACID CONCENTRATION	6820. PPM
[3]	B-10 DEPLETION VALUE	0. PPM
[4]	CURRENT VCT LEVEL	35.0 %
[5]	DESIRED VCT LEVEL	40.0 %

CALCULATION OUTPUTS

[1]	B-10 CORRECTED BORON CONCENTRATION	845. PPM
[2]	VCT ADDITION VOLUME	97. GALS
[3]	TOTAL FLOW RATE	79.9 GPM

CALCULATION CHECK

QUANTITIES [1] AND [2] BELOW SHOULD BE APPROXIMATELY THE SAME

[1]	VCT ADDITION VOLUME	97. GALS
[2]	(12. + 85.) (BA INTG SETTING + PW INTG SETTING) TOTAL INTEGRATOR SETTING	97. GALS

MAKEUP CONTROL / INDICATION

[1]	BA BATCH COUNTER (1-FQ-62-139) [1-M-6]	12. GALS
[2]	BA TO BLENDER (1-FC-62-139) [1-M-6]	24.7 %
[3]	BA TO BLENDER FLOW (1-FI-62-139) [1-M-6]	9.9 GPM
[4]	PW BATCH COUNTER (1-FQ-62-142) [1-M-6]	85. GALS
[5]	PW TO BLENDER (1-FC-62-142) [1-M-6]	35.0 %
[6]	PW TO BLENDER FLOW (1-FI-62-142) [1-M-6]	70.0 GPM

PERFORMER — Today DATE

IV/SRO — Today DATE

Watts Bar Nuclear Plant

NRC EXAM 2013-302

System JPM **E**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
E
NRC EXAM 2013-302

Task: Transfer 6.9 KV RCP Board 1A from Alternate to Normal.

Alternate Path: n/a

Facility JPM #: 3-OT-JPMR042.

Safety Function: 6 **Title:** Electrical

K/A 062 A4.01 Ability to manually operate and/or monitor in the control room: All breakers (including available switchyard).

Rating(s): 3.3 / 3.1 **CFR:** 41.4/45.5 to 45.8

Preferred Evaluation Location: **Preferred Evaluation Method:**

Simulator **X** In-**P**lant _____ **P**erform **X** **S**imulate _____

References: SOI-202.01, "6.9KV Reactor Coolant Pump Board 1A," Rev. 8.

Task Number: RO-202-SOI-202-002 **Title:** Transfer the 6.9 KV Reactor Coolant Board from Alternate to Normal

Task Standard: The applicant performs actions in accordance with SOI-202.01 Section 8.1 to transfer 1A RCP Board from its ALTERNATE to NORMAL power supply and restore the RCP control switches to a normal alignment.

Validation Time: 10 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME SSN Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
E
NRC EXAM 2013-302

SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 309 by performing the following actions:**
   - a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   - b. **Locate IC# 309.**
   - c. **Right "click" on IC# 309.**
   - d. **Select Reset on the drop down menu.**
   - e. **Right "click" on RESET.**
   - f. **Enter the password for IC# 309.**
   - g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   - h. **Perform SWITCH CHECK.**
3. **Place simulator in RUN and acknowledge any alarms.**
4. **Place simulator in FREEZE until Examiner cue is given.**
5. **Have copies of SOI-202.01 with all of Section 4.0 signed off and the SRO approval signed off in Section 8.1, step 1 available for each applicant.**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
E
NRC EXAM 2013-302
DIRECTIONS TO APPLICANT

DIRECTION TO APPLICANT:

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:

1. **A unit startup is in progress.**
2. **You are the Operator-at-the Controls.**

INITIATING CUES:

The Unit Supervisor has directed you to transfer 6.9 KV Reactor Coolant Pump Board 1A from ALTERNATE to NORMAL and to restore the controls to a normal alignment in accordance with SOI-202.01, "6.9KV Reactor Coolant Pump Board 1A."

Notify the Unit Supervisor when 6.9 KV Reactor Coolant Pump Board 1A has been transferred to NORMAL and the controls have been restored to normal alignment.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: **[1] OBTAIN** SRO approval. STANDARD: Applicant observes that SRO approval has already been granted by initials in Step 1. COMMENTS:	___ SAT ___ UNSAT
STEP 2. [2] **ENSURE** MSB has verified Time Delay Relay (TDR) 1-62-068- 0009 contact points 1 and 5 closed (located on left side panel in compartment 1A2 of RCP BD 1A). STANDARD: Applicant ensures that the MSB has verified Time Delay Relay (TDR) 1-62-068- 0009 contact points 1 and 5 closed. **CUE: When contacted as MSB, state that Time Delay Relay (TDR) 1-62-068- 0009 contact points 1 and 5 have been verified closed.** COMMENTS:	___ SAT ___ UNSAT
NOTE **IF Unit is out of service, Bd may be energized by backfeeding from USSTs.**	

STEP/STANDARD	SAT/UNSAT
STEP 3: [3] **CHECK** voltage 6560 to 7260V to Normal ACB 2112 on 1-EI-57-57, USST 1A VOLTS [1-M-1]. STANDARD: Applicant reads voltage approximately 7200V to Normal ACB 2112 on 1-EI-57-57, USST 1A VOLTS, on Panel 1-M-1. COMMENTS:	___ SAT ___ UNSAT
STEP 4: [4] **ENSURE** 1-HS-68-8AA, RCP 1 NORMAL BKR & LIFT PMP[1-M-5], PUSHED IN to place handswitch in control of ACB 2112. STANDARD: ___Applicant locates 1-HS-68-8AA, RCP 1 NORMAL BKR & LIFT PMP [1-M-5] and pushes the handswitch in on Panel 1-M-5. **Step is critical to transfer the RCP motor power supply from its ALTERNATE feed breaker to its NORMAL feed breaker**. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 5: [5] **ENSURE** 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR [1-M-5], PUSHED IN to place ACB 2522 auto transfer in MANUAL**.** STANDARD: ___Applicant locates 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR and pushes the handswitch in on Panel 1-M-5. **Step is critical to transfer the RCP motor power supply from its ALTERNATE feed breaker to its NORMAL feed breaker**. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 6: [6] **MONITOR** 1-EI-68-8A, RCP 1 AMPS [1-M-5] during transfer to ensure RCP Amp load transfers to Normal supply. STANDARD: Applicant locates 1-EI-68-8A, RCP 1 AMPS and observes approximately 440 amps. COMMENTS:	___ SAT ___ UNSAT
CAUTION **Release handswitches SLOWLY after transfer is complete to prevent inadvertent breaker actuation.**	
STEP 7: **Start of Critical Step(s)** **[7] PLACE AND HOLD** 1-HS-68-8AA, RCP 1 NORMAL BKR & LIFT PMP, in START**, AND PLACE 1**-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR, in STOP**.** **End of Critical Step(s)** STANDARD: ___Applicant acknowledges that this is a "two-handed" evolution. Applicant reads step, locates each handswitch, and then places and holds 1-HS-68-8AA, RCP 1 NORMAL BKR in START. While holding 1-HS-68-8AA in START, the applicant places 1-HS-68-8BA in STOP. *Critical step annotation is part of the actual plant procedure*. **Step is critical to transfer the RCP motor power supply from its ALTERNATE feed breaker to its NORMAL feed breaker**. COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8: [8] **ENSURE** Normal ACB 2112 CLOSED, and Alt ACB 2522 OPEN. STANDARD: Applicant determines from the lights on the handswitches that the Normal ACB 2112 is CLOSED (1-HS-68-8AA - GREEN LIGHT DARK, RED light LIT for RCP), and Alternate ACB 2522 is OPEN (1-HS-68-8BA - GREEN light LIT, RED light DARK.) COMMENTS:	___ SAT ___ UNSAT
STEP 9: [9] **IF** desired to place Board Transfer in AUTO, **THEN PULL** 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR switch, out to PULL AUTO**.** STANDARD: Applicant locates 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR and pulls the handswitch out to PULL AUTO position. COMMENTS: **End of JPM**	___ SAT ___ UNSAT

STOP TIME _____

E

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **A unit startup is in progress.**
2. **You are the Operator-at-the Controls.**

INITIATING CUES:

The Unit Supervisor has directed you to transfer 6.9 KV Reactor Coolant Pump Board 1A from ALTERNATE to NORMAL and to restore the controls to a normal alignment in accordance with SOI-202.01, "6.9KV Reactor Coolant Pump Board 1A."

Notify the Unit Supervisor when 6.9 KV Reactor Coolant Pump Board 1A has been transferred to NORMAL and the controls have been restored to normal alignment.

Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

SOI-202.01

6.9KV Reactor Coolant Pump Board 1A

Revision 0008 VFU

Quality Related Today DAH

Level of Use: Continuous Use

Effective Date: 11-19-2007

Responsible Organization: OPS, Operations

Prepared By: R. D. Dobbs

Approved By: Kathy Keefer

Revision Log

REVISION OR CHANGE NUMBER	EFFECTIVE DATE	AFFECTED PAGE NUMBERS	DESCRIPTION OF REVISION/CHANGE
Rev 4	12/02/94	All	Revise to latest format; change checklist position to Racked Up Open instead of racked up.
Rev 5	9/19/95	All	Update to latest format. Writers Guide review. Correct GOI/GO instruction references. Revise Sect 8.1 & 8.2 to change 2 steps in the Bd transfer, to 1 step, since it happens at the same time. Change Sect 8.1 & 8.2 Step that ensured RCP Bd was energized after the actual transfer step, to a monitoring step just before actual transfer step. Remove position requirements from RCP breakers in Checklist 1 since pump may be off or on. Corrected Steps referenced in Sect 5.0 Steps [19] & [20] NOTE. Other minor corrections & Clarifications.
6	7/25/00	2, 4, 5	Non-intent. Delete reference to PAI-10.10, which has been cancelled.
7	5/10/04	2, 7, 8, 11-13, 15	Non-intent. Incorporated critical steps. Incorporated additional CV requirement from PER 03-012913-000. Changed required bus voltage ranges to match 1-15E500 print design output.
8	11/19/07	All 5, 11 11-13	This procedure has been converted from Word 95 to Word 2002 (XP) using Rev.7 by Lorie Dake. Performed IQR. Provided Precaution G and check of TDR 62 contact closure on normal feeder to ensure transfer. Rearranged transfer steps to prevent signoff during transfer operation.

Table of Contents

1.0 INTRODUCTION

1.1 Purpose

To provide Instructions for Operation of 6.9kV Reactor Coolant Pump (RCP) Board 1A.

1.2 Scope

This Instruction includes the following operations:

A. Alignment for Normal Operation.

B. Transferring the Board from Normal To Alternate Supply.

C. Transferring the Board from Alternate To Normal Supply.

2.0 REFERENCES

2.1 Performance References

A. GO-3, Unit Startup from Less Than 4% Reactor Power to 30% Reactor Power.

B. GO-5, Unit Shutdown from 30% Reactor Power to Hot Standby.

2.2 Developmental References

A. FSAR 8.2.

B. GOI-7, Generic Equipment Operating Guidelines

C. SOI-68.02, Reactor Coolant Pumps

D. Tech Specs

E. TVA Drawings

1-15E500-1, -2, -3
1-45W705
1-45W760-68 Series

3.0 PRECAUTIONS AND LIMITATIONS

A. Protective Relaying must remain IN SERVICE, and Trip Fuses must be IN PLACE before energizing a feeder or bus.

B. All Breakers on a board should be OPEN, and Protective Grounds REMOVED before energizing the board.

C. When removing/installing 7200V line-side or bus PT fuses, Electrically-Rated Protective Gloves shall be used.

D. 6.9kV RCP BOARD Supply Breakers must be OPEN BEFORE closing Auxiliary Overcurrent Breaker.

E. Each ACB's closing spring must be verified charged after racking or operating the ACB. [1]

F. This Instruction covers only aligning RCP Board for standby readiness, and to transferring board supplies. RCP is started and shutdown in SOI-68.02.

G. Electrical Maintenance must verify Time Delay Relay (TDR) 1-62-068-0009 contact points 1 and 5 for the Normal Feeder Breaker to be closed prior to RCP transfer from Alternate to Normal Feeder Breaker during plant startup to ensure proper pump transfer.

Date Today **Initials**

4.0 PREREQUISITE ACTIONS

NOTES

1) Throughout Instruction where IF/THEN exists, the step is N/A if stated condition does not exist.

2) Signoffs/information in unused Sections may be left blank.

4.1 Preliminary Actions

[1] **INDICATE** Section to be performed, and reason for use:

5.0	Startup	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	N/A	8.0	Infrequent Operations	8.1

Section/ Reason/ Remarks: Transfer RCP from Alternate to Normal Power during power escalation

4.2 Field Preparations

[1] **REVIEW** plant procedures, processes, and programs in progress to ensure adequate configuration of components necessary for system operation. DAH

[2] **REVIEW** Section 3.0 Precautions and Limitations. DAH

4.3 Approvals and Notifications

[1] **COORDINATE** system operations/manipulations with UO. DAH

Date Today **Initials**

8.0 INFREQUENT OPERATIONS

8.1 Transfer RCP Bd 1A from Alternate to Normal

[1] **OBTAIN** SRO approval. DAH / SRO

[2] **ENSURE** MSB has verified Time Delay Relay (TDR) 1-62-068-0009 contact points 1and 5 closed (located on left side panel in compartment 1A2 of RCP BD 1A). _____

NOTE

IF Unit is out of service, Bd may be energized by backfeeding from USSTs.

[3] **CHECK** voltage 6560 to 7260V to Normal ACB 2112 on 1-EI-57-57, USST 1A VOLTS [1-M-1]. _____

[4] **ENSURE** 1-HS-68-8AA, RCP 1 NORMAL BKR & LIFT PMP [1-M-5], PUSHED IN to place handswitch in control of ACB 2112. _____

[5] **ENSURE** 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR [1-M-5], PUSHED IN to place ACB 2522 auto transfer in MANUAL. _____

[6] **MONITOR** 1-EI-68-8A, RCP 1 AMPS [1-M-5] during transfer to ensure RCP Amp load transfers to Normal supply. _____

CAUTION

Release handswitches SLOWLY after transfer is complete to prevent inadvertent breaker actuation.

Start of Critical Step(s)

[7] **PLACE AND HOLD** 1-HS-68-8AA, RCP 1 NORMAL BKR & LIFT PMP, in START, **AND**

PLACE 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR, in STOP. _____ / CV

End of Critical Step(s)

Date_____ **Initials**

8.1 Transfer RCP Bd 1A from Alternate to Normal (continued)

[8] **ENSURE** Normal ACB 2112 CLOSED, and Alt ACB 2522 OPEN. _____

[9] **IF** desired to place Board Transfer in AUTO, **THEN PULL** 1-HS-68-8BA, RCP 1 ALTERNATE BKR & XFER SELECTOR switch, out to PULL AUTO. _____

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System JPM **F**

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EVALUATION SHEET

Task: ALIGN 1B-B CCS PUMP TO SUPPLY HEADER 1B.

Alternate Path: n/a

Facility JPM #: 3-OT-JPMR124

Safety Function: 8 **Title:** Plant Service Systems

K/A 026 AA2.03 Ability to determine and interpret the following as they apply to the Loss of Component Cooling Water: The valve lineups necessary to restart the CCWS while bypassing the portion of the system causing the abnormal condition.

Rating(s): 2.6/2.9 **CFR:** 43.5 / 45.13

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: SOI-70.01, "Component Cooling Water (CCS) System," Rev 79.

Task Number: RO-070-SOI-70-005 **Title:** Align Component Cooling Water system pump 1B-B in service to train 1B supply header.

Task Standard: The applicant:

1.) Performs valve manipulations to align CCS Pump 1B-B to the 1B Supply header.

2.) Performs actions required to start CCS Pump 1B-B.

Validation Time: 18 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 310 by performing the following actions:**
   a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   b. **Locate IC# 310.**
   c. **Right "click" on IC# 310.**
   d. **Select Reset on the drop down menu.**
   e. **Right "click" on RESET.**
   f. **Enter the password for IC# 310.**
   g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   h. **Perform SWITCH CHECK.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	ccr15	power to appendix r valve 70-26	R	1	00:00:00		00:00:00		on	off
	ccr16	power to appendix r valve 70-27	R	2	00:00:00		00:00:00		on	off
	ccr18	power to appendix r valve 70-34	R	3	00:00:00		00:00:00		on	off
	ccr20	power to appendix r valve 70-64	R	4	00:00:00		00:00:00		on	off
	ccr21	power to appendix r valve 70-74	R	5	00:00:00		00:00:00		on	off
	ccr07	1-70-507 ccs pump 1a-a/1b-b xtie valve	R	6	00:00:00		00:00:00		close	00:00:00
	ccr15	power to appendix r valve 70-26	R	21	00:00:00		00:00:00		off	on
	ccr16	power to appendix r valve 70-27	R	22	00:00:00		00:00:00		off	on
	ccr18	power to appendix r valve 70-34	R	23	00:00:00		00:00:00		off	on
	ccr20	power to appendix r valve 70-64	R	24	00:00:00		00:00:00		off	on
	ccr21	power to appendix r valve 70-74	R	25	00:00:00		00:00:00		off	on

4. **Place simulator in RUN and acknowledge any alarms.**

5. ENSURE 2-HS-70-33A, CCS PMP 2B-B RED light LIT, GREEN light DARK and 2-HS-70-51A, CCS PMP C-S NORMAL ACB RED light DARK, GREEN light LIT, with handswitch in the STOP, PULL-TO-LOCK position.

6. ENSURE "Extra Operator" is present in the simulator.

7. Place simulator in FREEZE until Examiner cue is given.

SIMULATOR CONTINGENCY ACTIONS:

IF INITIAL CONDITION 310 is unavailable for any reason, the following actions must be taken to reconstruct the IC.

1. **Initialize to IC 40, 100% power BOL.**
2. **Perform switch check.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	ccr15	power to appendix r valve 70-26	R	1	00:00:00		00:00:00		on	off
	ccr16	power to appendix r valve 70-27	R	2	00:00:00		00:00:00		on	off
	ccr18	power to appendix r valve 70-34	R	3	00:00:00		00:00:00		on	off
	ccr20	power to appendix r valve 70-64	R	4	00:00:00		00:00:00		on	off
	ccr21	power to appendix r valve 70-74	R	5	00:00:00		00:00:00		on	off
	ccr07	1-70-507 ccs pump 1a-a/1b-b xtie valve	R	6	00:00:00		00:00:00		close	00:00:00
	ccr15	power to appendix r valve 70-26	R	21	00:00:00		00:00:00		off	on
	ccr16	power to appendix r valve 70-27	R	22	00:00:00		00:00:00		off	on
	ccr18	power to appendix r valve 70-34	R	23	00:00:00		00:00:00		off	on
	ccr20	power to appendix r valve 70-64	R	24	00:00:00		00:00:00		off	on
	ccr21	power to appendix r valve 70-74	R	25	00:00:00		00:00:00		off	on

4. **. Place simulator in RUN.**
5. **PLACE 2-HS-70-33A, CCS PMP 2B-B handswitch in the START position, and verify RED light LIT, GREEN light DARK.**
6. **PLACE 2-HS-70-51A, CCS PMP C-S NORMAL ACB handswitch in the STOP, PULL-TO-LOCK position and verify RED light DARK, GREEN light LIT.**
7. **Acknowledge and reset any alarms.**
8. **Save JPM to an open simulator IC location and PASSWORD PROTECT the IC.**

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READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **C-S CCS pump tripped during the last shift.**

2. **1-AOI-15, "Loss of Component Cooling Water (CCS)," Section 3.2, Loss of CCS Flow," has been performed.**

3. **The Unit Supervisor has evaluated PRA Risk, Reactor Trip Risk and Applicable Tech Spec LCOs.**

4. **You are the Control Room Operator.**

INITIATING CUES:

The Unit Supervisor directs you perform SOI-70.01, "Component Cooling Water (CCS)," Section 8.1, "Align Pump 1B-B to Supply Header 1B," beginning at Step 2.

Inform the Unit Supervisor when the alignment has been completed.

STEP/STANDARD	SAT/UNSAT
START TIME: _____	
STEP 1: [2] **ENSURE** Pump 1B-B, **NOT** in service. STANDARD: Applicant locates.1-HS-70-38A, CCS PMP 1B-B, and determines that the RED light is DARK and the GREEN light is LIT, indicating that the pump is STOPPED. COMMENTS:	___ SAT ___ UNSAT
STEP 2: [3] **PLACE** 1-HS-70-38A, CCS PMP 1B-B, in the STOP/PULL-TO-LOCK position. STANDARD: Applicant locates.1-HS-70-38A, CCS PMP 1B-B, and rotates the handswitch to the STOP position, then pulls the handswitch out to the PULL-TO-LOCK position. **(Critical).** **Step is critical to prevent damage to the 1B-B CCS Pump during valve realignments.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT

STEP 3: [4] **PLACE** the following breakers to ON:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	
480V Rx MOV Bd 1B2-B					
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-26)	C/14D	ON	1-BKR-70-26		CV
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-27)	C/17B	ON	1-BKR-70-27		CV
CCS PMP 1A/1B SUCT XTIE (1-FCV-70-34)	C/14E	ON	1-BKR-70-34		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-64)	C/15D	ON	1-BKR-70-64		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-74)	C/16A	ON	1-BKR-70-74		CV

STANDARD:

_____Applicant contacts the Console Operator and directs the Console Operator (as an AUO) to place the listed breakers to "ON." **(Critical).**

Step is critical to apply power to deenergized valves to allow for alignments.

COMMENTS:

CRITICAL STEP

___ SAT

___ UNSAT

CAUTION

Step 8.1[5] must be completed prior to continuing to prevent CCS headers 1-A and 1-B from being tied together.

NOTE

Independent Verification of Step 8.1[5] and 8.1[6] may be delayed until prior to Step 8.1[7].

STEP/STANDARD	SAT/UNSAT

STEP 4: [5] **CLOSE** the following valves:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	VERIF INITIAL
CCS PMPS 1A & 1B SUCT XTIE	0-M-27B	CLOSED	1-HS-70-34A		IV
CCS PUMP 1A-A/1B-B DISCHARGE CROSSTIE	A3T/725	CLOSED	1-ISV-70-507		IV

STANDARD:

___Applicant locates 1-HS-70-34A, CCS PMPS 1A & 1B SUCT XTIE and rotates the handswitch to the LEFT to the CLOSE position. **(Critical)**

The applicant contacts the Console Operator and requests that 1-ISV-70-507, CCS PMP 1A-A/1B-B DISCHARGE CROSSTIE be CLOSED. Console Operator modifies ccr07, 1-70-507 ccs pump 1a-a/1b-b xtie valve to open. Console Operator reports back as the AUO that 1-ISV-70-507 is OPEN.

Step is critical to allow for alignment of the 1B-B CCS pump to Supply Header 1B.

COMMENTS:

CRITICAL STEP

___ SAT

___ UNSAT

STEP/STANDARD	SAT/UNSAT

STEP 5: [6] **OPEN** the following valves:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	VERIF INITIAL
CCS PMP 1B TO C-S DISCH XTIE	0-M-27B	OPEN	1-HS-70-26A		IV
CCS PMP 1B TO C-S DISCH XTIE	0-M-27B	OPEN	1-HS-70-27A		IV
CCS PMP 1B TO C-S SUCT XTIE	0-M-27B	OPEN	1-HS-70-64A		IV
CCS PMP 1B TO C-S SUCT XTIE	0-M-27B	OPEN	1-HS-70-74A		IV

STANDARD:

___Applicant locates 1-HS-70-26A, CCS PMP 1B TO C-S DISCH XTIE, and rotates the handswitch to the RIGHT to the OPEN position. **(Critical)**

Applicant observes RED light LIT, GREEN light DARK on 1-HS-70-26A, CCS PMP 1B TO C-S DISCH XTIE.

___Applicant locates 1-HS-70-27A, CCS PMP 1B TO C-S DISCH XTIE, and rotates the handswitch to the RIGHT to the OPEN position. **(Critical)**

Applicant observes RED light LIT, GREEN light DARK on 1-HS-70-27A, CCS PMP 1B TO C-S DISCH XTIE.

___Applicant locates 1-HS-70-64A, CCS PMP 1B TO C-S SUCT XTIE, and rotates the handswitch to the RIGHT to the OPEN position. **(Critical)**

Applicant observes RED light LIT, GREEN light DARK on 1-HS-70-64A, CCS PMP 1B TO C-S SUCT XTIE.

___Applicant locates 1-HS-70-74A, CCS PMP 1B TO C-S SUCT XTIE, and rotates the handswitch to the RIGHT to the OPEN position. **(Critical)**

Applicant observes RED light LIT, GREEN light DARK on 1-HS-70-74A, CCS PMP 1B TO C-S SUCT XTIE.

Steps are critical to allow for alignment of the 1B-B CCS pump to Supply Header 1B.

COMMENTS:

CRITICAL STEP

___ SAT

___ UNSAT

STEP/STANDARD	SAT/UNSAT

STEP 6: [7] **PLACE** the following breakers to OFF:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	
480V Rx MOV Bd 1B2-B					
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-26)	C/14D	LOCKED OFF	1-BKR-70-26		CV
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-27)	C/17B	LOCKED OFF	1-BKR-70-27		CV
CCS PMP 1A/1B SUCT XTIE (1-FCV-70-34)	C/14E	LOCKED OFF	1-BKR-70-34		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-64)	C/15D	LOCKED OFF	1-BKR-70-64		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-74)	C/16A	LOCKED OFF	1-BKR-70-74		CV

___ SAT
___ UNSAT

STANDARD:

__Applicant contacts the Console Operator as an AUO and directs the Console Operator (as an AUO) to place the listed breakers to "OFF." **(Critical)**

Steps are critical to allow for realignment of listed breakers to comply with OR14.10.

COMMENTS:

STEP 7: [8] **IF** C-S CCS Pump I/S to Supply Header 1B, **THEN PERFORM** the following to swap to CCS Pump 1B-B:

___ SAT
___ UNSAT

STANDARD:

The applicant determines from the INITIAL CONDITIONS that the C-S CCS pump will remain out of service.

COMMENTS:

STEP/STANDARD	SAT/UNSAT
STEP 8: [9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B: [9.1] **UNLOCK and THROTTLE** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION to 25% OPEN. STANDARD: Applicant contacts an AUO and requests that 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION be unlocked and throttled to 25% OPEN. **CUE: When contacted as an AUO, the Console Operator will repeat back the request to open 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION to 25%. Console Operator reports back that 1-ISV-70-505B is 25% open.** COMMENTS:	___ SAT ___ UNSAT
CAUTION **CCS Pump damage may occur below 900 gpm per pump.**	
NOTE **Pump starting guidelines are in GOI-7.**	
STEP 9: [9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B: [9.2] **ENSURE** a sufficient flow path to provide greater than the minimum flow allowed. STANDARD: Applicant determines that there is a sufficient flow path. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10: [9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B: [9.3] **START** CCS PMP 1B-B, with 1-HS-70-38A. STANDARD: ___Applicant locates 1-HS-70-38A, CCSPMP 1B-B, and rotates the handswitch to the START position. **(Critical).** **Steps are critical to provide flow from the 1B-B CCS pump to Supply Header 1B** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE **1B Supply Header flow can be verified locally on 0-FI-70-201, [0-PNL-276-L643, A5-S/713].**	
STEP 11: [9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B: [9.4] **OPEN SLOWLY** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION, **THEN VERIFY** flow between 900-6800 gpm. STANDARD: Applicant contacts an AUO and requests that 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION be opened slowly, and to verify flow between 900-6800 gpm. **CUE: When contacted as an AUO, the Console Operator will repeat back the request to slowly open 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION. Console Operator reports back that 1-ISV-70-505B is open, and that flow is 6000 gpm.** COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT

STEP 12: [9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B:

[9.5] **LOCK OPEN** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION.

STANDARD:

Applicant contacts an AUO and requests that 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION be locked open.

CUE: When contacted as an AUO, the Console Operator will repeat back the request to lock open 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION. Console Operator reports back that 1-ISV-70-505B is locked open.

COMMENTS:

___ SAT
___ UNSAT

STEP 13: [10] **ENSURE** started pump 480V ACB Closing Spring is CHARGED: [C.2]

NOMENCLATURE	LOCATION	POSITION	UNID	PERF INITIAL
		480V SD Bd 1B1-B		
CCS PUMP 1B-B (1-PMP-70-38)	C/3C	CLOSING SPRING CHARGED	1-BKR-70-38	

STANDARD:

Applicant contacts an AUO and requests that the charging springs are charged on 1-BKR-70-38, CCS PUMP 1B-B.

CUE: When contacted as an AUO, the Console Operator will repeat back the request to ensure the closing spring is charged on 1-BKR-70-38, CCS PUMP 1B-B (1-PMP-70-38).

COMMENTS:

___ SAT
___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 14: [11] **REFER TO** Section 6.1 for temperature control of loop(s) placed in service. STANDARD: When applicant addresses Step 11, state that another operator will refer to Section 6.1. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

F

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **C-S CCS pump tripped during the last shift.**

2. **1-AOI-15, "Loss of Component Cooling Water (CCS)," Section 3.2, Loss of CCS Flow," has been performed.**

3. **The Unit Supervisor has evaluated PRA Risk, Reactor Trip Risk and Applicable Tech Spec LCOs.**

4. **You are the Control Room Operator.**

INITIATING CUES:

The Unit Supervisor directs you perform SOI-70.01, "Component Cooling Water (CCS)," Section 8.1, "Align Pump 1B-B to Supply Header 1B," beginning at Step 2.

Inform the Unit Supervisor when the alignment has been completed.

Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

SOI-70.01

Component Cooling Water (CCS) System

Revision 0079

VFU
Today
DAH

Quality Related

Level of Use: Continuous Use

Effective Date: 08-09-2013

Responsible Organization: OPS, Operations

Prepared By: P.R. Neu

Approved By: Ryan Nessell

Revision Log

Rev or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
74	10/06/12	2, 138-142 Att 1V Att 1H	Added steps to section 8.29 to support outage lineups for CCS HX maintenance. Changed Att 1V to reflect additional locked valve positions in 0-PI-OPS-17.0 IAW EQV 60187. Changed Att 1H to reflect additional handswitches added per DCN 58384 for Appendix R.
75	10/9/12	2, 81-88	Added steps to section 8.15 to support outage lineups for lining cooling Train A and Train B equipment with the C Heat Exchanger.
76	02/13/13	2 ATT 1V (pg 9) ATT 1H	Revised Attachment 1V to include 2-DRV-70-73 due to PIC 60319 of DCN 53413. Added note to Attachment 1H and corrected typo to match switch position with MCR labeling.
77	05/10/13	2, 20, 42, 43, 48, 52, 55, 66, 75, 112, 113, 123, 143, 148, 150, 154	Aligned P & L flow limits IAW System Description and corrected flow limits throughout procedure.[PER621378-001]
78	06/10/13	2, 73, 77	Removed step to verify modes 5 or 6 prior to performance of section 8.13 and added note to track IAW OR-14.10 to support maintenance of the 2A-A pump. Also removed part of Caution for Appendix R valves to be restored prior to Mode 4 from section 8.13 and revised Caution in Section 8.14 to track IAW OR-14.10.
79	08/09/13	2, ATT1Vpg 12	Added capped to the position for 1-TV-70-722B [PER686362-002]

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EXTERNAL ATTACHMENTS

Attachment 1P: U1 and Common Power Checklist 70.01-1P

Attachment 2P: U2 Power Checklist 70.01-2P

Attachment 1V: U1 CCS Normal Valve Checklist 70.01-1V

Attachment 2V: Pump 1A-A Normal Valve Checklist 70.01-2V

Attachment 3V: Pump 1B-B Normal Valve Checklist 70.01-3V

Attachment 4V: Pump C-S Normal Valve Checklist 70.01-4V

Attachment 5V: Pump 2A-A Normal Valve Checklist 70.01-5V

Attachment 6V: Pump 2B-B Normal Valve Checklist 70.01-6V

Attachment 7V: 2A ESF Header Valve Checklist 70.01-7V

Attachment 8V: U2 Equip from CCS HX B Valve Checklist 70.01-8V

Attachment 1H: Handswitch Checklist 70.01-1H

1.0 INTRODUCTION

1.1 Purpose

Provide instructions for operation of the Component Cooling System (CCS).

1.2 Scope

This Instruction includes operation of the following:

A. CCS Pumps and Heat Exchangers (HXs)

B. Pump Seal Leakage Return System

C. Thermal Barrier Booster Pumps (TBBPs)

This Instruction also includes the following infrequent operations:

D. Alternate Lineup for Pumps Supplying Train B Loads

E. Placing Unit 2 Loads in Service

F. ERCW Spool piece Installation

G. C-S Pump Power Supply Transfer

H. Alternating CCS Pump Operation

I. Alternating Thermal Barrier Booster Pump Operation

J. Feed & Bleed U1/U2 Train A/Train B CCS

K. Remove CCS flow from SFP HX A

L. Align CCS Train B to SFP HX A

2.0 REFERENCES

2.1 Performance References

A. SOI-90.01, Liquid Process Radiation Monitors

B. GOI-7, Generic Equipment Operating Guidelines

C. Fire Protection Report (FPR) Table 14.10

2.2 Developmental References

A. TI-31.08, Flow Balancing Valves Setpoint Positions

B. SOI-67.01, Essential Raw Cooling Water System

C. SOI-78.01, Spent Fuel Pool Cooling And Cleaning System

D. TI-78.004, Guidance For Implementing Higher SFP Heat Loads

E. GO-1, Unit Startup From Cold Shutdown To Hot Standby

F. Memorandum B26850503027, Locked Valves

G. N3-70-4002, System Description for Component Cooling System

H. N3-67-4002, System Description for ERCW

I. SOI-77.01, Liquid Waste Disposal

J. TVA Drawings:

1-45N600-70
1-45N706-1
1-45N1637-2, -7
1-45N1645-3, -6
1-45N1668-2
1-45W703-5, -6, -7
1-45W751-5, -6, -10, -12
1-45W760-70 Series
1-45W760-67-17
1-47W859 Series

K. Tech Spec 3.7.7, Component Cooling System

3.0 PRECAUTIONS AND LIMITATIONS

A. CCS design press is 150 psig. Design Temp is 200°F.

B. Normal CCS Supply Header (HX outlet) temp is 60°F to 95°F for "A" HX and 40°F to 95°F for "B" and "C" Heat exchangers. When ERCW inlet temperature is below 60°F, supply temperature may be lower than 40°F for the "B" and "C" heat exchangers and lower than 60°F for "A" heat exchanger but should be maintained as close to normal as possible by throttling ERCW flow. Additional limitations are discussed in Section 6.0.

C. CCS Pump flow: Minimum is 900 gpm; Maximum is 6800 gpm per pump.

D. C-S Pump Local Throwover Switch must **NOT** be operated if either Red light on the panel is on, indicating one of the 480V SD Bd ACBs is CLOSED. Switch Transfer may require Tech Spec LCO 3.7.7 entry.

E. Chemicals added to CCS for corrosion control are TOXIC. The Material Safety Data Sheets for the chemicals added to CCS (i.e. sodium molybdate, sodium hydroxide and Cobratec TT50), have precautions necessary for handling treated CCS water.

F. When heat load is on CCS, ERCW must be in service to CCS HX(s).

G. CCS misaligned to SFP HX(s) causes water interchange between Unit 1 and Unit 2.

H. To avoid CCS HX tube vibration and excessive load, do **NOT** exceed shell design flow of 12000 gpm.

I. All CCS Pumps start on a Blackout if handswitch is in A-P AUTO; however while U2 is in deferred status and Pump 2B-B is aligned with Pump C-S, Header 2A low press auto-start signal is disconnected from Pump 2B-B, and the SI Signal is disconnected from both U2 Pumps.

J. Before operating Train B equipment, flow must be established in 1B Header.

K. If a CCS loop is SHUT DOWN, associated Rad monitor will alarm on low flow.

L. Discharge of various relief valves is routed to station drainage.

M. Thermal Barrier Booster Pumps trip on Cntmt ∅B Isol signal, and Cntmt Isol Valves for Thermal Barriers, and RCP upper and lower oil coolers **CLOSE**. If power is lost to either TBBP (Rx MOV Bd) the ∅B seal-in is lost and the pump can restart with no flow path.

N. When isolating CCS-supplied HX, the primary side must be isolated and allowed to cool below 200°F BEFORE isolating CCS flow.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

O. When RHR temp is above 212°F. CCS through RHR HX(s) may flash during low CCS flow conditions.

P. After proper rate is set, throttling CCS flow to the RHR HXs to control RHR cooldown rate is prohibited. Such action can cause overheating of the HX CCS side.

Q. RHR HX heat load during hot shutdown is limited by throttling the reactor coolant flow through HX(s) to maintain HX CCS outlet at 146°F or below.

R. ERCW Spool piece Installation to Surge Tank(s) is done only if no Demin Water is available for makeup.

S. Each ACB closing spring must be verified charged during **RACK-IN**, and after each ACB operation. [C.2]

T. During Modes 4 (with RHR in service), 5, and 6 with only one CCS Pump available for Train A, it is necessary to limit flow demands on CCS. Isolation of SFPCS HX A to ensure adequate cooling to RHR HX (and other equipment) is required. If the second CCS Pump normally aligned to CCS Train 1A cannot be placed in service before the SFP water temperature annunciator alarms, it will be necessary to realign the CCS System before the SFP water boils. CCS Train 1B must be used to provide RHR cooling. If RHR HX 1B is **NOT** in service, it must be placed in service. RHR HX 1A must be removed from service, and SFPCS HX A shall be returned to service on CCS Train 1A. If RHR HX 1B cannot be placed in service, CCS Pump C-S must be realigned to CCS Train 1A to provide the additional cooling water required to supply both the RHR and SFPCS heat exchangers, and other components served by the CCS Train 1A. See Discussion in Section 6.0

U. CCS Pump 2B-B is aligned to replace C-S Pump in support of Train 1B, and valves are positioned with power removed to assure availability of CCS flow paths, in event of Appendix R fire.

V. Valves to non-safety related CCS piping shall remain locked closed except during actual operation when under constant operator surveillance.

W. CCS supply and discharge valves to PASS HXs shall be locked closed except during sampling operations.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

X. Environmental services can permit draining CCS heat exchangers to the station sump (versus FDCT which must be processed) on a case by case basis per guidelines of ECM-3. Operations should coordinate with the environmental staff prior to initiating/terminating any releases to station sump so that they can calculate release concentrations and closely monitor pond conditions.

Y. With RCPs in service, alignment of 1B-B CCS Pump to the "B" train CCS header increases the vulnerability of Unit 1 to a single point failure. The loss of the 1A-A CCS Pump impacts the RCP oil coolers for Unit 1. Evaluation of the need for the alignment and the potential impact should be conducted prior to the performance of Section 8.1.

Z. EDC 59024 modifies the function and clarifies the usage and operating valve position alignment of the CCS Spent Fuel Pit (SFP) Heat Exchanger inlet and discharge valves, 0-ISV-70-524B and 529B. This EDC provides allowance to place these valves into throttled positions in order to minimize cavitation and vibration affects attributed to throttling 0-THV-70-530B, SFP Heat Exchanger B CCS Outlet Throttle Valve.

Date Today INITIALS

4.0 PREREQUISITE ACTIONS

4.1 Preliminary Actions

NOTES

1) Throughout instruction where **IF/THEN** exists, the step is **N/A** if condition does **NOT** exist.

2) Throughout this instruction, Concurrent Verification (CV) for breaker or fuse manipulations may be marked **N/A** if no manipulation is performed.

[1] **INDICATE** Section to be performed, and reason for use.

5.0	Startup	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	N/A	8.0	Infrequent Operations	8.1

Section/ Reason/ Remarks: Align 1B-B CCS pump to supply Header 1B while repairs are made to C-S1 CCS pump.

4.2 Field Preparations

[1] **ENSURE** Section 3.0 Precautions and Limitations, REVIEWED. DAH

[2] **ENSURE** Demin Water System AVAILABLE, and IN SPECS per Chemistry, for Surge Tank makeup. DAH

4.3 Approvals and Notifications

[1] **COORDINATE** system operations/manipulations with UO. DAH

[2] **IF** work is in a radiation/contamination area, **THEN**

NOTIFY Radiation Protection (RP) for surveys and/or permits as necessary. DAH

[3] **IF** a Process Radiation Monitor alarms OR a leak from a radioactive system to the CCS is detected, **THEN**

NOTIFY RP and Chemistry. DAH

Date Today INITIALS

8.0 INFREQUENT OPERATION

8.1 Align Pump 1B-B to Supply Header 1B

CAUTION

Performance of this section with RCPs in service results in an increased vulnerability to single point failure. The loss of the 1A-A CCS Pump will result in an impact on the Unit 1 RCP oil coolers. Refer to AOI-24, RCP MALFUNCTIONS DURING PUMP OPERATION, for RCP Shutdown Criteria.

NOTE

Appendix R breakers and valves which are repositioned should be tracked per OR-14.10.

[1] **ENSURE** applicable items have been evaluated:

- PRA Risk DAH
- Reactor Trip Risk DAH
- Applicable Tech Spec LCOs DAH

[2] **ENSURE** Pump 1B-B, **NOT** in service. _____

[3] **PLACE** 1-HS-70-38A, CCS PMP 1B-B, in the STOP/PULL-TO-LOCK position. _____

_____
CV

Date_____ INITIALS

8.1 Align Pump 1B-B to Supply Header 1B (continued)

[4] **PLACE** the following breakers to ON:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	
480V Rx MOV Bd 1B2-B					
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-26)	C/14D	ON	1-BKR-70-26		CV
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-27)	C/17B	ON	1-BKR-70-27		CV
CCS PMP 1A/1B SUCT XTIE (1-FCV-70-34)	C/14E	ON	1-BKR-70-34		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-64)	C/15D	ON	1-BKR-70-64		CV
CCS PMP 1A/1B TO C-S SUCT XTIE (1-FCV-70-74)	C/16A	ON	1-BKR-70-74		CV

CAUTION

Step 8.1[5] must be completed prior to continuing to prevent CCS headers 1-A and 1-B from being tied together.

NOTE

Independent Verification of Step 8.1[5] and 8.1[6] may be delayed until prior to Step 8.1[7].

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

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	VERIF INITIAL
CCS PMPS 1A & 1B SUCT XTIE	0-M-27B	CLOSED	1-HS-70-34A		IV
CCS PUMP 1A-A/1B-B DISCHARGE CROSSTIE	A3T/725	CLOSED	1-ISV-70-507		IV

Date_____ INITIALS

8.1 **Align Pump 1B-B to Supply Header 1B (continued)**

[6] **OPEN** the following valves:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	VERIF INITIAL
CCS PMP 1B TO C-S DISCH XTIE	0-M-27B	OPEN	1-HS-70-26A		IV
CCS PMP 1B TO C-S DISCH XTIE	0-M-27B	OPEN	1-HS-70-27A		IV
CCS PMP 1B TO C-S SUCT XTIE	0-M-27B	OPEN	1-HS-70-64A		IV
CCS PMP 1B TO C-S SUCT XTIE	0-M-27B	OPEN	1-HS-70-74A		IV

[7] **PLACE** the following breakers to OFF:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	VERIF INITIAL
480V Rx MOV Bd 1B2-B					
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-26)	C/14D	LOCKED OFF	1-BKR-70-26		CV
CCS PMP 1A/1B TO C-S DISCH XTIE (FCV-70-27)	C/17B	LOCKED OFF	1-BKR-70-27		CV
CCS PMP 1A/1B SUCT XTIE (1-FCV-70-34)	C/14E	LOCKED OFF	1-BKR-70-34		CV
CCS PMP 1A/1B TO CS SUCT XTIE (1-FCV-70-64)	C/15D	LOCKED OFF	1-BKR-70-64		CV
CCS PMP 1A/1B TO CS SUCT XTIE (1-FCV-70-74)	C/16A	LOCKED OFF	1-BKR-70-74		CV

[8] **IF** C-S CCS Pump I/S to Supply Header 1B, **THEN**

PERFORM the following to swap to CCS Pump 1B-B:

[8.1] **UNLOCK and THROTTLE** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION to 25% OPEN. _____

Date_____ INITIALS

8.1 **Align Pump 1B-B to Supply Header 1B (continued)**

CAUTION

CCS Pump damage may occur below 900 gpm per pump.

NOTE

Pump starting guidelines are in GOI-7.

[8.2] **ENSURE** a sufficient flow path to provide greater than the minimum flow allowed. _____

[8.3] **START** CCS PMP 1B-B, with 1-HS-70-38A. _____

NOTES

1) 1B Supply Header flow can be verified locally on 0-FI-70-201, [0-PNL-276-L643, A5-S/713].
2) Throttling the discharge valves on the OPERABLE A train or B train pump requires entry into LCO 3.7.7 in MODES 1-4.

[8.4] **SLOWLY OPEN** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION,

WHILE CLOSING 0-ISV-70-505, CCS PUMP C-S DISCHARGE ISOLATION, to 75% CLOSED. _____

[8.5] **WHEN** 0-ISV-70-505, CCS PUMP C-S DISCHARGE ISOLATION, is 75% CLOSED, **THEN**

STOP C-S CCS Pump: (**N/A** unused blank)

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	
CCS PMP C-S NORMAL ACB	0-M-27B	A-P AUTO	2-HS-70-51A		IV
CCS PMP C-S ALT ACB	0-M-27B	A-P AUTO	1-HS-70-51A		IV

[8.6] **VERIFY** flow between 900 and 6800 gpm. _____

Date_____ INITIALS

8.1 Align Pump 1B-B to Supply Header 1B (continued)

[8.7] **PERFORM** the following:

NOMENCLATURE	LOC	POSITION	UNID	PERF INITIAL	
CCS PUMP 1B-B DISCHARGE ISOLATION	A3S/713	LOCK OPEN	1-ISV-70-505B		CV
CCS PUMP C-S DISCHARGE ISOLATION	A3S/713	LOCK OPEN	0-ISV-70-505		CV

[9] **PERFORM** the following if C-S CCS Pump NOT I/S to Supply Header 1B:

[9.1] **UNLOCK and THROTTLE** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION to 25% OPEN. _____

CAUTION

CCS Pump damage may occur below 900 gpm per pump.

NOTE

Pump starting guidelines are in GOI-7.

[9.2] **ENSURE** a sufficient flow path to provide greater than the minimum flow allowed. _____

[9.3] **START** CCS PMP 1B-B, with 1-HS-70-38A. _____

NOTE

1B Supply Header flow can be verified locally on 0-FI-70-201, [0-PNL-276-L643, A5-S/713].

[9.4] **OPEN SLOWLY** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION, **THEN**

VERIFY flow between 900-6800 gpm. _____

[9.5] **LOCK OPEN** 1-ISV-70-505B, CCS PUMP 1B-B DISCHARGE ISOLATION. _____

_____
CV

Date_____ INITIALS

8.1 Align Pump 1B-B to Supply Header 1B (continued)

[10] **ENSURE** started pump 480V ACB Closing Spring is CHARGED: [C.2]

NOMENCLATURE	LOCATION	POSITION	UNID	PERF INITIAL
		480V SD Bd 1B1-B		
CCS PUMP 1B-B (1-PMP-70-38)	C/3C	CLOSING SPRING CHARGED	1-BKR-70-38	

[11] **REFER TO** Section 6.1 for temperature control of loop(s) placed in service. _____

End of Section

Watts Bar Nuclear Plant

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System JPM **G**

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
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EVALUATION SHEET

Task: Complete 1-SI-85-2, Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)

Alternate Path: After Control bank D is inserted to 210 steps, when the applicant attempts to withdraw Control Bank D to its previous position Control Bank D Group 2 rods insert. Upon diagnosis of the continuous rod insertion, the applicant trips the reactor.

Facility JPM #: 2009-10 NRC Exam JPM B.1.a

Safety Function: 1 **Title:** Reactivity Control

K/A 001 A4.03 Ability to manually operate and/or monitor in the control room: CRDS mode control.

Rating(s): 4.0 / 3.7 **CFR:** 41.7/45.5 to 45.8

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: 1-SI-85-2,"Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)," Rev. 13

Task Number: RO-085-SOI-85-2-001 **Title:** Verify operability of each control bank/shutdown bank.

Task Standard: The applicant:

1. Selects the CBC position on 1-RBSS, ROD BANK SELECT.
2. Inserts, then withdraws Control Bank C rods 10 steps.
3. Selects the CBD position on 1-RBSS, ROD BANK SELECT.
4. Inserts, then withdraws Control Bank D rods 10 steps.
5. Diagnoses the continuous insertion of Control Bank D Group 2 rods.
6. Performs a reactor trip in response to the continuous insertion of the Control Bank D Group 2 rods, prior to exceeding ΔI limits OR the rod insertion low-low limit.

Validation Time: 20 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

WATTS BAR NUCLEAR PLANT
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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 311 by performing the following actions:**
   - a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   - b. **Locate IC# 311.**
   - c. **Right "click" on IC# 311.**
   - d. **Select Reset on the drop down menu.**
   - e. **Right "click" on RESET.**
   - f. **Enter the password for IC# 311.**
   - g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   - h. **Perform SWITCH CHECK.**
3. **ENSURE the following information appears on the Director Summary Screen:**

	Key		Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	rd02	uncontrolled rod insertion; bank d, group 2.	M	30	00:00:00	00:00:00	00:00:00		100	0

4. **ENSURE Event 30 is loaded.**
   [Control Bank D in Bank Select and inserted to 210 steps] zdirbss1(10)==1 & pc_rdu0052<=210.
5. **ENSURE a marked-up copy of 1-SI-85-2 is available to the Examiner.**
6. **ENSURE "Extra Operator" is present in the simulator.**
7. **DATA COLLECTION is REQUIRED for this JPM. ENSURE DATA COLLECTION IS RUNNING.**
8. **Place simulator in FREEZE until Examiner cue is given.**
9. **ENSURE DATA COLLECTION IS SAVED BEFORE RESETTING THE SIMULATOR.**

Event		Description/Role Play
		Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.***
		Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATEPOWER CAB (2AC) 1-PNL-85-L118 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.***
		Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATE POWER CAB (1BD) 1-PNL-85-L121 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.***
		Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATEPOWER CAB (2BD) 1-PNL-85-L117 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.***

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
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NRC EXAM 2013-302
READ TO APPLICANT

DIRECTION TO APPLICANT:

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:

1. **Unit 1 is operating at 100% power.**
2. **Performance of 1-SI-85-2,"Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)," is in progress.**
3. **An AUO is stationed at the CONTROL ROD DRIVE PANELS to support performance of 1-SI-85-2.**
4. **The procedure has been completed through Section 6.6 for Control Bank B.**

INITIATING CUES:

The Unit Supervisor has directed you to complete 1-SI-85-2,"Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)," for Control Bank C and Control Bank D.

Notify the Unit Supervisor when the control rods are returned to the "AS FOUND" position."

STEP/STANDARD	SAT/UNSAT

START TIME: _____

EXAMINER: The following actions are taken from 1-SI-85-2, Section 6.7, CONTROL BANK C (CBC).

NOTE 1 Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.

NOTE 2 Rod movement is verified by monitoring (RPIs) and Step Counters.

STEP 1: **[1] ENSURE T**avg - **T**ref deviation is adjusted to allow for bank movement of ten steps. STANDARD: Applicant determines that the Tavg - Tref deviation is sufficient for bank movement. COMMENTS:	___ SAT ___ UNSAT

NOTE

1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.

STEP 2: [2] **RECORD** the initial position of the following Step Counters: 1-CBCG1, CONTROL BANK C1:_____steps. 1-CBCG2, CONTROL BANK C2:_____steps. STANDARD: Applicant records rod position for Control Bank C group 1 rods as 228 steps from demand counter 1-CBCG1 on 1-M-4. Applicant records rod position for Control Bank C group 2 rods as 228 steps from demand counter 1-CBCG2 on 1-M-4. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
CAUTION If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement: • Tavg is not within 1 °F of program, • Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS), • Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].	
STEP 3: **[3] PLACE** 1-RBSS, ROD BANK SELECT, in CBC. STANDARD: Applicant places 1-RBSS, Rod Bank Select switch, in the CBC (control bank C) position. **Step is critical to allow movement of Control Bank C rods ONLY.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 4: [4] **VERIFY** correct bank selected locally by GRP. SELECT Light B illuminated on: [4.1] CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120. [4.2] CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATE POWER CAB (2AC) 1-PNL-85-L118. STANDARD: Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.*** Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATE POWER CAB (2AC) 1-PNL-85-L118 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.*** COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5: [5] **(ρ) MOVE** Control Bank C at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and **VERIFY** movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) STANDARD: Applicant will insert CBC rods ten steps. **Step is critical since it is used to determine if Control Bank C motion meets acceptance criteria of the surveillance procedure.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 6: **[6] VERIFY** Control Bank C1 and C2 Step Counters agree within plus or minus 2 steps. STANDARD: Applicant determines from 1-CBCG1 and 1-CBCG2 Step counter positions that rods are within the ± 2 step limit. COMMENTS:	___ SAT ___ UNSAT
STEP 7: **[7] (ρ) RETURN** Control Bank C to its original position as recorded in **Step** 6.7[2] of this section using 1-FLRM, ROD MOTION CONTROL. STANDARD: Applicant withdraws Control Bank C to its original position of 228 steps. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8: [8] **IF** Rod Insertion Limit Lo Alarm 87-A does not clear, **THEN** • **REFER TO** Tech Spec LCO 3.1.7. • **CONTACT** System Engineer to reset 87-A USING ICS. STANDARD: Applicant determines that the Limit Lo Alarm 87-A has cleared and marks the step as "N/A." COMMENTS:	___ SAT ___ UNSAT
STEP 9: Section 6.7, Control Bank C (CBC) complete. STANDARD: Applicant determines that Section 6.7 is complete and continues to Section 6.8 CONTROL BANK D (CBD). COMMENTS:	___ SAT ___ UNSAT
EXAMINER: The following actions are taken from 1-SI-85-2, Section 6.8, CONTROL BANK D (CBD).	
NOTE 1 Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.	
NOTE 2 Rod movement is verified by monitoring (RPIs) and Step Counters.	
STEP 10: **[1] ENSURE T**avg - **T**ref deviation is adjusted to allow for bank movement of ten steps. STANDARD: Applicant determines that the Tavg - Tref deviation is sufficient for bank movement. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
NOTE 1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.	
STEP 11: **[2] RECORD** the initial position of the following Step Counters: 1-CBDG1, CONTROL BANK D1: _____ steps. 1-CBDG2, CONTROL BANK D2: _____ steps. STANDARD: Applicant records rod position for Control Bank D group 1 rods as 220 steps from demand counter 1-CBDG1 on 1-M-4. Applicant records rod position for Control Bank D group 2 rods as 220 steps from demand counter 1-CBDG2 on 1-M-4. COMMENTS:	___ SAT ___ UNSAT
NOTE The operator has the option of moving Control Bank D five Steps in one direction, then 10 steps in the opposite direction and then return to normal. This method will have less overall effect on reactor power.	
STEP 12: **[3] PLACE** 1-RBSS, ROD BANK SELECT, in CBD. STANDARD: Applicant places 1-RBSS, Rod Bank Select switch, in the CBD (control bank D) position. **Step is critical to allow movement of Control Bank D rods ONLY.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 13: [4] **VERIFY** correct bank selected locally by GRP SELECT Light B illuminated on: [4.1] CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATEPOWER CAB (1BD) 1-PNL-85-L121. [4.2] CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATEPOWER CAB (2BD) 1-PNL-85-L117. STANDARD: Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATE POWER CAB (1BD) 1-PNL-85-L121 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.*** Applicant contacts the AUO stationed to support the surveillance at CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATE POWER CAB (2BD) 1-PNL-85-L117 and requests the status of the GRP SELECT light B. ***ROLE PLAY: When contacted as the AUO, the Console Operator will repeat back request. The Console Operator reports the GRP SELECT light B is LIT.*** COMMENTS:	___ SAT ___ UNSAT

NOTE

1-XA-55-4A-64F, C-11 BANK D AUTO WITHDRAWAL BLOCKED, will actuate if Control Bank D Rods are withdrawn past 220 Steps.

STEP/STANDARD	SAT/UNSAT
STEP 14: **[5] (ρ) MOVE** Control Bank D at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and **VERIFY** movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) STANDARD: Applicant may either: Comply with the information contained in the NOTE preceding Step 3 OR Insert rods ten steps, and then withdraw the rods back to their original position. **Step is critical since it is used to determine if Control Bank D motion meets acceptance criteria of the surveillance procedure.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 15: **[6] VERIFY** Control Bank D1 and D2 Step Counters agree within plus or minus 2 steps. STANDARD: Applicant determines from 1-CBDG1 and 1-CBDG2 Step counter positions that rods are within the ± 2 step limit. COMMENTS:	___ SAT ___ UNSAT
EXAMINER: When the applicant begins to withdraw Control Bank D, a Slave Cycler mechanical failure; associated with Control Bank D, Group 2 This will cause 86-A, CONTROL ROD URGENT FAILURE to occur. The ROD TO BANK DEVIATION alarm will be indicated on 1-MON-85-5000/1, CERPI MONITOR 1 and 1-MON-85-5000/2, CERPI MONITOR 2. **Upon diagnosis of the continuous insertion of multiple rods, the applicant performs the IMMEDIATE ACTION of 1-AOI-2, "Malfunction of Reactor Control System," and trips the reactor. Reactor must be tripped prior to exceeding ΔI limits OR the rod insertion lo-lo limits.**	

STEP/STANDARD	SAT/UNSAT
STEP 16: **[7] (ρ) RETURN** Control Bank D to its original position as recorded in Step **[2]** of this section using 1-FLRM, ROD MOTION CONTROL. STANDARD: Applicant returns Control Bank D group 1 and group 2 rods to their original position of 220 steps. COMMENTS:	___ SAT ___ UNSAT
EXAMINER: Upon diagnosis of the continuous insertion of multiple rods, the applicant performs the IMMEDIATE ACTION of 1-AOI-2, "Malfunction of Reactor Control System," and trips the reactor. **The following actions are taken from 1-AOI-2, "Malfunction of Reactor Control System," Section 3.2, "Uncontrolled Rod Bank Movement."**	
STEP 17: 1. **STOP** uncontrolled rod motion: a. **PLACE** control rods in MAN**.** STANDARD: Applicant determines that 1-RBSS, ROD BANK SELECT is in the "CBD" position, and that rods are in manual. Applicant may elect to transfer from CBD to "MAN" position on 1-RBSS, ROD BANK SELECT. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 18: 1. **STOP** uncontrolled rod motion: b. **CHECK** control rod movement STOPPED. STANDARD: Applicant determines from audible feedback associated with Control Band D Group 2 step counters, the Control Bank D Group 2 step counter display and from individual rod position indicators on the CERPI MONITORs that rod insertion is continuing. Applicant enters the **RESPONSE NOT OBTAINED** column for actions. COMMENTS:	___ SAT ___ UNSAT
STEP 19: 1. **STOP** uncontrolled rod motion: b. **RESPONSE NOT OBTAINED:** **(ρ) TRIP** reactor. **GO TO** 1-E-0, Reactor Trip or Safety Injection. STANDARD: Applicant locates 1-RT-1, REACTOR TRIP and rotates the handswitch to the RIGHT to the TRIP position prior to exceeding ΔI limits OR the rod insertion low-low limits. **Step is critical to place the reactor in a known condition.** COMMENTS: **END OF TASK**	**CRITICAL STEP** ___ SAT ___ UNSAT

STOP TIME _____

G

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **Unit 1 is operating at 100% power.**
2. **Performance of 1-SI-85-2,"Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)," is in progress.**
3. **An AUO is stationed at the CONTROL ROD DRIVE PANELS to support performance of 1-SI-85-2.**
4. **The procedure has been completed through Section 6.6 for Control Bank B.**

INITIATING CUES:

The Unit Supervisor has directed you to complete 1-SI-85-2,"Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)," for Control Bank C and Control Bank D.

Notify the Unit Supervisor when the control rods are returned to the "AS FOUND" position."

Watts Bar Nuclear Plant

Unit 1

Surveillance Instruction

1-SI-85-2

Reactivity Control Systems Movable Control Assemblies (Modes 1 and 2)

Revision 0013

VFU
Today
DAH

Quality Related

Level of Use: Continuous Use

Effective Date: 07-12-2010

Responsible Organization: OPS, Operations

Prepared By: Nicholas Armour

Approved By: Greg Evans

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
9	3/17/04	2, 13	Non-intent. Changed note prior to Section 6.0, Step 47 to reference annunciator 64-F instead of 87-C due to DCN 51620.
10	7/12/04	2, 6, 11-14	Non-intent. Revised Step 4.3[1]. Renumber steps in Section 6.0.
11	09/20/04	1-3 6 7-15 9, 10 16 ALL	Non-Intent: Relocated previous revision Step 6.0[4], recording of 1-RBSS position, to PREREQUISITE 4.3[2] to facilitate restructure of Section 6.0 Restructured Section 6.0 such that the previous revision has been broken into subsections. Adds notes to Step 6.3[4] and 6.4[4] to alert Operator that CERPI Monitor indicated Rod Speed may be inaccurate while moving SBC or SBD rods. Replaced Step 8.1 list of QA records with "Completed Data Packages." Corrected typographical and format errors.
12	06/03/10	All 7,23 9,10,12,14, 16,18,20, 22,23 6, 8-10,12,14, 15,18,19, 22	This procedure has been converted from Word 95 to Word 2002 (XP) using Rev. 11 Added Chemistry notification steps addressed in PER 168408, Added end of section closeouts. Added precaution defining Greek symbol (ρ) as indicator for a step that directly affects reactivity.
13	07/12/10	2, 8, 10, 11, 13, 14, 16, 17, 19	Added proper group selected local verification steps to Section 6.1 thru 6.8 (PER 221706).

Table of Contents

Table of Contents (continued)

1.0 INTRODUCTION

1.1 Purpose

This Surveillance Instruction (SI) provides detailed steps to verify operability of each Shutdown and Control Rod not fully inserted.

1.2 Scope

1.2.1 Operability Tests to be Performed

This instruction is performed by placing the rods in Bank Select, moving each bank at least 10 Steps, and returning the bank to its original position to verify all rods operable.

1.2.2 Surveillance Requirements Fulfilled and Modes

This SI satisfies the following Surveillance Requirement (SR):

SURVEILLANCE REQUIREMENT	APPLICABLE MODES	PERFORMANCE MODES
SR 3.1.5.2	1, 2	1, 2, 3

1.3 Frequency and Conditions

A. This SI is required to be performed at least once every 92 days.

B. This SI is required to be in frequency prior to Mode 2.

2.0 REFERENCES

2.1 Performance References

None

2.2 Developmental References

Unit 1 Technical Specification Section 3.1.5.2.

3.0 PRECAUTIONS AND LIMITATIONS

A. Nuclear Instrumentation must be observed closely for any unanticipated reactivity changes when moving rods.

B. Rods are required to be returned to their original position as soon as possible following required movement to prevent unnecessary T_{avg} - T_{ref} deviation.

C. Controlling bank rod insertion limits and delta flux limits must be observed during rod movement.

D. The Senior Reactor Operator (SRO) is to be contacted as soon as practical if any rod fails to move during performance of this instruction.

E. If any shutdown or control rod fails to move during the performance of this instruction, the actions of LCO 3.1.5 may be applicable.

F. Prior to rod movement, T_{avg} - T_{ref} deviation may need adjustment to ensure temperature limits will not be exceeded when rods are repositioned.

G. Steps that directly affect reactivity will be preceded with the Greek symbol (ρ).

Date Today **Initials**

4.0 PREREQUISITE ACTIONS

NOTE

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

4.1 Preliminary Actions

[1] **RECORD** start date and time on Surveillance Task Sheet. DAH

[2] **RECORD** present plant Mode: 1 DAH

[3] **ENSURE** the following:

[3.1] Control Rod Drive MG Set (s) in SERVICE. DAH

[3.2] Reactor Trip Breakers CLOSED. DAH

4.2 Approvals and Notifications

[1] **OBTAIN** SM/SRO approval to perform this SI on Surveillance Task Sheet. DAH

[2] **ENSURE** Chemistry notified prior to performance of this instruction. DAH

4.3 Field Preparations

[1] **ENSURE** Precautions and Limitations in Section 3.0 have been **REVIEWED**. DAH

[2] **RECORD** the as found position of 1-RBSS, ROD BANK **SELECT** (Rod Bank Selector Switch).
1-RBSS: AUTO DAH

5.0 ACCEPTANCE CRITERIA

Verify each rod not fully inserted has freedom of movement in the core equal to or greater than 10 Steps.

Date Today **Initials**

6.0 PERFORMANCE

6.1 SHUTDOWN BANK A (SBA)

NOTES

1) Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.
2) Rod movement is verified by monitoring (RPIs) and Step Counters.
3) Alarm 83D, ROD DEVIN & SEQ PWR RANGE TILT COMPUTER ALARM, may actuate when shutdown rods are inserted from fully withdrawn.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of 10 steps. DAH

[2] **RECORD** the initial position of the following Step Counters:

[2.1] 1-SBAG1, SHUTDOWN BANK A1: 228 steps. DAH

[2.2] 1-SBAG2, SHUTDOWN BANK A2: 228 steps. DAH

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program,
- Less than 5 minutes has elapsed since any change in rod control input (i.e. Tavg, Tref, or NIS)
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in SBA. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light C illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120. DAH

[4.2] CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATE POWER CAB (2AC) 1-PNL-85-L118. DAH

Date Today **Initials**

6.1 SHUTDOWN BANK A (SBA) (continued)

[5] **(ρ) MOVE** Shutdown Bank A at least 10 Steps in any one direction, as indicated on appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) DAH

[6] **VERIFY** Shutdown Bank A1 and A2 Step Counters agree within plus or minus 2 steps. DAH

[7] **(ρ) RETURN** Shutdown Bank A to its initial position recorded in Step 6.1[2] of this section. DAH

[8] Section 6.1, Shutdown Bank A (SBA) complete. DAH

6.2 SHUTDOWN BANK B (SBB)

NOTES

1) Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

3) Alarm 83D, ROD DEVIN & SEQ PWR RANGE TILT COMPUTER ALARM, may actuate when shutdown rods are inserted from fully withdrawn.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of 10 steps. DAH

[2] **RECORD** the initial position of the following Step Counters: DAH

[2.1] 1-SBBG1, SHUTDOWN BANK B1: 228 steps. DAH

[2.2] 1-SBBG2, SHUTDOWN BANK B2: 228 steps. DAH

Date Today **Initials**

6.2 **SHUTDOWN BANK B (SBB) (continued)**

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK **SELECT**, in SBB. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light C illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATE POWER CAB (1BD) 1-PNL-85-L121. DAH

[4.2] CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATE POWER CAB (2BD) 1-PNL-85-L117. DAH

[5] **(ρ) MOVE** Shutdown Bank B at least 10 Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) DAH

[6] **VERIFY** SHUTDOWN BANK B1 and B2 Step Counters agree within plus or minus 2 steps. DAH

[7] **(ρ) RETURN** Shutdown Bank B to its original position as recorded in Step 6.2[2]of this section with 1-FLRM, ROD MOTION CONTROL. DAH

[8] Section 6.2, Shutdown Bank B (SBB) complete. DAH

Date Today **Initials**

6.3 **SHUTDOWN BANK C (SBC)**

NOTES

1) Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

3) Alarm 83D, ROD DEVIN & SEQ PWR RANGE TILT COMPUTER ALARM, may actuate when shutdown rods are inserted from fully withdrawn.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. DAH

[2] **RECORD** the initial position of the following Step Counter:

1-SBCG1, SHUTDOWN BANK C1: 228 steps. DAH

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS)
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in SBC. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light A illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-119 SOLID STATE POWER CAB (SCD) 1-PNL-85-L119. DAH

Date Today Initials

6.3 **SHUTDOWN BANK C (SBC) (continued)**

NOTE

During movement of SBC rods, CERPI Monitor Rod speed may be inaccurate.

[5] **(ρ) MOVE** Shutdown Bank C at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit). DAH

[6] **(ρ) RETURN** Shutdown Bank C to its original position as recorded in Step 6.3[2] of this section using 1-FLRM, ROD MOTION CONTROL. DAH

[7] Section 6.3, Shutdown Bank C (SBC) complete. DAH

6.4 **SHUTDOWN BANK D (SBD)**

NOTES

1) Between rod bank movements, T_{avg} - T_{ref} deviation may be adjusted using manual rod control or by adjusting turbine load

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

3) Alarm 83D, ROD DEVIN & SEQ PWR RANGE TILT COMPUTER ALARM, may actuate when shutdown rods are inserted from fully withdrawn.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. DAH

[2] **RECORD** the initial position of the following Step Counter: DAH

1-SBDG1, SHUTDOWN BANK D1: 228 steps. DAH

Date Today **Initials**

6.4 **SHUTDOWN BANK D (SBD) (continued)**

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in SBD. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light B illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-119 SOLID STATE POWER CAB (SCD) 1-PNL-85-L119. DAH

NOTE

During movement of SBD rods, CERPI Monitor Rod speed may be inaccurate.

[5] **(ρ) MOVE** Shutdown Bank D at least ten Steps in any one direction as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) DAH

[6] **(ρ) RETURN** Shutdown Bank D to its original position as recorded in Step 6.4[2] of this section using 1-FLRM, ROD MOTION CONTROL. DAH

[7] Section 6.4, Shutdown Bank D (SBD) complete. DAH

Date Today **Initials**

6.5 CONTROL BANK A (CBA)

NOTES

1) Between rod bank movements, Tavg - Tref deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. DAH

NOTE

1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.

[2] **RECORD** the initial position of the following Step Counter:

1-CBAG1, **CONTROL** BANK A1: 228 steps. DAH

1-CBAG2, **CONTROL** BANK A2: 228 steps. DAH

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in CBA. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light A illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120. DAH

[4.2] CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATE POWER CAB (2AC) 1-PNL-85-L118. DAH

Date_____ Initials

6.5 CONTROL BANK A (CBA) (continued)

[5] **(ρ) MOVE** Control Bank A at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) DAH

[6] **VERIFY** Control Bank A1 and A2 Step Counters agree within plus or minus 2 steps. DAH

[7] **(ρ) RETURN** Control Bank A to its original position as recorded in Step 6.5[2] of this section using 1-FLRM, ROD MOTION CONTROL. DAH

[8] **IF** Rod Insertion Limit Lo Alarm 87-A does not clear, **THEN**

- **REFER TO** Tech Spec LCO 3.1.7. DAH
- **CONTACT** System Engineer to reset 87-A USING ICS. DAH

[9] Section 6.5, Control Bank A (CBA) complete. DAH

6.6 CONTROL BANK B (CBB)

NOTES

1) Between rod bank movements, T_{avg} - T_{ref} deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. DAH

NOTE

1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.

[2] **RECORD** the initial position of the following Step Counters:

[2.1] 1-CBBG1, CONTROL BANK B1: 228 steps. DAH

[2.2] 1-CBBG2, CONTROL BANK B2: 228 steps. DAH

Date Today Initials

6.6 CONTROL BANK B (CBB) (continued)

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in CBB. DAH

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light A illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATE POWER CAB (1BD) 1-PNL-85-L121. DAH

[4.2] CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATE POWER CAB (2BD) 1-PNL-85-L117. DAH

[5] **(ρ) MOVE** Control Bank B at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) DAH

[6] **VERIFY** Control Bank B1 and B2 Step Counters agree within plus or minus 2 steps. DAH

[7] **(ρ) RETURN** Control Bank B to its original position as recorded in Step 6.6[2]of this section using 1-FLRM, ROD MOTION CONTROL. DAH

[8] **IF** Rod Insertion Limit Lo Alarm 87-A does **NOT** clear, **THEN**

- **REFER TO** Tech Spec LCO 3.1.7. N/A
- **CONTACT** System Engineer to reset 87-A USING ICS. ↓

[9] Section 6.6, Control Bank B (CBB) complete. DAH

Date_____ Initials

6.7 CONTROL BANK C (CBC)

NOTES

1) Between rod bank movements, T_{avg} - T_{ref} deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. _____

NOTE

1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.

[2] **RECORD** the initial position of the following Step Counters:
1-CBCG1, CONTROL BANK C1:_____steps. _____

1-CBCG2, CONTROL BANK C2:_____steps. _____

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

- Tavg is not within 1 °F of program,
- Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),
- Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4].

[3] **PLACE** 1-RBSS, ROD BANK SELECT, in CBC. _____

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light B illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-120 SOLID STATE POWER CAB (1AC) 1-PNL-85-L120. _____

[4.2] CONTROL ROD DRIVE PANEL 1-L-118 SOLID STATE POWER CAB (2AC) 1-PNL-85-L118. _____

Date_____ Initials

6.7 CONTROL BANK C (CBC) (continued)

[5] **(ρ) MOVE** Control Bank C at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) _____

[6] **VERIFY** Control Bank C1 and C2 Step Counters agree within plus or minus 2 steps. _____

[7] **(ρ) RETURN** Control Bank C to its original position as recorded in **Step** 6.7[2] of this section using 1-FLRM, ROD MOTION CONTROL. _____

[8] **IF** Rod Insertion Limit Lo Alarm 87-A does not clear, **THEN**

- **REFER TO** Tech Spec LCO 3.1.7. _____
- **CONTACT** System Engineer to reset 87-A USING ICS. _____

[9] Section 6.7, Control Bank C (CBC) complete. _____

6.8 CONTROL BANK D (CBD)

NOTES

1) Between rod bank movements, T_{avg} - T_{ref} deviation may be adjusted using manual rod control or by adjusting turbine load.

2) Rod movement is verified by monitoring (RPIs) and Step Counters.

[1] **ENSURE** T_{avg} - T_{ref} deviation is adjusted to allow for bank movement of ten steps. _____

NOTE

1-XA-55-4B-87A, ROD INSERTION LIMIT LO, may actuate during the following test sections.

[2] **RECORD** the initial position of the following Step Counters:

- 1-CBDG1, CONTROL BANK D1:_____steps. _____
- 1-CBDG2, CONTROL BANK D2:_____steps. _____

Date_____ **Initials**

6.8 CONTROL BANK D (CBD) (continued)

NOTE

The operator has the option of moving Control Bank D five Steps in one direction, then ten Steps in the opposite direction and then return to normal. This method will have less overall effect on Reactor Power.

[3] **PLACE** 1-RBSS, ROD BANK **SELECT**, in CBD. _____

[4] **VERIFY** correct bank selected locally by GRP. SELECT Light B illuminated on:

[4.1] CONTROL ROD DRIVE PANEL 1-L-121 SOLID STATE POWER CAB (1BD) 1-PNL-85-L121. _____

[4.2] CONTROL ROD DRIVE PANEL 1-L-117 SOLID STATE POWER CAB (2BD) 1-PNL-85-L117. _____

NOTE

1-XA-55-4A-64F, C-11 BANK D AUTO WITHDRAWAL BLOCKED, will actuate if Control Bank D Rods are withdrawn past 220 Steps.

[5] **(ρ) MOVE** Control Bank D at least ten Steps in any one direction, as indicated on the appropriate Step Counter, and

VERIFY movement of the rods in the proper direction is indicated on the appropriate RPIs. (Acc Crit) _____

[6] **VERIFY** Control Bank D1 and D2 Step Counters agree within plus or minus 2 steps. _____

[7] **(ρ) RETURN** Control Bank D to its original position as recorded in **Step** 6.8[2] of this section using 1-FLRM, ROD MOTION CONTROL. _____

[8] **IF** Rod Insertion Limit Lo Alarm 87-A does not clear, **THEN**

- **REFER TO** Tech Spec LCO 3.1.7. _____
- **CONTACT** System Engineer to reset 87-A USING ICS. _____

[9] Section 6.8, Control Bank D (CBD) complete. _____

Date_____ Initials

6.9 RESTORATION

CAUTION

If rod movement demand exists via any of the following methods, the rod bank select switch should be moved through AUTO rapidly to avoid undesired rod movement:

Tavg is not within 1 °F of program

Less than 5 minutes has elapsed since any change in rod control input (i.e, Tavg, Tref, or NIS),

Demand is indicated on the Computer Enhanced Rod Position Indication (CERPI) monitors [1-M-4]

[1] **PLACE** 1-RBSS, ROD BANK SELECT, in MANUAL. _____

[2] **IF** T_{avg} **NOT** on program, **THEN**
RETURN T_{avg} - T_{ref} within 1.5°F. _____

[3] **RETURN** 1-RBSS, ROD BANK SELECT, to the as found position recorded in Section 4.3[2]. _____

[4] **IF** Acceptance Criteria is **NOT** met, **THEN**

NOTIFY the SRO as soon as practical after observation of the noncompliance, for consideration of possible entry into LCO 3.1.5. _____

[5] Section 6.9, Restoration complete. _____

Date_____ **Initials**

7.0 POST SURVEILLANCE ACTIVITIES

[1] **NOTIFY** SM/SRO that Instruction is **COMPLETE**. _____

[2] **RECORD** completion date and time on Surveillance Task Sheet. _____

[3] **NOTIFY** Chemistry of completion of SI and to analyze RCS for Ni and Fe. _____

8.0 RECORDS

8.1 QA Records

The Data Package is a QA record, and handled in accordance with the Document Control and Records Management (DCRM) program and contains the following:

Completed Data Package.

8.2 Non-QA Records

None

Source Notes
(Page 1 of 1)

Requirements Statement	Source Document	Implementing Statement
		None

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System JPM **H (RO Only)**

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EVALUATION SHEET

Task: RESPOND TO RHR PUMP TRIP PER AOI-14.

Alternate Path: n/a

Facility JPM #: 3-OT-JPMR164

Safety Function: 4P **Title:** Heat Removal From Reactor Core

K/A 025 AA1.09 Ability to operate and / or monitor the following as they apply to the Loss of Residual Heat Removal System: LPI pump switches, ammeter, discharge pressure gauge, flow meter, and indicators.

Rating(s): 3.2/3.1 **CFR:** 41.7 / 45.5 / 45.6

Simulator **X** In-**P**lant _____ **P**erform **X** **S**imulate _____

References: SOI-74.01, "Residual Heat Removal System," Rev. 61.
AOI-14 "Loss Of RHR Shutdown Cooling" Rev. 37.

Task Number: RO-074-AOI-14-002 **Title:** During RHR pump operation, respond to an RHR pump trip.

Task Standard: The applicant responds to the trip of 1A RHR pump in accordance with AOI-14, "Loss of RHR Shutdown Cooling," Section 3.5, "RHR Pump 1A-A Trip" and places the 1B RHR pump in service.

Validation Time: 25 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

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SIMULATOR OPERATOR INSTRUCTIONS:

1. **ENSURE NRC Examination Security has been established.**
2. **RESET to Initial Condition 312 by performing the following actions:**
   - a. **Select ICManager on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
   - b. **Locate IC# 312.**
   - c. **Right "click" on IC# 312.**
   - d. **Select Reset on the drop down menu.**
   - e. **Right "click" on RESET.**
   - f. **Enter the password for IC 312.**
   - g. **Select "Yes" on the INITIAL CONDITION RESET pop-up window.**
   - h. **Perform SWITCH CHECK.**
3. **SELECT Director on the THUNDERBAR menu (right hand side of Instructor Console Screen).**
4. **ENSURE the following information appears on the Director Screen:**

	Key	Description	Type	Event	Delay	Inserted	Ramp	Initial	Final	Value
	csr03	containment spray pump a power	R		00:00:00	00:00:00	00:00:00		off	off
	csr04	containment spray pump b power	R		00:00:00	00:00:00	00:00:00		off	off
	sir08	si pump a power	R		00:00:00	00:00:00	00:00:00		off	off
	sir09	si pump b power	R		00:00:00	00:00:00	00:00:00		off	off
	csr05	power to cntmt spray valves fcv-72-2, 39.	R		00:00:00	00:00:00	00:00:00		off	off
	cvr03	power removal centrifugal charge pump b	R		00:00:00	00:00:00	00:00:00		off	off
	rhr12	rhr spray hdr a isolation valve power, fcv-72-40	R		00:00:00	00:00:00	00:00:00		off	off
	rhr13	rhr spray hdr b isolation valve power, fcv-72-41	R		00:00:00	00:00:00	00:00:00		off	off
	hs-30-38a-1	01010 air return fans a-a on/off(green)	O		00:00:00	00:00:00	00:00:00		off	off
	hs-30-39a-1	01010 air return fans b-b on/off(green)	O		00:00:00	00:00:00	00:00:00		off	off
	rh01a	rhr pump a trip	M	1	00:00:00		00:00:00		Active	InActive
	rhr06	hr htx bypass valve hcv-74-36	R	2	00:00:00		00:00:00		0	1
	rhr07	hr htx bypass valve hcv-74-37	R	3	00:00:00		00:00:00		1	0
	rhr03	hr valve 74-530 to cvcs letdown	R	4	00:00:00		00:00:00		0	1
	rhr04	hr valve 74-531 to cvcs letdown	R	5	00:00:00		00:00:00		1	0

5. **Place simulator in RUN and acknowledge any alarms.**

6. Place GREEN Tags on the following components:

- **1-HS-72-27A, Cntmt Spray Pmp A**
- **1-HS-72-10A, Cntmt Spray Pmp B**
- **1-HS-63-10A, SI Pmp A**
- **1-HS-63-15A, SI Pmp B**
- **1-HS-62-104A, CCP B-B**
- **Air Return Fan A-A 1-HS-30-38A**
- **Air Return Fan B-B 1-HS-30-39A**
- **1-HS-63-26A, BIT Outlet**
- **1-HS-63-25A, BIT Outlet**
- **1-HS-72-40A, RHR Spray Header A to Cntmt**
- **1-HS-72-41A, RHR Spray Header B to Cntmt**
- **1-HS-63-72A, Cntmt Sump to RHR Pmp A Suction**
- **1-HS-63-73A, Cntmt Sump to RHR Pmp B Suction**
- **1-HS-72-44A, Cntmt Sump to CS Pmp A Suction**
- **1-HS-72-45A, Cntmt Sump to CS Pmp B Suction**
- **1-HS-72-39A, Cntmt Spray Hdr A to Cntmt**
- **1-HS-72-2A, Cntmt Spray Hdr B to Cntmt**
- **1-HS-63-8A, RHR Pmp A to Charging Pmp Suction**
- **1-HS-63-11A, RHR Pmp B to SI Pmp Suction**
- **1-HS-3-116A/A, ERCW to AFWP A-A Suction From Hdr A**
- **1-HS-3-126 A/A, ERCW to AFWP B-B Suction From Hdr B**
- **1-HS-3-136 A/A, ERCW to TD AFWP Suction From Hdr A**
- **1-HS-3-179 A/A, ERCW to TD AFWP Suction From Hdr B**

8. ENSURE “Extra Operator” is present in the simulator.

9. Place simulator in FREEZE until Examiner cue is given.

10. ENSURE a replacement copy of AOI-14 is available to update simulator copy after JPM performance.

	Simulator Event No.	Description/Role Play
	1	1A-A RHR Pump trip. ***ROLE PLAY: When CB AUO contacted, state that pump tripped on Instantaneous over current.*** ***When AB AUO contacted state that there is evidence of cable damage to the motor pigtail, there is an odor of burnt insulation but there is no smoke or fire.***
	1	1B-B RHR Pump start. ***ROLE PLAY: IF/WHEN Aux Bdlg AUO contacted, state that 1B-B RHR pump is ready for a start.***
	2	AUO is dispatched to close 1-HCV-74-36 ***ROLE PLAY: When contacted as an AUO to close 1-HCV-74-36, repeat back request. Enter Event 2, which will enter remote function rh06 to close. Report back that 1-HCV-74-36 is closed.***
	3	AUO is dispatched to open 1-HCV-74-37 ***ROLE PLAY: When contacted as an AUO to open 1-HCV-74-37, repeat back request. Enter Event 3, which will enter remote function rh07 to open. Report back that 1-HCV-74-37 is open.***
	4	AUO is dispatched to close 1-SPV-74-530 ***ROLE PLAY: When contacted as an AUO to close 1-SPV-74-530, repeat back request. Enter Event 4, which will enter remote function rh03 to close. Report back that 1-SPV-62-530 is closed.***
	5	AUO is dispatched to open 1-HCV-74-36 ***ROLE PLAY: When contacted as an AUO to open 1-SPV-74-531, repeat back request. Enter Event 5, which will enter remote function rh04 to open. Report back that 1-SPV-74-531 is open.***

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READ TO APPLICANT

DIRECTION TO APPLICANT:

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 cue sheet I provided you.

INITIAL CONDITIONS:

1. **Unit 1 is in MODE 5.**
2. **Unit 1 has been cooled down.**
3. **1A-A RHR train is in service.**
4. **1B-B RHR pump is available, and was in service 12 hours ago.**
5. **CVCS is in service.**
6. **RHR to CVCS Letdown is in service from RHR Heat Exchanger A outlet.**
7. **You are the Operator at the Controls.**

INITIATING CUES:

Monitor the control board and respond to events using appropriate procedure.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

EXAMINER: After the applicant has stated that the task is understood, the Console Operator will enter Event 1 to trip the 1A-A RHR pump on instantaneous overcurrent after 30 seconds.	
EXAMINER: The following actions are taken from AOI-14, "Loss of RHR Shutdown Cooling," Section 3.5, "RHR Pump 1A-A trip."	
STEP 1: 1. **CHECK** BOTH RHR pumps stopped. STANDARD: Applicant places 1-HS-74-10A in STOP PULL-TO-LOCK in response to 14-E, M-1 THRU M-6 MOTOR TRIPOUT, which was received when the 1A-A RHR pump tripped. Applicant checks 1-HS-74-20A RHR pump 1B-B stopped. ***When contacted as an AUO, the Console Operator will repeat back the request to determine why 1A-A RHR Pump has tripped. Console Operator reports that there is evidence of cable damage to the motor pigtail, there is an odor of burnt insulation but there is no smoke or fire.*** COMMENTS:	___ SAT ___ UNSAT
STEP 2: 2. **CHECK** RCS temp less than 235°F. STANDARD: Applicant determines that RCS temperature is less than 235°F by checking the following temperature recorders (Applicant may also use plasma displays or plant computer): • 1-TR-74-14 RHR Hx A Temp °F • 1-TR-74-25 RHR Hx B Temp °F COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 3: 3. **ADJUST** charging and letdown to maintain RCS level and press. STANDARD: Applicant may adjust 1-HIC-62-83 RHR LETDOWN FLOW CONTROL closed and 1-FCV-62-93 CHARGING HEADER FLOW PZR LEVEL CONTROL to minimum to slow increase in pressurizer level as observed on PZR COLD CAL Level 1-LI-68-321. Applicant may also adjust 1-FCV-62-89. COMMENTS:	___ SAT ___ UNSAT
CAUTION **If the running RHR pump tripped due to inadequate suction supply or alignment problems, then do NOT attempt to start standby pump until adequate supply and alignment is ensured.**	
STEP 4: 4. **CHECK** RHR pump 1B-B available. STANDARD: Applicant determines that 1B-B RHR pump is available (given in INITIAL CONDITIONS). COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5: 5. **OPEN** 1-FCV-70-153, CCS to RHR HX B. STANDARD: Applicant determines that 1-FCV-70-153 is open by checking 1-HS-70-153A is tagged with Power Disconnected Open (PDO) tag. Applicant may check flow through heat exchanger on 1-EI-70-155 RHR Hx B Flow. COMMENTS:	___ SAT ___ UNSAT
STEP 6: 6. **ENSURE** RCS HL to RHR suction OPEN: • 1-FCV-74-1 and 1-FCV-74-2, OR • 1-FCV-74-8 and 1-FCV-74-9. STANDARD: Applicant determines 1-FCV-74-1 and -2 are OPEN by checking respective control board hand switch RED light LIT and GREEN light DARK on 1-HS-74-1A and 1-HS-74-2A. COMMENTS:	___ SAT ___ UNSAT
STEP 7: 7. **OPEN** 1-FCV-74-21, RHR pump 1B-B suction. STANDARD: The applicant determines 1-FCV-74-21 open by checking RED light LIT and GREEN light DARK on hand switch 1-HS-74-21. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8: 8. **CLOSE** RHR Hx outlets and bypass: • 1-FCV-74-16, RHR Hx A outlet. • 1-FCV-74-28, RHR Hx B outlet. • 1-FCV-74-32, RHR Hx bypass. STANDARD: _____Applicant locates 1-HIC-74-16A and closes by rotating CCW to the stop. **(Critical).** _____Applicant locates 1-HIC-74-32A and closes by rotating CCW to the stop. **(Critical).** _____Applicant locates 1-HIC-74-28A and checks closed by rotating CCW to the CLOSE stop. **This step is critical to flow path alignment prior to starting 1B-B RHR pump to limit starting current.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 9: 9. **ALIGN** RHR pump 1B-B discharge: a. **OPEN** 1-FCV-63-94, RHR B to CL 1 & 4. b. **OPEN** 1-FCV-74-35, RHR Hx B outlet xtie. c. **CLOSE** 1-FCV-74-33, RHR Hx A outlet xtie. d. **CLOSE** 1-FCV-63-93, RHR A to CL 2 & 3. STANDARD: _____Applicant locates 1-HS-63-94A and rotates the handswitch to the right to the OPEN position **(Critical).** Applicant observes GREEN light is DARK and RED light is LIT. _____Applicant locates 1-HS-74-35A and rotates the handswitch to the right to the OPEN position **(Critical).** Applicant observes GREEN light is DARK and RED light for LIT. _____Applicant locates 1-HS-74-33A and rotates the handswitch to the left to the CLOSED position **(Critical).** Applicant observes GREEN light is LIT and RED light is DARK. _____Applicant locates 1-HS-63-93A and rotates the handswitch to the left to the CLOSED position **(Critical).** Applicant observes GREEN light is LIT and RED light is DARK. **This step is critical to establish proper flow path prior to start of 1B-B RHR pump, and to isolate the flow path from the 1A-A RHR pump.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10: 10. **START** RHR pump 1B-B. STANDARD: _____Applicant locates1-HS-74-20A and rotates the handswitch to the right to the START position **(Critical)**. Applicant verifies GREEN light is DARK and the RED light LIT. Applicant observes amps for the 1B-B RHR pump on 1-EI-74-17A, rising. Applicant observes discharge pressure for the 1B-B RHR pump on 1-PI-74-26, rising. Applicant may contact an AUO to check the 1B-B RHR Pump ready for a start prior to starting the pump. ***When contacted as an AUO, the Console Operator will repeat back the request check 1B-B RHR Pump ready for a start. Console Operator reports the 1B-B RHR Pump is ready for a start.*** **This step is critical to starting 1B-B RHR pump and establishing RHR shutdown cooling.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 11: 11. **ADJUST** 1-FCV-74-28 to establish RHR flow within the RHR Pump operating flow limits in SOI-74.01 Appendix A. STANDARD: _____Applicant adjusts RHR flow through 1-FCV-74-28 by rotating CW from 0% using 1-HIC-74-28A and observing rising flow on 1-FI-63-92A, RHR TO CL 1&4 NR FLOW. **Establishing a flow of 2000 to 4000 gpm is critical to establishing RHR shutdown cooling.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 12: 12. **ALIGN** RHR Hx bypass flow: a. **CLOSE** 1-HCV-74-36, RHR Hx A bypass isol. b. **OPEN** 1-HCV-74-37, RHR Hx B bypass isol. c. **ADJUST** 1-FCV-74-32, RHR Hx bypass FCV. STANDARD: Applicant contacts AUO to close 1-HCV-74-36. **(Must contact the local operator to close valve).** ***When contacted as an AUO, the Console Operator will repeat back the request to close 1-HCV-74-36. Console Operator enters Event 2 (rhr06) and reports back that 1-HCV-74-36 is CLOSED.*** Applicant contacts AUO to open 1-HCV-74-37. **(Must contact the local operator to open valve).** ***When contacted as an AUO, the Console Operator will repeat back the request to close 1-HCV-74-37. Console Operator enters Event 3 (rhr07) and reports back that 1-HCV-74-37 is CLOSED.*** Applicant locates 1-HIC-74-32A and adjusts to stabilize RCS temperature as observed on 1-TR-74-25 RHR Hx B Temp °F. COMMENTS:	___ SAT ___ UNSAT
STEP 13: 13. **WHEN** RHR flow greater than 1400 gpm, **THEN ENSURE** 1-FCV-74-24, RHR pump B mini-flow CLOSED. STANDARD: Applicant checks mini flow valve 1-FCV-74-24 closed by checking GREEN light LIT on 1-HS-74-24A when flow greater than 1400 gpm as determined by Window 113-C RHR PUMP DISCH PRESS HI/MINI FLOW CONDITION clearing. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
CAUTION **Rapid changes in letdown flow and RCS pressure may occur during RHR letdown realignment. The following steps should be coordinated to allow MCR adjustments as local alignments are performed especially if PZR is water solid.**	
STEP 14: 14. **ALIGN** RHR pump 1B-B to CVCS: a. **CLOSE** 1-SPV-74-530, Tr A [1A Hx rm/722]. b. **OPEN** 1-SPV-74-531, Tr B [1B Hx rm/722]. STANDARD: _____Applicant contacts AUO to close 1-SPV-74-530. **(Critical to contact the local operator to close valve).** ***When contacted as an AUO, the Console Operator will repeat back the request to close 1-SPV-74-530. Console Operator enters Event 4 (rhr03) and reports back that 1-SPV-74-530 is CLOSED.*** _____Applicant contacts AUO to open 1-SPV-74-531. **(Critical to contact the local operator to open valve).** ***When contacted as an AUO, the Console Operator will repeat back the request to open 1-SPV-74-531. Console Operator enters Event 5 (rhr04) and reports back that 1-SPV-74-531 is OPEN.*** **This step is critical to establish proper flow path to CVCS after start of 1B-B RHR pump.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15: 15. **ESTABLISH** RHR letdown a. **SLOWLY OPEN** 1-FCV-62-83, RHR Letdown Flow Control. b. **MONITOR** 1-PI-62-81, LP Letdown Press. STANDARD: Applicant locates 1-HIC-62-83A and rotates the setpoint dial COUNTER CLOCKWISE SLOWLY, while monitoring 1-PI-62-81, LP LETDOWN PRESS. **EXAMINER: After the applicant has opened 1-FCV-62-83, state that "another operator will complete AOI-14 actions."** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

H

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **Unit 1 is in MODE 4.**
2. **Unit 1 has been cooled down.**
3. **1A-A RHR train is in service.**
4. **1B-B RHR pump is available, and was in service 12 hours ago.**
5. **CVCS is in service.**
6. **RHR to CVCS Letdown is in service from RHR Heat Exchanger A outlet.**
7. **You are the Operator at the Controls.**

INITIATING CUES:

Monitor the control board and respond to events using appropriate procedure.

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System JPM I

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EVALUATION SHEET

Task: BYPASS1-PCV-62-81, CVCS LETDOWN HX PRESS CNTL, FOR LOCAL CONTROL

Alternate Path: n/a

Facility JPM #: 3-OT-JMPA156A

Safety Function: 2 **Title:** Reactor Pressure Control.

K/A 004 A4.05 Ability to manually operate and/or monitor in the control room: Letdown pressure and temperature control valves

Rating(s): 3.6/3.1 **CFR:** 41.7 / 45.5 to 45.8

Evaluation Method: Simulator _____ **In-Plant** **X** Classroom _____

References: SOI-62.01, "CVCS - Charging and Letdown," Rev. 64.

Task Number: AUO-062-SOI-62.1-015 **Title:** Bypass 1-PCV-62-81, CVCS Letdown Heat Exchanger Pressure Control, for local control.

Task Standard: Applicant performs SOI-62.01, "CVCS - Charging and Letdown," Section 8.15, "Bypass 1-PCV-62-81, CVCS LETDOWN HX PRESS CNTL, for Local Control," and stabilizes pressure.

Validation Time: 15 minutes **Time Critical:** Yes _____ No **X**

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Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

Tools/Equipment/Procedures Needed:

Hard Hat, Safety Glasses, Hearing Protection, Plant Approved Shoes, Gloves.

ALARA considerations.

Start this JPM at elevation 713' RP Table.

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READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, which step(s) to simulate or discuss, and provide initiating/operating cues.

NO MANIPULATION OF PLANT EQUIPMENT SHALL OCCUR DURING THIS JPM. SIMULATE ALL MANIPULATIONS.

When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure that you indicate to me when you fully understand your task. To indicate that you have completed your assigned task return the cue sheet I provided you. To indicate that you have completed your assigned task return the cue sheet I provided you.

INITIAL CONDITIONS:

1. **Unit is at 100% RTP.**
2. **Centrifugal Charging Pump 1A-A is in service.**
3. **Letdown Pressure Control Valve 1-PCV-62-81 has been operating in a sluggish manner causing swings in letdown pressure.**
4. **Work Control has been contacted and has requested that 1-PCV-62-81 be bypassed to permit further investigation of the pressure control valve.**

INITIATING CUES:

The Unit Operator has directed you to bypass 1-PCV-62-81, LETDOWN PRESSURE CONTROL using SOI-62.01, "CVCS - Charging and Letdown," Section 8.15, "CVCS LETDOWN HX PRESS CNTL, for Local Control."

Maintain radio contact with the MCR operator to allow the MCR operator to provide direction and control of letdown pressure.

Notify the Unit Operator when you have bypassed 1-PCV-62-81.

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: [1] **ESTABLISH** communications with personnel at the Main Control Room (or Aux Control Room) and Aux Bldg el 737 Outside the letdown heat exchanger room. STANDARD: Applicant locates local phone and indicates that communication has been established to the Main Control Room. COMMENTS:	___ SAT ___ UNSAT
STEP 2: [2] **PLACE** 1-HIC-62-81A, LETDOWN PRESS CONTROL in MANUAL. STANDARD: Applicant contacts the Main Control room to ensure that the UO has placed the valve controller in manual. ***CUE: When UO contacted, acknowledge, then state that 1-HIC-62-81A is in MANUAL*** COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 3: [3] **THROTTLE CLOSED** 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION [A5U/737] until pressure rise indicated in MCR or Aux Cntl Rm. STANDARD: Applicant locates 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION, and indicates that to throttle the valve CLOSED, the handwheel must be rotated in the clockwise direction. ***CUE:*** ***After performer states how to THROTTLE CLOSED the valve, then state that valve hand wheel rotates in clockwise direction.*** ***IF control room contacted to monitor letdown pressure, then after several turns state that letdown pressure has risen 20 psig.*** ***IF applicant FULLY CLOSES 1-ISV-62-673, then report that letdown pressure is oscillating and Window 110-C, LO PRESS LTDN RELIEF LINE TEMP HI is LIT.*** **Step is critical for establishing proper flow path for bypassing 1-PCV-62-81.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT

NOTE

The next step will cause a pressure swing in the letdown header. The MCR operator and local operator should coordinate actions to minimize the pressure swings.

EXAMINER: The following step is a controlled iterative process. The applicant should throttle OPEN the bypass valve (1-BYV-62-672) a finite amount and then throttle CLOSED the isolation valve (1-ISV-62-673) an approximately equal amount. In doing this, the applicant will minimize the overall transient on the letdown subsystem.

If the applicant excessively throttles the bypass valve open (without isolating the normal letdown path an equivalent amount), then flashing in the letdown stream will occur.

If the applicant excessively throttles the isolation closed (without bypassing the normal path), then lifting of the letdown relief valve will occur (with diversion of letdown to the PRT).

STEP/STANDARD	SAT/UNSAT
STEP 4: [4] **THROTTLE OPEN** 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS [A5U/737] while CLOSING 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION. STANDARD: Applicant locates 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS ISOLATION, and states that to throttle the valve OPEN, the handwheel must be rotated in the counter clockwise direction. Applicant indicates that letdown line pressure has been controlled per UO directions (counter clockwise on 1-BYV-62-672 and clockwise on 1-ISV-62-673 until 1-ISV-62-673 is fully closed**.** ***CUE:*** ***If UO contacted, state that letdown pressure has lowered by 20 psig as 1-BYV-62-672 is OPENED.*** ***If UO contacted, state that letdown pressure has risen by 20 psig as 1-BYV-62-673 is CLOSED.*** ***If the applicant continues to OPEN 1-BYV-62-672 without subsequently closing 1-ISV-62-673 CVCS LETDOWN HEADER ISOLATION, report as the UO that letdown pressure and flow are oscillating, and 1-TI-62-71, REGEN HX OUT LTDN TEMP is 390°F and rising.*** ***If the applicant continues to CLOSE 1-ISV-62-673 without subsequently opening 1-BYV-62-672 then report that letdown pressure is oscillating and Window 110-C, LO PRESS LTDN RELIEF LINE TEMP HI is LIT.*** **Step is critical for establishing proper flow path for bypassing 1-PCV-62-81** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5: [5] **ADJUST** 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS [A5U/737] to maintain desired letdown press. STANDARD: Applicant responds to cues and controls letdown line pressure per UO directions (clockwise on 1-BYV-62-672 to raise pressure and counter clockwise on 1-BYV-62-672 to lower pressure). ***CUE: If UO contacted, state that letdown pressure needs to be raised 20 psig, from 300 to 320 psig.*** ***CUE: As operator operates 1-BYV-62-672 clockwise, state that letdown pressure is now to 320 psig.*** ***CUE: As Unit Operator state that Rad Waste AUO will be contacted to control the 1-BYV-62-672 if additional adjustments are required.*** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

I

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **Unit is at 100% RTP.**

2. **Centrifugal Charging Pump 1A-A is in service.**

3. **Letdown Pressure Control Valve 1-PCV-62-81 has been operating in a sluggish manner causing swings in letdown pressure.**

4. **Work Control has been contacted and has requested that 1-PCV-62-81 be bypassed to permit further investigation of the pressure control valve.**

INITIATING CUES:

The Unit Operator has directed you to bypass 1-PCV-62-81, LETDOWN PRESSURE CONTROL using SOI-62.01, "CVCS - Charging and Letdown," Section 8.15, "CVCS LETDOWN HX PRESS CNTL, for Local Control."

Maintain radio contact with the MCR operator to allow the MCR operator to provide direction and control of letdown pressure.

Notify the Unit Operator when you have bypassed 1-PCV-62-81.

Watts Bar Nuclear Plant

Unit 1

System Operating Instruction

SOI-62.01

CVCS-Charging and Letdown

VFL
Today
DAH

Revision 0064

Quality Related

Level of Use: Continuous Use

Effective Date: 09-17-2012

Responsible Organization: OPS, Operations

Prepared By: R. C. Davidson

Approved By: W. E. Sprinkle

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
62	05/03/11	2, 4, 21, 30, 33, 43, 47, 48, 53, 75, 88, 89, 91, pg 10 Att 1V	Added steps and caution to ensure that the in service WGDT Hydrogen concentration is acceptable to receive the Oxygen concentration contained in the VCT, when it is Burped.[PER 354351] Added infrequent operation section 8.22 for Placing 1-HIC-62-93A in Auto with a Deviation [PCR 4997] Added specific steps to clarify how to raise PZR level in section 8.20 and to return 1-HIC-62-93A to Auto in section that were needed.[PCR 3435] Minor editorial changes Added descriptive word of "EXTERNAL" to the external attachment table of contents and corrected the external attachments titles. Added unit designator to "1-XI-62-93" Corrected Att 1V commitment number [PCR 4961]
63	06/08/12	2, 34, 36, 37, 46, 47, 74, 90, 91, 92, 95	PER 473046: Changed "Burping the VCT" section to allow inventory conservation. PCR 3656: Added sections to bypass and restore Seal Return Filter. PCR 3441: Clarified section for H2O2 addition to determine correct demin to use and clarify loop for section reuse. PCR 5653: Clarified sections for Excess Letdown to notify RP and address boration effectiveness. PCR 6196: Added section to shutdown charging.
64	09/17/12	2, 77, 78	Minor editorial to remove step 20 and move step 21 of Section 8.13 to end of section for better continuity. Section will be completed in its entirety with each peroxide addition.

Table of Contents

Table of Contents (continued)

EXTERNAL ATTACHMENTS

Attachment 1P: Power Checklist 62.01-1P

Attachment 1V: Valve Checklist 62.01-1V

1.0 INTRODUCTION

1.1 Purpose

To provide the instructions for operation of the Chemical and Volume Control System (CVCS).

1.2 Scope

This Instruction includes operation of the following CVCS subsystems:

A. Charging

B. Letdown

C. RCP Seal Injection

D. Chemical Addition

2.0 REFERENCES

2.1 Performance References

A. 0-PI-OPS-17.0, 18 Month Locked Valve Verification

B. 0-PI-OPS-17.1, 18 Month Locked Breaker Verification

C. 1-SI-63-10.1-A, ECCS Pump and Discharge Pipe Venting-Train A Inside Containment

D. 1-SI-63-10-B, ECCS Pumps Venting-Train B

E. 1-SI-68-33, Measurement of Controlled Leakage of the Reactor Coolant Pump Seals

F. 1-TRI-62-901, ASME Section XI Inservice System Pressure Test CVCS Inside Containment

G. GOI-7, Generic Equipment Operating Guidelines

H. SOI-62.02, Boron Concentration Control

I. SOI-62.04, CVCS Purification Systems

J. SOI-70.01, Component Cooling System (CCS)

K. SOI-74.01, Residual Heat Removal System (RHR)

L. SOI-77.01, Liquid Waste Disposal

M. SOI-77.02, Waste Gas Disposal

N. SOI-77.04, Auxiliary Building Nitrogen System

O. SOI-77.09, Auxiliary Building Hydrogen System

P. SOI-81.01, Primary Makeup Water System

Q. SOI-90.01, Radiation Monitoring System

R. SOI-235.01, 120V AC Vital Power System 1-I

S. SOI-235.03, 120V AC Vital Power System 1-III

T. SOI-235.04, 120V AC Vital Power System 1-IV

U. SOI-236.01, 125V DC Vital Battery Board I

2.1 Performance References (continued)

V. SOI-236.02, 125V DC Vital Battery Board II

W. CM-6.24, Sampling CVCS Mixed Bed Demineralizers

X. CM-5.09, Shutdown Primary Chemistry Control

Y. TI-4, Part II, Plant Curve Book, Tank Curves, Turbine Curves

Z. TI-59, Boron Tables

AA. 1-SI-63-10.2-A, ECCS Pump and Discharge Pipe Venting-Train A Outside Containment

2.2 Developmental References

A. GO-1, Plant Startup from Cold Shutdown to Hot Standby

B. GO-2, Plant Startup from Hot Standby to Minimum Load

C. GO-3, Plant Shutdown from Minimum Load to Cold Shutdown

D. 1-SI-0-8, Monitoring Component Cyclic or Transient Limits

E. N3-62-4001, Chemical and Volume Control System

F. SOI-68.01, Reactor Coolant System

G. TVA Drawings:

1. 1-45N600-62 Series
2. 45N706-1, -3
3. 45W751-1, -7
4. 45N760-62 Series
5. 45N1645-1, -2
6. 47B601-62
7. 47W809-1
8. 47W809-2
9. 47W809-9 -3, -6
10. 47W859-2

3.0 PRECAUTIONS AND LIMITATIONS

NOTE

During power changes, letdown should be maximized when possible to reduce Crud Induced Power Shift, also know as, Axial Offset Anomaly.

A. Maximum letdown flow is 120 gpm.

B. If Letdown Heat Exchanger (LDHX) outlet temperature reaches 140°F, demineralizer resin damage could occur.

C. During summer months, the lowest achievable letdown heat exchanger outlet temperature is limited by the CCS temperature, which in turn is limited by river temperature (via ERCW cooling to the CCS heat exchanger). The lowest achievable letdown heat exchanger outlet temperature is approximately 6 degrees higher than the river temperature. Attempting to operate with a letdown temperature less than 6 degrees higher than the river temperature will force 1-TCV-70-192 full open rendering 1-HIC-62-78A ineffective. Letdown temperature will then vary slightly as river temperature varies throughout the day. This causes slight changes in reactor power as boron affinity changes in the demin beds as the letdown temperature changes. Therefore, 1-HIC-62-78A, LETDOWN HX OUTLET TEMP TCV-70-192 CNTL should not be allowed to control 1-TCV-70-192 at its full open position.

D. If Reactor Coolant (RC) filter is bypassed, flow through demins should be secured or diverted to the HUT to prevent resin entering RCS if the demin resin screen fails.[C.2]

E. Charging and Letdown are in service together. If Letdown isolates or Charging is lost, the other must be isolated (see exception below). If Charging is lost and Letdown remains in service, flashing or lifting of the letdown relief could occur. If Letdown is lost and Charging remains in service, thermal shock or a positive reactivity insertion could result from cold water entering RCS.
EXCEPTION: If all the following conditions exist:

1. Any RCP Thermal Barrier Out Of Service
2. In service Charging Pump trips
3. RCP seal flow is required.

Then the Operator may immediately start an available charging pump.

F. RCP seal damage can occur if VCT press is below 15 psig with RCPs running.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

G. A pneumatic relay, added to panel L-112 to limit the signal to 1-FCV-62-93, ensures 32 to 35 gpm RCP seal injection flow in the event of an Appendix R fire, by preventing valve closure. This pneumatic relay has a bypass valve on panel L-112 to allow effective flow control at low RCS pressures (i.e., heat-up and cool-down).

H. Operating CCPs on mini-flow for extended periods could cause pump damage due to the small amount of water being re-circulated at high pressure.

I. H_2 concentration should be maintained 25 to 50 cc/kg (STP) of water when plant is at power.

J. Safety practices are required when handling hazardous chemicals. Face shields, rubber gloves, and protective clothing must be worn in preparation, handling, and sampling operations.

K. Lithium Hydroxide is a strong caustic and a strong irritant to the eyes, skin and membranes. It is also toxic by ingestion and inhalation. Precautions must be taken to prevent direct contact with or ingestion or inhalation of this chemical.

L. After each start of a CCP, ensure ACB closing spring recharges.

M. Explosive mixtures of hydrogen and oxygen in the VCT and the HUTs must be avoided at all times. The oxygen content in the tanks must **NOT** exceed 2% by volume when hydrogen concentration in the tanks exceeds 4% by volume. Nitrogen gas may be used for purging.

N. Concurrent closure of 1-ISV-62-953 and 2-ISV-62-953 is prohibited to ensure a discharge path for the VCT and BIT relief valves.

O. When operating at a minimum charging flow rate, check that the letdown flow is being cooled below 380°F. If **NOT**, raise charging and/or reduce letdown flow to lower letdown temperature.

P. After significant change in letdown and charging flow, RCP seal injection flows require checking, and adjusting if necessary.

Q. Alternating between the Alternate and Normal Charging paths should be done at cold shutdown when possible to avoid charging line transients.

R. Pressure downstream of the letdown orifices must remain high enough to preclude flashing.

S. Pressure drop across #1 seals should be checked to ensure seal injection flow is adequate and labyrinth pressure drop is normal before RCS pressure exceeds approximately 380 psig.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

T. During Cold Shutdown (Mode 5), auxiliary spray is used to provide a rapid means of cooling down the pressurizer near the end of plant cool-down. During this mode of operation, charging flow-rate shall be controlled to a maximum of 232 gpm to ensure auxiliary spray flow-rate does **NOT** exceed 200 gpm.

U. A minimum charging flow of 15 gpm through the regenerative HX should be maintained at all times.

V. When water Solid with letdown from RHR, FCV-62-83 RHR letdown should be full **OPEN**, and RCS press controlled by PCV-62-81, LETDOWN PRESS CONTROL. The normal letdown system including all orifices must remain in service.

W. Early notification of Instrument Maintenance will ensure instruments are available to support system operations.

X. Instrument Maintenance Department should be notified to ensure required instrumentation is placed in service to support system operation.

Y. Work in Radiologically Controlled Areas (RCAs) requires the use of existing Radiation Work Permits (RWPs) and may require additional ALARA Preplans. Failure to follow posted Rad control requirements can cause unnecessary radiation exposure. Radiation Protection should be notified of work having the potential to change radiological conditions.

Z. When isolating any boron injection flow path to the core, care must be taken to ensure that the remaining available boron injection flow-paths are sufficient to meet the requirements of TR3.1.1 (Modes 4, 5, & 6), and TR3.1.2 (Modes 1, 2, & 3).[C.8]

AA. If hydrogen peroxide is to be added prior to refueling, the RCS should be borated to the refueling boron concentration as soon as possible to achieve acidic conditions by at least 400°F.

BB. If the primary system is to be opened, then Hydrazine must **NOT** be added to the RCS during any phase of unit cool-down or shutdown.

CC. Before starting idle CCPs, possible reactivity effects from dilution or boration due to water trapped in local piping must be considered, e.g., different CB at last pump run.

3.0 PRECAUTIONS AND LIMITATIONS (continued)

DD. VCT Hydrogen and Nitrogen supply pressure limit of 15-20 psi is established to provide margin associated with APP R manual operator actions. The analysis assumes this pressure range while at the low end of VCT level range (~20% level). It is anticipated that pressure may increase above 20 psi when evolutions that cause the VCT level to increase are in progress (i.e. burping the VCT or during boration/dilution evolutions) as a result of the raising VCT liquid level compressing the gas volume.

EE. Steps that directly affect reactivity will be preceded with the Greek symbol (ρ).

FF. Steps within this instruction may require venting, draining or breaching radioactive components or systems to the atmosphere. Appropriate radiation protection controls must be established to prevent the spread of contamination and avoid the generation of airborne radioactivity.

Date Today INITIALS

4.0 PREREQUISITE ACTIONS

4.1 Preliminary Actions

NOTES

1) Throughout instruction where an **IF/THEN** statement occurs, the step is **N/A** if the stated condition does **NOT** exist.
2) Signoffs/information in unused Sections may be left blank.

[1] **INDICATE Section to be performed, and reason for use.**

5.0	Startup	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	N/A	8.0	Infrequent Operations	8.15

Subsection/Reason/Remarks Bypassing 1-PCV-62-81, CVCS LETDOWN HX PRESS CNTL, for local control to support troubleshooting of controller

4.2 Field Preparations

[1] **REVIEW** Plant procedures, processes, and programs in progress to ensure accurate configuration of components necessary for system operation. DAH

[2] **ENSURE** VCT Makeup available per SOI-62.02. DAH

[3] **ENSURE** N_2 available to VCT per SOI-77.04. DAH

[4] **ENSURE** H_2 available to VCT per SOI-77.09. DAH

[5] **ENSURE** Waste Gas Vent Header in service (or available) per SOI-77.02. DAH

[6] **ENSURE** Liquid Waste System in service (or available) per SOI-77.01. DAH

[7] **ENSURE** CCS in service (or available) per SOI-70.01. DAH

Date Today **INITIALS**

4.2 Field Preparations (continued)

[8] **ENSURE** at least one of the following valves LOCKED OPEN to provide a vent path for the VCT relief valve:[C.1]

NOMENCLATURE	LOCATION	UNID	PERF INITIAL
HOLDUP TANK A VCT INLET	A8S/713	1-ISV-62-953	DAH
HOLDUP TANK B VCT INLET	A9S/713	2-ISV-62-953	DAH

[9] **ENSURE** 120V AC Vital Instrument Power Board 1-I in service (or available) per SOI-235.01. DAH

[10] **ENSURE** 120V AC Vital Instrument Power Board 1-III in service (or available) per SOI-235.03. DAH

[11] **ENSURE** 120V AC Vital Instrument Power Board 1-IV in service (or available) per SOI-235.04. DAH

[12] **ENSURE** 125V DC Vital Battery Board I in service (or available) per SOI-236.01. DAH

[13] **ENSURE** 125V DC Vital Battery Board II in service (or available) per SOI-236.02. DAH

4.3 Approvals and Notifications

[1] **COORDINATE** system operations/manipulations with UO. DAH

[2] **NOTIFY** Radwaste AUO if section performed will affect radwaste tank levels. DAH

[3] **NOTIFY** Chemistry when bypassing the Demineralizer DAH

[4] **NOTIFY** Radiation Protection to identify potential radiological impacts and ensure appropriate radiation protection measures are in place as necessary. DAH

Date _____ INITIALS

8.15 Bypassing 1-PCV-62-81, CVCS LETDOWN HX PRESS CNTL, for Local Control

[1] **ESTABLISH** communications with personnel at the Main Control Room (or Aux Control Room) and Aux Bldg el 737 Outside the letdown heat exchanger room. _____

[2] **PLACE** 1-HIC-62-81A, LETDOWN PRESS CONTROL in MANUAL. _____

[3] **THROTTLE CLOSED** 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION [A5U/737] until pressure rise indicated in MCR or Aux Cntl Rm. _____

NOTE

The next step will cause a pressure swing in the letdown header. The MCR operator and local operator should coordinate actions to minimize the pressure swings.

[4] **THROTTLE OPEN** 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS [A5U/737] while CLOSING 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION _____

[5] **ADJUST** 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS [A5U/737] to maintain desired letdown press. _____

Date _____ INITIALS

8.15 Bypassing 1-PCV-62-81, CVCS LETDOWN HX PRESS CNTL, for Local Control (continued)

[6] **WHEN** desired to return 1-PCV-62-81 to service, **THEN**

PERFORM the following: _____

[6.1] **ENSURE** 1-PCV-62-81, CLOSED. _____

[6.2] **OPEN** 1-ISV-62-673, CVCS LETDOWN HEADER ISOLATION [A5U/737] _____

[6.3] **THROTTLE OPEN** 1-PCV-62-81, CVSC LETDOWN HX PRESS CNTL using 1-HIC-62-81 until letdown pressure reduces. _____

NOTE

Sub-steps [6.4] and [6.5] should be performed simultaneously while maintaining desired letdown pressure.

[6.4] **CLOSE** 1-BYV-62-672, CVCS LETDOWN PCV-62-81 BYPASS [A5U/737]. _____

[6.5] **ADJUST** 1-PCV-62-81, CVSC LETDOWN HX PRESS CNTL, to maintain desired letdown pressure. _____

[6.6] **IF** automatic operation of 1-PCV-62-81 is desired, **THEN PLACE** 1-HIC-62-81 in auto. _____

End of Section

Watts Bar Nuclear Plant

NRC Exam 2013-302

System JPM J

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
J
NRC Exam 2013-302
EVALUATION SHEET

Task: LOCAL RESTART OF C&SS AIR COMPRESSORS.

Alternate Path: Compressor "A" has high discharge air temperature and high oil temperature indication lights. Compressor "A" fails to auto load.

Facility JPM #: 3-OT-JPMA001C Rev 5

Safety Function: 8 **Title:** Plant Service Systems

K/A 065 AK3.08 Knowledge of the reasons for the following responses as they apply to the Loss of Instrument Air: Actions contained in EOP for loss of instrument air.

Rating(s): 3.7/3.9 **CFR:** 41.5,41.10 / 45.6 / 45.13

Evaluation Method: Simulator _____ In-Plant **X**

References: 1-AOI-10 "Loss of Control Air" Rev. 1

Task Number: AUO-032-AOI-010-002 **Title:** Perform Attachment 1 of AOI-10, Local Restart of Control and Station Service Air Compressors.

Task Standard: The applicant has aligned and started "A" and "B" Air Compressors using AOI-10, "Loss of Control Air," Attachment 1, "Local Restart of C&SS Air Compressors." Control Air (Non-Essential) pressure has been re-established.

Validation Time: 15 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

Hard Hat, Safety Glasses, Hearing Protection, Gloves and Plant Approved Shoes.
AOI-10 Attachment 1.
High Noise Area; energized rotating equipment that can auto start.

EVALUATOR NOTE: Provide a copy of AOI-10 Attachment 1 to performer with candidate's cue sheet.

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
J
NRC EXAM 2013-302

READ TO APPLICANT

DIRECTION TO APPLICANT:

I will explain the initial conditions, which step(s) to simulate or discuss, and provide initiating/operating cues.

NO MANIPULATION OF PLANT EQUIPMENT SHALL OCCUR DURING THIS JPM. SIMULATE ALL MANIPULATIONS.

When you complete the task successfully, the objective for this job performance measure will be satisfied.

Ensure that you indicate to me when you fully understand your task.

To indicate that you have completed your assigned task return the cue sheet I provided you.

INITIAL CONDITIONS:

1. **A loss of offsite power has occurred.**
2. **The Diesel Generators have started and are feeding the Shutdown Boards.**
3. **The Control and Service Air compressors were aligned normal with "C" air compressor in the lead prior to the Blackout.**
4. **A loss of Non-essential and Service air has occurred (Air pressure is at 75 psig decreasing).**
5. **Essential Air is being supplied by the Aux. Air compressors.**
6. **The 480V Auxiliary Building Common Board does not have voltage available on its normal or alternate supply.**
7. **Local control power is available to the air compressors.**
8. **You are a support AUO on shift.**

INITIATING CUES:

1. **The Unit Operator has dispatched you with a copy of Attachment 1 of AOI-10 with instructions to perform steps 2 through 10.**
2. **Notify the Unit Operator when you have completed the task.**

STEP/STANDARD	SAT/UNSAT

START TIME: _____

STEP 1: 2. Locally **CHECK** 0-PCV-33-4, SERVICE AIR SUPPLY ISOLATION, CLOSED [T7M/708]. STANDARD: The applicant locates and describes how to check that 0-PCV-33-4 is in the closed position by either the green local indicating light or the stem down on the valve. ***CUE:*** ***When the valve is checked, state that green light is ON, Red light is OFF, and Stem is down, with the indicator at "C".*** COMMENTS:	___ SAT ___ UNSAT
STEP 2: 3. **CHECK** local control station alarm DARK [Panel 0-L-240, T7M/708]. STANDARD: The applicant locates the local control station (Panel 0-L-240) alarms and indicates how to check the alarms. ***CUE:*** ***When checked, indicate that Compressor "A" high discharge air temp and high oil temp lights are illuminated.*** The applicant proceeds to RNO column after discovery of the high discharge air temp and high oil temp on "A" compressor being LIT. COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 3: 3. **RESPONSE NOT OBTAINED:** **IF** local control station alarm LIT, **THEN PERFORM** the following for each air compressor in alarm: **a. RESET** high air temp at each compressor (0-TS-32-41, -36,-31). STANDARD: Applicant locates and describes how to depress the High Air Temp reset push button, 0-TS-32-41, (on west side of "A" air compressor). ***CUE: When checked, and after applicant indicates how to depress pushbutton for 0-TS-32-41, state that "the pushbutton is as you see it (reset)."*** **Step is critical because "A" compressor cannot be started with the alarm switch NOT reset.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 4: 3. **RESPONSE NOT OBTAINED:** **IF** local control station alarm LIT, **THEN PERFORM** the following for each air compressor in alarm: **b. RESET** high oil temp switches at each air compressor (0-TS-32-40, -35, -30). STANDARD: Applicant locates and describes how to depress the High oil Temp reset push button, 0-TS-32-40, (on east side of "A" air compressor). ***CUE: When checked, and after applicant indicates how to depress pushbutton for 0-TS-32-40, state that "the pushbutton is as you see it (reset)."*** **Step is critical because "A" compressor cannot be started with the alarm switch NOT reset.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 5: 3. **RESPONSE NOT OBTAINED:** **IF** local control station alarm LIT, **THEN PERFORM** the following for each air compressor in alarm: **c. RESET** Common Alarm using 0-HS-32-25B, COMPRESSOR A, B, C RESET [0-L-240, yellow PB]. STANDARD: Applicant locates and describes how to depress 0-HS-32-25B COMPRESSOR A, B, C RESET pushbutton. ***CUE: When checked, and after applicant indicates how to depress pushbutton for 0-HS-32-25B, state that "the pushbutton is as you see it (reset)."*** **Step is critical because "A" compressor cannot be started without using pushbutton to reset trip logic.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 6: 3. **RESPONSE NOT OBTAINED:** **IF** local control station alarm LIT, **THEN PERFORM** the following for each air compressor in alarm: **d. CHECK** common and all compressor local alarms DARK. STANDARD: The applicant locates the alarms and requests the status of each alarm on panel. ***CUE: After high air temp and high oil temp, reset push buttons at compressor "A", and 0-HS-32-25B has been pushed, indicate to the applicant that all alarms lights on panel are dark.*** COMMENTS:	___ SAT ___ UNSAT
STEP 7: 4. **PLACE** the following C&SS Compressors to HAND [0-L-240]: • A, 0-HS-32-25D. • B, 0-HS-32-26A. STANDARD: Applicant locates and describes how to place 0-HS-32-25D for “A” Compressor and 0-HS-32-26A for “B” Compressor to the HAND position. ***CUE: Indicate that both handswitches point to HAND.*** **Step is critical because the hand switches enable the respective local start pushbuttons.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 8: 5. **PLACE** 0-HS-32-25A, STATION AIR COMPRESSOR SEQUENCE CONTROL, to Position 1. STANDARD: Applicant locates and describes how to rotate 0-HS-32-25A, Station Air Compressor Sequence Selector Control, to select Position 1. ***CUE: Indicate that Sequence Selector is in position 3 before operation, and indicate that Sequence Selector is in position 1 after operation.*** COMMENTS:	___ SAT ___ UNSAT
STEP 9: 6. **START** Compressor A by pushing 0-HS-32-25E. STANDARD: Applicant locates and describes how to depress 0-HS-32-25E manual start push button. ***CUE: If JPM Steps 4, 5, 6, and 7 were SAT, then when PB is depressed, if asked, state that an air compressor start was heard. If JPM Steps 4, 5, 6, or 7 were UNSAT, if asked, state that compressor start was not heard.*** **Step is critical to start air compressor.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 10: 7. **CHECK** Compressor A loads automatically. STANDARD: The applicant describes how to determine that air compressor "A" is loaded, by observing the loading solenoids, or by the sound changing at Compressor "A". ***CUE: When checked, state that the air compressor sound indicates that it has NOT loaded, state that air pressure is NOT rising (several local gauges), or, if both solenoids are checked to be magnetized, state that they are de-energized.*** Applicant proceeds to RNO column after being cued to the failure of "A" compressor to load. COMMENTS:	___ SAT ___ UNSAT
STEP 11: 7. **RESPONSE NOT OBTAINED:** **IF** Compressor A does **NOT** Auto load, **THEN PLACE** 0-HS-32-43A and -43B to ON (Local 0-JB-291-226). STANDARD: _____Applicant locates and describes how to place 0-HS-32-43A and 0-HS-32-43B to the ON positions. ***CUE: After hand switches have been placed to the ON position and when checked, state that the air compressor sound indicates that it has not loaded, the air pressure is dropping, or, if both solenoids are checked to be magnetized, state that they are de-energized.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 12: 7. **RESPONSE NOT OBTAINED:** **IF** Compressor A does **NOT** load from local panel, **THEN**: **a. CLOSE** 0-ISV-32-578, STATION AIR COMPR A UNLOADING HDR ISOL. b. **VENT** 0-TV-32-579, STATION AIR COMPR A UNLOADING HDR TEST. STANDARD: _____Applicant locates and describes how to close 0-ISV-32-578 by stating that the valve handwheel must be rotated clockwise. ***CUE: After Valve 0-ISV-32-578 has been located and closed state that valve handwheel rotated clockwise until snug and valve stem moved into valve body.*** _____Applicant locates and describes how to open 0-TV-32-579 by stating that the valve handwheel must be rotated counter-clockwise. ***CUE: After Valve 0-TV-32-579 has been located and opened state that valve handwheel rotated counterclockwise until snug (state that air was heard venting from end of valve if asked).*** The applicant indicates how to determine air compressor "A" is has loaded after 0-TV-32-579 is open. ***CUE: IF asked and when checked state that the compressor sound indicated it has loaded and air pressure is rising.*** **Steps are critical to bleed air to force compressor to load.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 13: 8. **START** Compressor B by pushing, 0-HS-32-26B. STANDARD: _____Applicant locates and describes how to depress 0-HS-32-26B manual start push button. ***CUE: If JPM Step 7 was SAT, then when PB is depressed, if asked state that an air compressor start was heard. If JPM Step 7 was UNSAT, if asked, state that compressor start was not heard.*** **Step is critical to start air compressor.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 14: 9. **CHECK** Compressor B loads automatically. STANDARD: The applicant describes how to determine that air compressor "B" is loaded, by observing the loading solenoids, or by the sound changing at Compressor "B". ***CUE: When checked, state that the air compressor sound indicates that it has loaded or, if both solenoids are checked to be magnetized, state that they are energized.*** COMMENTS:	___ SAT ___ UNSAT

STEP/STANDARD	SAT/UNSAT
STEP 15: 10. **MONITOR** Compressor operation: • Oil press 25-30 psig on A, B, and C. • Cooling water flow. • Compressors auto-loading. STANDARD: Applicant locates oil pressure indicators (Compressor A, 0-PI-32-40; Compressor B, 0-PI-32-35) and states that oil pressure on both compressors should be 25-30 psig. Applicant locates discharge drains and states that cooling water flow should be seen at the drain points. Applicant determines from previous steps that Compressor A Compressors was manually loaded, and that Compressor B automatically loaded. Applicant states that Compressor C is shutdown due to the loss of power. ***CUE: After the applicant has described the status of Compressor A and B, state that "another operator will continue Attachment 1 performance from this point."*** Applicant notifies the Unit Operator that AOI-10, "Loss of Control Air," Attachment 1 "Local Restart of C&SS Air Compressors" is complete through Step 10. COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

J

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **A loss of offsite power has occurred.**
2. **The Diesel Generators have started and are feeding the Shutdown Boards.**
3. **The Control and Service Air compressors were aligned normal with "C" air compressor in the lead prior to the Blackout.**
4. **A loss of Non-essential and Service air has occurred (Air pressure is at 75 psig decreasing).**
5. **Essential Air is being supplied by the Aux. Air compressors.**
6. **The 480V Auxiliary Building Common Board does not have voltage available on its normal or alternate supply.**
7. **Local control power is available to the air compressors.**
8. **You are a support AUO on shift.**

INITIATING CUES:

The Unit Operator has dispatched you with a copy of Attachment 1 of 1-AOI-10 with instructions to perform steps 2 through 10.

Notify the Unit Operator when you have completed the task.

Attachment 1
(Page 1 of 5)

Local Restart of C&SS Air Compressors

Step	Action/Expected Response	Response Not Obtained

NOTE 1 Continuous contact between UO and NAUO should be maintained to aid quick recovery of air compressors.

NOTE 2 Attachment 1 is posted on panel 0-L-240 near the station air compressors. The posting must be revised if this Attachment is revised. Changes in revision level or page number will **NOT** require re-posting, as long as the content does **NOT** change

1.	**CHECK** C&SS AIR COMPR SEQUENCER UNDERVOLTAGE [42-E], DARK.	**SELECT** ALT control power using 125V DC Manual Transfer Switch 0-XS-32-5049 [0-L-240].
2.	Locally **CHECK** 0-PCV-33-4, SERVICE AIR SUPPLY ISOLATION, CLOSED [T7M/708].	**CLOSE** 0-PCV-33-4 using 0-HS-33-4.
3.	**CHECK** local station alarm DARK [0-L-240, T7M/708].	**IF** local station alarm LIT, **THEN** **PERFORM** the following for each compressor in alarm: a. **RESET** high air temp at each compressor (0-TS-32-41, -36, -31). b. **RESET** high oil temp at each air compressor (0-TS-32-40, -35, -30). c. **RESET** common alarm using 0-HS-32-25B, COMPRESSOR A, B, and C RESET [0-L-240, yellow PB]. d. **CHECK** common and all local alarms, DARK.

Attachment 1
(Page 2 of 5)

Local Restart of C&SS Air Compressors

Step	Action/Expected Response	Response Not Obtained
4.	**PLACE** the following C&SS Compressors to HAND [0-L-240]: • A, 0-HS-32-25D. • B, 0-HS-32-26A.	
5.	**PLACE** 0-HS-32-25A, STATION AIR COMPRESSOR SEQUENCE CONTROL, to Position 1.	
6.	**START** Compressor A by pushing 0-HS-32-25E.	
7.	**CHECK** Compressor A loads automatically.	**IF** Compressor A does **NOT** Auto load, **THEN** **PLACE** 0-HS-32-43A and -43B to ON (Local 0-JB-291-226). **IF** Compressor A does **NOT** load from local panel, **THEN**: a. **CLOSE** 0-ISV-32-578, STATION AIR COMPR A UNLOADING HDR ISOL. b. **VENT** 0-TV-32-579, STATION AIR COMPR A UNLOADING HDR TEST.
8.	**START** Compressor B by pushing, 0-HS-32-26B.	

Attachment 1
(Page 3 of 5)

Local Restart of C&SS Air Compressors

Step	Action/Expected Response	Response Not Obtained
9.	**CHECK** Compressor B loads automatically.	**IF** Compressor B does **NOT** Auto load, **THEN** **PLACE** 0-HS-32-38A and -38B to ON (Local 0-JB-291-226). **IF** Compressor B does **NOT** load from local panel, **THEN**: a. **CLOSE** 0-ISV-32-581, STATION AIR COMPR B UNLOADING HDR ISOL. b. **VENT** 0-TV-32-582, STATION AIR COMPR B UNLOADING HDR TEST.
10.	**MONITOR** Compressor operation: • Oil press 25-30 psig on A, B, and C. • Cooling water flow. • Compressors auto-loading.	• **LOAD** and **UNLOAD** compressors manually to maintain greater than 83 psig using RNO for Steps 7 & 9.

Attachment 1
(Page 4 of 5)

Local Restart of C&SS Air Compressors

Step	Action/Expected Response	Response Not Obtained

NOTE If 480V Aux Bldg Common Bd is energized, Compressors C should be running and loaded by the load sequencer relay. If the compressors have to be restarted, the SAFESTOP/RESET button for each compressor may have to be placed in SAFESTOP, then back to RESET to allow restart.

11. **CHECK** 480V Aux Bldg Common Bd ENERGIZED.

    ** **GO TO** Step 14.

12. **CHECK** local control station alarm DARK [0-L-240, T7M/708].

    IF any local alarm LIT,
    THEN
    PERFORM the following for each compressor in alarm:

    a. **RESET** high air temp at each compressor (0-TS-32-41, -36, -31).

    b. **RESET** high oil temp at each compressor (0-TS-32-40, -35, -30).

    c. **RESET** common alarm using 0-HS-32-25B, COMPRESSOR A, B, and C RESET [yellow PB].

    d. **CHECK** common and all local alarms, DARK.

13. **PLACE** C C&SS Compressor to AUTO USING 0-HS-32-27A.

14. **CHECK** air press returning to between 95 and 100 psig.

Attachment 1
(Page 5 of 5)

Local Restart of C&SS Air Compressors

Step	Action/Expected Response	Response Not Obtained
15.	**IF** compressor A or B being operated in manual mode, **THEN** **MONITOR** compressor operation and system press until compressors can be returned to auto mode.	
16.	**RETURN** TO Instruction in effect.	

Watts Bar Nuclear Plant

NRC EXAM 2013-302

System JPM K

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE

K

NRC EXAM 2013-302

EVALUATION SHEET

Task: TRANSFER 250V DC TURB BLDG DIST BD #1 FROM NORMAL TO ALTERNATE.

Alternate Path: n/a

Facility JPM #: 3-OT-JPMA123

Safety Function: 6 **Title:** Electrical System

K/A 063 K4.02 Knowledge of DC electrical system design feature(s) and/ or interlock(s) which provide for the following: Breaker interlocks, permissives, bypasses and cross-ties.

Rating(s): 2.9/3.2 **CFR:** 41.7/45.5 to 45.8

Evaluation Method: Simulator **X** In-Plant _____ **Classroom** _____

References: SOI-239.01, "250V Battery Board 1," Rev. 15.

Task Number: AUO-239-SOI-239.1-08 **Title:** Transfer a 250V DC Turbine Building Distribution Board.

Task Standard: The applicant transfers the 250V DC Turbine Building Distribution Board #1 from its Normal to Alternate supply per SOI-239.01, "250V Battery Board 1," Section 8.7.1, "Transfer from Normal to Alternate."

Validation Time: 15 minutes **Time Critical:** Yes _____ No **X**

==========

Applicant: _____ _____ Time Start: _____
NAME Docket No. Time Finish: _____

Performance Rating: SAT ____ UNSAT ____ Performance Time ___

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

_____

_____

Tools/Equipment/Procedures Needed:

Hard Hat, Gloves, Safety Glasses and Plant Approved Shoes.

Procedure SOI-239.01 Section 8.7.1, Transfer from Normal to Alternate."

References:

SOI-239.01, "250V Battery Board 1,"Rev. 15.

WATTS BAR NUCLEAR PLANT
JOB PERFORMANCE MEASURE
K
NRC EXAM 2013-302

READ TO APPLICANT

DIRECTION TO APPLICANT:

NO MANIPULATION OF PLANT EQUIPMENT SHALL OCCUR DURING THIS JPM. SIMULATE ALL MANIPULATIONS

I will explain the initial conditions, which step(s) to simulate or discuss, and provide initiating/operating cues. When you complete the task successfully, the objective for this job performance measure will be satisfied. Ensure that you indicate to me when you fully understand your task. To indicate that you have completed your assigned task return the cue sheet I provided you.

INITIAL CONDITIONS:

1. **The Unit is in MODE 5.**
2. **Maintenance is required that will cause 250V DC Battery Board #1 to be de-energized.**
3. **You are an AUO on shift.**

INITIATING CUES:

You have been instructed to transfer the 250V DC Turbine Building Distribution Board #1 to its alternate supply per the SOI-239.01, Section 8.7.1.

Notify the Unit 1 US/SRO when the board has been transferred.

START TIME: _____

NOTE **The Turbine Bldg Dist Bd will auto transfer on a complete loss of DC with no time delay, or if voltage drops to 188 volts for 4 seconds. Return to normal is manual only.**	
STEP 1: [2] **ENSURE** 0-BKR-239-1A102, ALT SUPPLY FROM 250V BATTERY BD 2, closing springs charged. STANDARD: Applicant indicates that the yellow "CHARGED" flag in the window above the CLOSE pushbutton on 0-BKR-239-1A102, ALT SUPPLY FROM 250V BATTERY BD 2. ***CUE: After applicant has discussed the proper method of verifying the closing spring is charged, indicate the yellow CHARGED flag is visible.*** \COMMENTS:	___ SAT ___ UNSAT
STEP 2: [3] **CHECK** at least 267 volts indicated on 250 V BATTERY BOARD 2 VOLTMETER on 0-DPL-239-1 250V DC TURB BLDG DIST BD 1. STANDARD: Applicant observes 250V BOARD 2 VOLTMETER on 0-DPL-239-1 and Voltage is verified to be at least 267 volts using 250V Battery Board 2 voltmeter. ***CUE: Indicate 270 volts on 250V BOARD 2 VOLTMETER on 0-DPL-239-1.*** COMMENTS:	___ SAT ___ UNSAT

STEP 3: [4] **PLACE** AUTO/MANUAL SUPPLY XFER SWITCH CS-101, to the MAN position. STANDARD: Applicant locates CS-101 and indicates that the transfer switch must be rotated to the left to MAN position. ***CUE: After applicant has demonstrated the proper positioning of CS-101, indicate that CS-101 is in MAN.*** **Step is critical to ensure that the transfer from Alternate to Normal can be accomplished.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 4: [5] **CLOSE** and **HOLD** ALT SUPPLY FROM 250V BATTERY BD 2, control switch until transfer is complete. STANDARD: Applicant locates ACB 102 and indicates that the breaker switch must be rotated to the right to the CLOSE position and held there UNTIL after the normal supply switch is placed in the TRIP position and transfer is verified. **Step is critical to ensure that the transfer from Alternate to Normal is accomplished without power interruption.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 5: [6] **PLACE** NORM SUPPLY FROM 250V BATTERY BD 1, control switch in the TRIP position. STANDARD: Applicant locates ACB 103 and indicates that the breaker switch must be rotated to the left to the TRIP position and HELD there UNTIL the transfer is verified. **Step is critical to ensure that the transfer from Alternate to Normal is accomplished without power interruption.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 6: [7] **ENSURE** breakers transferred. STANDARD: Applicant ensures ACB 102 is closed (verbalizes that a RED target is expected on ACB 102) and ACB 103 is open (verbalizes that a GREEN target is expected on ACB 103.) ***CUE: After checked, if asked confirm that ACB 102 has red target and ACB 103 has green target.*** COMMENTS:	___ SAT ___ UNSAT

STEP 7: [8] **VERIFY** between 267 and 283 volts indicated on 250 V BATTERY BOARD 2 VOLTMETER on 0-DPL-239-1 250V DC TURBINE BLDG DISTRIBUTION BOARD 1. STANDARD: Applicant observes 250V BOARD 2 VOLTMETER on 0-DPL-239-1 and Voltage is verified to be at least 267 volts using 250V Battery Board 2 voltmeter. ***CUE: Indicate 270 volts on 250V BOARD 2 VOLTMETER on 0-DPL-239-1.*** **Step is required to be performed to ensure that sufficient voltage exists after transfer from Normal to Alternate.** COMMENTS:	___ SAT ___ UNSAT
STEP 8: [9] **ENSURE** AUTO/MANUAL SUPPLY XFER SWITCH CS-101, in MAN position. STANDARD: Applicant ensures that CS-101 is in the MAN position, which is the position that was selected during Step 3 of the procedure. COMMENTS:	___ SAT ___ UNSAT
STEP 9: Notify the Unit Supervisor that the transfer is complete. STANDARD: The US/SRO is notified that the transfer is complete. ***CUE: Acknowledge the report using repeat back.*** COMMENTS: **END OF TASK**	___ SAT ___ UNSAT

STOP TIME _____

K

Handout Package for Applicant

APPLICANT CUE SHEET

(RETURN TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

1. **The Unit is in MODE 5.**
2. **Maintenance is required that will cause 250V DC Battery Board #1 to be de-energized.**
3. **You are an AUO on shift.**

INITIATING CUES:

You have been instructed to transfer the 250V DC Turbine Building Distribution Board #1 to its alternate supply per the SOI-239.01, Section 8.7.1.

Notify the Unit 1 US/SRO when the board has been transferred.

Watts Bar Nuclear Plant

Unit 0

System Operating Instruction

SOI-239.01

250V Battery Board 1

Revision 0015

Non-Quality Related

Level of Use: Continuous Use

VFU
Today
DAH

Effective Date: 04-11-2012

Responsible Organization: OPS, Operations

Prepared By: Ray Neu

Approved By: Newton Lacy

Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
11	4/04/05	2, 21, 25	Minor/Editorial. Incorporated UC-1. Switched Section 8.2, Steps [16] and [17] for proper shutdown of a charger to be consistent with similar steps in Section 8.1
12	02/16/07	All	This procedure has been converted from Word 95 to Word 2002 XP using rev 11, by Austin Norris.
13	05/09/11	2, 5, 39, 40	Implemented DCN 52769 which replaced the Westinghouse generator voltage regulator with the digital dual channel Unitrol 5000 Excitation Control System which changed nomenclature for BKR 217. Relocated BKR 217 to SOI-47.02 ATT 1P power checklist. Added step to section 8.7.1 and 8.7.2 to ensure closing springs charged before transfer (PCR 4308). Made Checklist 1 an External Attachment.
14	03/16/12	2, 59-63	Added sections 8.24 and 8.25 to prevent the possibility of an OPEN procedure. (PER476719)
15	04/11/12	2, 57, 58, 61	Corrected typo for alarm verification and split step to verify BD1 and BD2 breakers open prior to line up.

Table of Contents

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Table of Contents (continued)

EXTERNAL ATTACHMENTS

Attachment 1P: Power Checklist 239.01-1P

1.0 INTRODUCTION

1.1 Purpose

This Instruction provides the detailed steps for the operation of the 250V Battery Board I, Charger I and 0-S, 250V Electrical Control Board Distribution Panels 6, 7, 8 and 250V Turbine Building Distribution Panel 1.

1.2 Scope

This Instruction includes operations of the 250V Battery System.

2.0 REFERENCES

2.1 Performance References

None

2.2 Developmental References

A. FSAR Section 8.3.2.1.2

B. GOI-7, "Generic Equipment Operating Guidelines"

C. TVA Drawings:

1. 1-15E500-2
2. 1-45W700-2
3. 1-45W704-1
4. 1-45W705
5. 1-45W707-1
6. 1-45W731
7. 1-45W749-1
8. 55W715-2
9. 55W716-6,-7,-8
10. 75W1550

3.0 PRECAUTIONS AND LIMITATIONS

A. All breakers on a board should be OPEN and all protective grounds shall be removed before energizing the board.

B. A circuit that blows a fuse after being replaced once should have the circuit checked before replacing the fuse a second time, unless the SRO and plant conditions dictate otherwise.

C. To prevent explosive mixtures of H2 and O2 from accumulating in battery rooms, the battery room exhaust fans should be in service at all times.

D. A permanent or portable eyewash station should be available in the battery rooms.

E. Acid spills should be neutralized with a solution of baking soda and water and all traces of the spill should be wiped up.

F. There should be no smoking, open flames, or arcs in the battery rooms.

G. Positive or negative battery board grounds should be maintained as low as possible.

H. The use of alternate supplies to the 250 VDC battery chargers from the 480V Shutdown Boards will result in the charger and the 480V Shutdown Board being in an unanalyzed condition and will require entry into or tracking of T/S LCO 3.8.9 or 3.8.10.

Date Today INITIALS

4.0 PREREQUISITE ACTIONS

4.1 Preliminary Actions

NOTES

1) Signoffs/information in unused Sections may be left blank.
2) Throughout this instruction, Concurrent Verification (CV) for breaker or fuse manipulations may be marked **N/A** if no manipulation is performed.

[1] **INDICATE** Section to be performed, and reason for use: DAH

5.0	Startup	N/A	7.0	Shutdown	N/A
6.0	Normal Operation	N/A	8.0	Infrequent Operations	8.7.1

Section/ Reason/ Remarks: Transfer 250V DC Turb Bldg Dist Bd 1 from Normal to Alternate

4.2 Field Preparations

[1] **REVIEW** alignment/availability of systems necessary for System operation. DAH

4.3 Approvals and Notifications

[1] **COORDINATE** system operations/manipulations with UO. DAH

Date Today INITIALS

8.7 250V DC Turb Bldg Dist Bd 1, 0-DPL-239-1, Transfer

NOTE

The Turbine Bldg Dist Bd will auto transfer on a complete loss of DC with no time delay, or if voltage drops to 188 volts for 4 seconds. Return to normal is manual only.

8.7.1 Transfer from Normal to Alternate

[1] **OBTAIN** SRO approval prior to performing this Section. DAH / SRO

[2] **ENSURE** 0-BKR-239-1A102, ALT SUPPLY FROM 250V BATTERY BD 2, closing springs charged. _____

[3] **CHECK** at least 267 volts indicated on 250 V BATTERY BOARD 2 VOLTMETER on 0-DPL-239-1 250V DC TURB BLDG DIST BD 1. _____

[4] **PLACE** AUTO/MANUAL SUPPLY XFER SWITCH CS-101, to the MAN position. _____

[5] **CLOSE** and **HOLD** ALT SUPPLY FROM 250V BATTERY BD 2, control switch until transfer is complete. _____ / CV

[6] **PLACE** NORM SUPPLY FROM 250V BATTERY BD 1, control switch in the TRIP position. _____ / CV

[7] **ENSURE** breakers transferred. _____

[8] **VERIFY** between 267 and 283 volts indicated on 250 V BATTERY BOARD 2 VOLTMETER on 0-DPL-239-1 250V DC TURBINE BLDG DISTRIBUTION BOARD 1. _____

[9] **ENSURE** AUTO/MANUAL SUPPLY XFER SWITCH CS-101, in MAN position. _____

End of Section