JOB PERFORMANCE MEASURE

Job Position SRO / RO	No. JP-OP-315-0104-184	Revision 1
JPM Title Shift running RRMG Lube Oil Pumps - Noisy Pump Alt Path	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO / NO

Evaluator: _____

Validating Representatives Name: J. Walters / D. Roberts

JPM Type: Normal / **Alternate Path /** Time Critical Start Time _____

Evaluation Method: **Perform** / Walkthrough / Discuss Stop Time _____

Location: Plant / **Simulator** / Classroom Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
* **1**.				9.							
* **2**.											
3.											
4.											
* **5.**											
* **6.**											
7.											
8.											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ **PASS** _____ **FAIL**

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

B3100 – Reactor Recirculation System

Task:

02B3100013– Shift Reactor Recirculation Motor Generator Set Lube Oil Pumps

References: Required (R) / Available (A)

23.138.01, Reactor Recirculation System (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are the P603 Operator.
- Work is going to take place on the South RRMG Lube Oil Pump B1 later in the shift.

Initiating Cue(s):

The CRS directs you to shift running Lube Oil Pumps for the South RRMG Set in accordance with 23.128.01, Section 4.2.

The RB Rounds NO is standing by locally at the South RRMG Set to support the pump shift.

Terminating Cue(s):

South RRMG Lube Oil Pump B1 has been returned to service.

Task Standard:

The task is satisfactorily met when the examinee has shifted the Reactor Recirculation Motor Generator (RRMG) Set Lube Oil Pumps by placing the B2 pump in service, subsequently recognizes degraded conditions for the B2 pump, and shifts back to the original RRMG Set Lube Oil Pump configuration with the B1 pump in service.

Licensed Operator Exam Information (required for NRC exams)

Safety Function/Category:

1 – Reactivity Control

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 202001 – Reactor Recirculation System

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the control room:

A4.06 Oil Pumps..... 3.0

Maintenance Rule Safety Classification:

B3100-01

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide examinee with Cue Sheet.**		
NOTE:	**The examinee should refer to 23.138.01, Section 4.2 for task performance. When this section is found, provide examinee with copy of reference material.**		
CUE:	**If asked, inform examinee that the Reactor Building Rounds NO is standing by to swap RRMG Lube Oil Pumps for the South RRMG Set.**		
NOTE:	**The following step will initiate tripped indication of the Standby Lube Oil Pump and cause 3D96, MOTOR TRIPPED, to alarm.**		
CUE:	**If informed, acknowledge receipt of MOTOR TRIPPED ALARM.**		
*** 1.**	[4.2.2.1] Place standby N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN.	*** 1.**	Places S RRMG Lube Oil Pump B2 in RUN.
*** 2.**	[4.2.2.2] Place running N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in OFF/RESET.	*** 2.**	Places the S. RRMG Lube Oil Pump B1 in OFF/RESET.
	Alternate Path starts here.		
Note:	**When the B2 pump starts, ammeter oscillations will occur.**		
CUE:	**IF asked, report the S. RRMG Lube Oil Pump B2 is making a loud rattling sound.**		
CUE:	**IF asked to mark fluid drive bearing oil supply pressure, report that South RRMG Set Bearing Oil Supply Pressure is oscillating between about 20 and 30 psig on B31-RA15B.**		
3.	[4.2.2.3] Verify N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN, starts.	3.	Verifies the S. RRMG Lube Oil Pump B2 starts.
4.	Recognize indications of problems for N (S) RR MG Set Lube Oil Pump B2.	4.	Recognizes and reports problems with N (S) RR MG Set Lube Oil Pump B2.
CUE:	**Direct examinee to shift back to the B1 pump in service.**		
NOTE:	**The following step will initiate tripped indication of the Standby Lube Oil Pump and cause 3D96, MOTOR TRIPPED, to alarm.**		
CUE:	**If informed, acknowledge receipt of MOTOR TRIPPED ALARM.**		
*** 5.**	[4.2.2.1] Place standby N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN.	*** 5.**	Places S RRMG Lube Oil Pump B1 in RUN.
*** 6.**	[4.2.2.2] Place running N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in OFF/RESET.	*** 6.**	Places the S. RRMG Lube Oil Pump B2 in OFF/RESET.
7.	[4.2.2.3] Verify N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN, starts.	7.	Verifies the S. RRMG Lube Oil Pump B1 starts.
CUE:	**If called, report as Reactor Building Rounds NO that you have a good start on the South RRMG Lube Oil Pump B1.**		
NOTE:	**If asked, direct the examinee to place the B2 Pump CMC in AUTO.**		

ELEMENT		STANDARD	
8.	[4.2.2.4] Place non-running N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in AUTO.	8.	Places non-running S. RRMG Lube Oil Pump B2 in AUTO or leaves in OFF-RESET.
CUE:	**When called as RB Rounds, report local fluid drive bearing oil supply pressure is 36 psig on B31-RA15B South RRMG Set Brg Oil Supply Press Ind.**		
9.	[4.2.2.5] Verify Fluid Drive Bearing Oil Supply is 25 to 45 psig as indicated on B31-RA15A (B), North (South) RR MG Set Brg Oil Supply Press Ind (locally at RR MG Set gauge board).	9.	Directs NO to verify Fluid Drive Bearing Oil Supply is 25 to 45 psig as indicated on B31-RA15A (B), North (South) RR MG Set Brg Oil Supply Press Ind (locally at RR MG Set gauge board).
CUE:	**End JPM when the S. RRMG Lube Oil Pump B1 is in service and oil pressure has been verified.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

JPM Title Shift running RRMG Lube Oil Pumps - Noisy Pump Alt Path	No.: JP-OP-315-0104-184 Revision: 1 Page 6

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

None

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee that time compression may be used for activities performed outside of the Control Room. Notify Examinee if JPM is Time Critical (only if JPM is **NOT** Alternate Path.)

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any IC with the South RRMG Set in service with the B3103-C001C, S RRMG Set Lube Oil Pump B1, in service and the B2 pump in Auto.

Malfunctions:

Number	Title	Value	Delay	Ramp
BBAZP603_A154NOISE	Noise Amplitude (**Note 1**)	10.0	N/A	N/A

Note 1: The noisy ammeter malfunction will insert when the B2 Pump starts and it will clear when the B2 Pump is subsequently shut down per conditional steps.

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp
N/A				

Special Instructions:

N/A

Cue Sheet: (JP-OP-315-0104-184)

Initial Conditions:

- You are the P603 Operator.
- Work is going to take place on the South RRMG Lube Oil Pump B1 later in the shift.

Initiating Cue(s):

The CRS directs you to shift running Lube Oil Pumps for the South RRMG Set in accordance with 23.128.01, Section 4.2.

The RB Rounds NO is standing by locally at the South RRMG Set to support the pump shift.

Cue Sheet: (JP-OP-315-0104-184)

Initial Conditions:

- You are the P603 Operator.
- Work is going to take place on the South RRMG Lube Oil Pump B1 later in the shift.

Initiating Cue(s):

The CRS directs you to shift running Lube Oil Pumps for the South RRMG Set in accordance with 23.128.01, Section 4.2.

The RB Rounds NO is standing by locally at the South RRMG Set to support the pump shift.

Section Divider

DO NOT give the following to examinee until specified in Cue.

REACTOR RECIRCULATION SYSTEM

Revision Summary

1) Changed "eSOMS" to "Electronic" Operator Rounds, no rev bar used.
2) Changed indication light status per CARD 21-25621.
3) Added Note and clarification per CARD 21-25622.
4) Added Note to section 6.1 per CARD 21-25920.

Attachments

1	032112	Reactor Recirculation System Valve Lineup
2	112519	Reactor Recirculation System Electrical Lineup
3	042909	Reactor Recirculation System Instrument Lineup

Enclosures

A	011414	Recirc MG Trips
B	072895	Instrument Rack (Partial) H21-P006/H21-P022 Layout
C	052400	Saturation Temperature vs Pressure Chart
D	041708	Idle Recirc Pump Startup (Mode 1, 2, 3 and 4)
E	012417	RR MG Sets A & B Scoop Tube Positioner
F	050900	DCS Configuration Change Or MFP Failure Impacts
G	042909	DCS Alarm Tagnames, Tag Descriptions, and Failures
H	062409	Recirc Flow to Minimum During EOPs (Copy located at Panel H11-P603)
I	011414	Reactor Recirc MG Set Speed Control for Maintaining Reactor Power during Normal Shift Operation (Copy located at Panel H11-P603)
J	042118	Reactor Recirc Pump Oil Local Level Check

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #**	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	JP-OP-315-0104-184	119		22-0003	1703.02	I	N	

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1.0 PURPOSE

CM To prescribe the method for operating the Reactor Recirculation (RR) System (RRS) in all modes.

1.1 System Description

The RRS is comprised of two separate loops. Each loop consists of a variable speed pump (RR Pump) driven by its own Motor Generator (RR MG Set), valves, piping and associated controls and instrumentation. Each RR Pump provides the driving force for the Reactor Core coolant through 10 Jet Pumps, internal to the Reactor Pressure Vessel (RPV).

The RRS provides a larger heat transfer rate from the core than can be achieved through natural circulation. In addition, the variable speed RR Pumps provide a means of changing Reactor Power level by adjusting the coolant moderator flow through the core.

Scoop Tube Positioner Lock and Electrical Speed Stops, Lock, Deviation, and DCS Features

Scoop Tube Positioner Lock and Electrical Speed Stops:

The mechanism used to lock the RR MG Set scoop tube control arm is internal friction of the Positioner. The Electric Low-Speed Stop (ELSS) and Electric High-Speed Stop (EHSS) are limit switches, also internal to the Scoop Tube Positioner. When tripped, the ELSS and EHSS limit switches disables the motor control circuit in the raise direction for the EHSS, or the lower direction for the ELSS. This feature allows the Scoop Tube Positioner to clear the ELSS or EHSS, by lowering demand if the EHSS is reached, or raising demand if the ELSS is reached. The Mechanical Low and High speed stops are adjusted out of the way such that they are beyond the ELSS and EHSS limit switches. Therefore, they should not be encountered. Refer to TABLE 1 for further details.

Scoop Tube Positioner Lock:

The Scoop Tube Positioner can be remotely locked from the Control Room, COP H11-P603. Locking the Scoop Tube Positioner disables the motor control circuit in both directions.

The local Scoop Tube Positioner control switch at B31-P403A (B) (RB4), also locks the Scoop Tube Positioner when in LOCK position. Refer to TABLE 1, and Enclosure E, for further details.

The Scoop Tube Positioner will automatically lock when any of the following conditions occur (see Enclosure E for more details):

- High Fluid Drive Oil Temperature
- RR MG Set Emerg Lube Oil Pump C (D) starts
- Bus 65G Load Shed Lockout Relay, 47X-65G-1, 47X-65G-2, 47X-65G-3, (2 of 3) causes trip
- Loss of Power to the Scoop Tube Positioner
- Loss of the 4-20mA signal to the Scoop Tube Positioner
- Loss of the internal position feedback signal to the Scoop Tube Positioner
- Scoop Tube Positioner internal fault, B31-P404A (B)
- DCS logic Scoop Tube Lock relay trips

All Scoop Tube Positioner locks must be reset from the Control Room, COP H11-P603.

Scoop Tube Positioner lock DCS features:

The DCS logic will automatically lock the Scoop Tube Positioner if any one of the following conditions exist:

- The difference between North (South) RR MG Set speed and the respective setpoint (SP) of the N (S) RR MG Set Speed Controller exceeds 5%
- After a short time delay, the difference between North (South) RR MG Set Scoop Tube Position and the respective output of the N (S) RR MG Set Speed Controller exceeds 5%
- B3103-C003A (B), North (South) RR MG Set Scoop Tube A Positioner, position feedback to DCS fails
- Bad module status of DCS digital input module, DCS Tagname 1020231S or1020232S (B31-P004, RB4), or power failure of DCS relay output termination unit (H11-P612 2-7/8A Fuse 1), DCS Tagname C2-F1-Fuse (see Enclosure E for more details).

The DCS logic will bypass the automatic scoop tube locks of setpoint versus speed and output versus position 5% difference functions, during and for approximately 90 seconds after, the following conditions clear:

- RR Limiter 1, 2, 3, 4 or Manual Runback
- Red SETPOINT LIMITING box is visible on C32-K816, FW & RR Flat Panel Display
- N (S) RR MG Set Speed Controller setpoint (SP) is adjusted
- 2 speed signal failures on North (South) RR MG Set
- When N (S) RR MG Set Speed Controller is in EMERGENCY BYPASS operation
- When North (South) RR MG Set is tripped

Scoop Tube Positioner Deviation Indication:

Deviation indication is provided on the C32-K816, FW & RR Flat Panel Display. Deviation is the difference between the output of B31K819A (B), a signal conditioner that applies a characterized curve the DCS control demand signal or the output signal from the N (S) RR MG Set Speed Controllers when in EMERGENCY BYPASS, and the position feedback from the Scoop Tube Positioner feedback signal. Deviation is meaningful when the Scoop Tube Positioner is Locked. Deviation will occur when any of the following conditions occur:

- Scoop Tube Positioner has reached the ELSS, the EHSS
- The Scoop Tube Positioner has been locked, and the N (S) RR MG Set Speed Controller output signal is subsequently changed when the speed controllers are in EMERGENCY BYPASS

Deviation indication is functional at all times DCS power is available and the dedicated DCS feedback transmitter internal to the Scoop Tube Positioner is operating. When the Scoop Tube A (B) Positioner is locked, the DCS calculates the linear equivalent of characterized Scoop Tube position to force the output signal of the respective RR MG Set Speed Control System to track Scoop Tube Position. Similarly, the DCS also forces the N (S) RR MG Set Speed Controller to track RR MG Set A (B) speed when the Scoop Tube is locked. Output and setpoint tracking allow the DCS to provide bumpless transfer when the Scoop Tube is unlocked. MG Set A (B) speed and output tracking functions are overridden whenever the N (S) RR MG Set Speed Controllers are placed in EMERGENCY BYPASS. Refer to Table 1 for further details.

TABLE 1

MODE	POSITIONER	POSITION TRANSMITTER
Scoop tube locked	Energized with drive motor disabled. Local manual control enabled	Energized
Local manual control	Energized with drive motor disabled	Energized
ELSS	Energized for increasing speed with drive motor disabled for decreasing speed	Energized
EHSS	Energized for decreasing speed with drive motor disabled for increasing speed	Energized

When the local power switch is in NORMAL, the Scoop Tube A (B) Positioner remains locked, and Scoop Tube A (B) Positioner will indicate correctly providing the proper tracking signal before the lock is reset for Scoop Tube A (B) Positioner.

RR Limiters Functions:

The DCS logic design provides all RR Limiters for the N(S) RR MG Set Speed Controllers, in AUTO or MANUAL.

If the output was rapidly lowered to reduce Recirc to minimum and a limiter is actuated with recirc speed above the limiter, the speed will continue to lower to the limiter setting and the output will be raised to the limiter setting.

RR Limiter 1:

RR Limiter 1 is actuated when B3105-F031A (B), N (S) RR Pump Discharge Vlv, is not full open or total Feedwater flow is less than 20% of original rated value (approximately 3.15 Million lb./hr). The DCS logic design limits the rate RR Limiter 1 changes the setpoint (SP) in AUTO or the output in MANUAL, preventing rapid Core Flow and Reactor Power changes.

During Refueling Outages when RPV Hydro testing requires running North (South) RR MG Sets, RR Limiter 1 can be manually bypassed using a key-lock switch at RR Panel H11-P612. When RR Limiter 1 is bypassed for this test condition, RPV Hydro Limiter 1 Bypass boxes will be visible and Limiter 1 boxes will clear for the North and South RR MG Sets on the C32-K816, FW & RR Flat Panel Display. Operation of this switch is not within the scope of this procedure.

RR Limiter 1 automatically resets when B3105-F031A (B), N (S) RR Pump Discharge Vlv, is open and total feedwater flow is greater than 20% of original rated value (approximately 3.15 Million lb./hr).

RR Limiter 2:

RR Limiter 2 is actuated when RPV Level 4 (192.7 inches) alarms and a RFP is tripped or has low suction flow.

RR Limiter 2 immediately step changes the output of N (S) RR MG Set Speed Controller, causing a rapid speed change to the North (South) RR MG Set.

RR Limiter 2 is automatically bypassed by Limiter 4 unless RR Limiter 2 actuation preceded entry into single loop operation. RR Limiter 2 can be manually bypassed on COP H11-P603 using Recirc A & B Flow Limiter 2/3 Defeat Switch.

RR Limiter 2 is manually reset when Reactor water level is greater than Level 4 or both RFP operating with normal suction flows. RR Limiter 2 can be individually reset for each RR MG Set.

RR Limiter 3:

RR Limiter 3 is actuated when both Heater Drain Check Valves N2200-F026A and B are closed for greater than 3 seconds.

RR Limiter 3 immediately step changes the output of N (S) RR MG Set Speed Controller, causing a rapid speed change to the North (South) RR MG Set.

RR Limiter 3 is automatically bypassed by Limiter 4 unless RR Limiter 3 actuation preceded entry into single loop operation. RR Limiter 3 can be manually bypassed on COP H11-P603 using Recirc A & B Flow Limiter 2/3 Defeat Switch.

RR Limiter 3 is manually reset for both North and South RR MG Sets when either Heater Drain Check Valve N2200-F026A (B) opens. RR Limiter 3 must be reset simultaneously for both North and South RR MG Sets. Therefore, resetting RR Limiter 3 also resets RR Limiter 2 and/or RR Limiter 4 if present and their initiating condition is clear.

RR Limiter 4:

RR Limiter 4 is actuated by the North (South) RR MG Set drive motor or North (South) RR MG Set generator field breakers opening. When RR Limiter 4 actuates, and RR Limiter 2 or 3 is not enforcing when Limiter 4 actuates, a 75% high speed limit is enforced on the running N (S) RR MG Set Speed Controller and RR Limiter 2 and 3 are automatically bypassed. The DCS logic design limits the rate RR Limiter 4 changes the setpoint (SP) in AUTO or the output in MANUAL, preventing rapid Core Flow and Reactor Power changes.

RR limiter 4 is bypassed when a RR MG Set trips only if RR Limiter 2 or 3 was enforcing before the RR MG Set trips.

RR Limiter 4 is manually reset after starting the opposing RR MG Set. RR Limiter 4 can be individually reset for each RR MG Set.

High Core Flow Setpoint and Output Limiters:

The Maximum Core Flow limit is set by the EHSS limit switches internal to B3103-C003A and B, North and South RR MG Set Scoop Tube Positioner. Mechanical stops on the North and South RR MG Set Scoop Tube Positioners back up the EHSS and also provide margin to the Maximum Core Flow limit, but should not be engaged.

The DCS logic provides maximum limiters on the setpoint and output of the N (S) RR MG Set Speed Controller to help prevent reaching the North and South RR MG Set Scoop Tube Positioner EHSS limit switch settings. When either DCS limiter is reached, the limiter forces the N (S) RR MG Set Speed Controller setpoint or output into tracking mode, preventing the setpoint or the output from exceeding the limiter settings.

Low Speed Setpoint and Output Limiters:

B3103-C003A and B, North and South RR MG Set Scoop Tube Positioner, have ELSS limit switches, nominally set at 20% speed. Mechanical stops on the North and South RR MG Set Scoop Tube Positioners back up the ELSS.

The DCS logic also provides minimum limiters on the setpoint and output of the N (S) RR MG Set Speed Controllers. When either limiter is reached, the limiter internally prevents the setpoint and the output from exceeding the limiter settings. The limiters do not force the setpoint of the speed controllers into track mode. Therefore, the setpoint (SP) or output value displayed on the speed controller can be less than the internal limiter setting.

Recirc Manual Runback:

An amber Recirc Manual RUNBACK covered pushbutton is provided on COP H11-P603. The Recirc Manual Runback is a feature for use when abnormal plant conditions occur that requires a rapid power reduction. When the Recirc Manual RUNBACK pushbutton is pushed, the DCS logic simultaneously reduces the N and S RR MG Set Speed Controllers setpoint (SP) in AUTO or output in MANUAL. The DCS logic changes the setpoint (SP) in AUTO or output in MANUAL at the same rate as RR Limiters 1, 4 and operator adjustments are made in AUTO or MANUAL.

If any of the above conditions occur after the Recirc Manual Runback pushbutton has been pushed and before the Recirc Manual Runback automatically resets, the Recirc Manual Runback will terminate. When the Recirc Manual Runback is terminated by one of the conditions above, the RR MG Sets will either follow the RR Limiter or hold at speed, relative to the condition.

The Recirc Manual Runback automatically resets when the N and S RR MG Set Speed Controllers AUTO or MANUAL DCS logic adjustments are completed.

DCS System Features:

When the North (South) RR MG Set, Generator A (B) Field Breaker is open, the DCS logic design automatically adjusts the N (S) RR MG Set Speed Controller output to 12% and the setpoint to 28% for startup. Therefore, the speed controller cannot be adjusted for setpoint or output, in MANUAL or AUTO when the RR MG Set is shutdown.

The N (S) RR MG Set Speed Controller may be in either MANUAL or AUTO for startup. The DCS logic design automatically places the speed controllers in AUTO after the North (South) RR MG Set, Generator A (B) Field Breaker closes.

When adjusting the N (S) RR MG Set Speed Controller, the DCS logic design limits the rate the setpoint in AUTO or the output in MANUAL actually changes, preventing rapid Core Flow and Reactor Power changes.

The DCS logic design uses a tracking function in AUTO and MANUAL; including when RR Limiters are actuated and when the respective RR MG Set Scoop Tube A (B) is locked. The tracking function provides bumpless transfer when RR Limiter are reset and when Scoop Tube Positioner is unlocked, eliminating unexpected Core Flow and Reactor Power changes.

When the N (S) RR MG Set Speed Controller is in AUTO, the DCS logic design compares North (South) RR MG Set Speed to the respective setpoint (SP). The result of this comparison adjusts the Scoop Tube Positioner to maintain North (South) RR MG Set Speed at setpoint (SP).

When the N (S) RR MG Set Speed Controller is in MANUAL, speed control is bypassed. The Scoop Tube Positioner moves directly in response to operator output adjustment of speed controller, regardless of actual North (South) RR MG Set speed.

Operator Interfaces:

The DCS has two forms of operator interfaces:

- The N (S) RR MG Set Speed Controllers (MANUAL/AUTO control stations)
- The C32-K816, FW & RR Flat Panel Display

N (S) RR MG Set Speed Controllers:

The N and S RR MG Set Speed Controllers automatically shift to EMERGENCY BYPASS for any of the following conditions:

- When both Multiple Function Processor (MFP) modules are automatically halted to load a new design configuration
- When communication between the MFP modules and the controllers is lost
- When a failure occurs to both MFP modules, or the associated Input/Output (I/O) modules

When changing DCS configuration, the N and S RR MG Set Speed Controllers should be manually placed in EMERGENCY BYPASS. This prevents the DCS from automatically shifting the controllers from EMERGENCY BYPASS to MANUAL when the DCS configuration change is complete.

To return the N and S RR MG Set Speed Controllers to MANUAL after restoring from a DCS failure, the EMERGENCY BYPASS switch must be placed in position "M" and returned to position "A" for each of the controllers.

FW & RR Flat Panel Display:

C32-K816, FW & RR Flat Panel Display provides pop-up display boxes for the North and South RR MG Sets when the following conditions occur:

- Limiter 1, 2, 3 or 4
- Manual Runback
- Limiter 2/3 Bypassed
- Scoop Tube Locked
- RPV Hydro Limiter 1 Defeat

C32-K816, FW & RR Flat Panel Display provides alarm display, trend and dynamic status screens, accessible by touch-screen pushbuttons, for the various analog and digital points associated with operation of the RR MG Sets.

During DCS configuration changes or if both MFPs fail, the following occurs:

- RRCS data displayed on C32-K816, FW & RR Flat Panel Display, is invalid and is frozen in purple
- All DCS digital (on/off) outputs are affected, including:
  - Amber Flow Limiter and Manual Runback lights on COP H11-P603
  - Automatic Scoop Tube Positioner A and B Lock DCS
  - The following Annunciators:
    - 3D129, RECIRC A & B FLOW LIMITER 2/3 DEFEATED
    - 3D126, RECIRC SYS A RECIRC FLOW LIMITING
    - 3D150, RECIRC SYS B RECIRC FLOW LIMITING
    - 3D143, RECIRC SYS A DCS TROUBLE
    - 3D167, RECIRC SYS B DCS TROUBLE
    - 5D85, LOSS OF HEATER DRAINS

If the Conductor Server/Client communications or computers fail only the C32-K816, Fw & RR Flat Panel Display, is affected. No DCS logic is affected.

If the Composer Engineering Workstation fails, there is no impact to the C32-K816, Fw & RR Flat Panel Display, or DCS Logic operation.

2.0 REFERENCES

2.1 Use References

2.1.1 Procedures

- 20.138.03, Uncontrolled Recirc Flow Change
- 22.000.02, Plant Startup To 25% Power
- 22.000.03, Power Operation 25% to 100% to 25%
- 23.108, Heater Drains System
- 23.138.02, Operation of Recirculation System Motor Generator Set Fan Coil Units
- 23.707, Reactor Water Cleanup System
- 24.000.01, Situational Surveillances/LCO Action Tracking
- 24.138.06, Jet Pump Operability
- 54.000.06, APRM Calibration

2.1.2 Technical Specifications/TRM

- Technical Specifications, Section 3.4.1, Recirculation Loops Operating
- Technical Specifications, Section 3.4.8, Residual Heat Removal (RHR) Shutdown Cooling System - Hot Shutdown
- Technical Specifications, Section 3.4.9, Residual Heat Removal (RHR) Shutdown Cooling System - Cold Shutdown
- Technical Specifications, Section 3.4.10, RCS Pressure and Temperature (P/T) Limits
- Technical Specifications, Section 3.9.7, Residual Heat Removal (RHR) - High Water Level
- Technical Specifications, Section 3.9.8, Residual Heat Removal (RHR) - Low Water Level
- Technical Specifications, SR 3.4.1.1
- Technical Specifications, SR 3.4.10.3
- Technical Specifications, SR 3.4.10.4
- Technical Specifications, SR 3.4.10.5

- Technical Specifications, SR 3.4.10.6
- TRM Section TR 3.4.1, Recirculation Loops Operating
- TRM Section TR 3.4.4, Reactor Pressure Water Level-Cold Shutdown
- TRM Section TR 3.9.4, Reactor Pressure Water Level-Refueling
- TRM Section SR 3.4.1.1

2.2 Potential Use References

2.2.1 Technical Specifications/TRM

- Technical Specifications, Section 3.4.2, Jet Pumps
- Technical Specifications, SR 3.4.2.1

2.2.2 Procedures

- 23.106, Control Rod Drive Hydraulic System
- 23.127, Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System
- 23.415, Drywell Cooling System
- 23.702, Equipment and Floor Drainage System

2.2.3 Drawings

E-2834-01	Plan Equipment and Installation - Recirc MG-Set & Related Equipment Rx Bldg 4th Floor S. W. Area
I-2101-01	Schematic Diagram - Recirc Pump B3103C001A Drive Motor
I-2101-02	Schematic Diagram - Recirc Pump B3103C001B Drive Motor
I-2101-04	Schematic Diagram - Recirculation Pump B Discharge Valve B3105-F031B
I-2101-05	Schematic Diagram - Recirculation Pump A Discharge Valve B3105-F031A
I-2101-06	Schematic Diagram - Recirc Pump MG Set Lube Oil Pump A1-B3103C001A
I-2101-07	Schematic Diagram - Recirc Pump MG Set Lube Oil Pump A2-B3103C001B
I-2101-10	Schematic Diagram - Recirc Pump B3103C001A

I-2101-11	Schematic Diagram - Recirc Pump B3103C001B
I-2101-12	Schematic Diagram - Recirc MG Set Emerg. Oil Pumps C & D B3103-C002A & C002B
I-2104-12	Wiring Diagram - Reactor Recirc FW DCS Composer Interface Cab H11-P634
I-2105-01	Schematic Diagram - Reactor Recirc System Relays, Timers, & Temp Monitoring Notes & References
I-2105-02	Schematic Diagram - Reactor Recirc System Equipment List
I-2105-03	Schematic Diagram - Recirc MG Set A Protection and Auxiliary Relay Circuits
I-2105-04	Schematic Diagram - Recirc MG Set B Protection and Auxiliary Relay Circuits
I-2105-05	Schematic Diagram - Recirc MG Set A & B Auxiliary AC Circuits
I-2105-06	Recirc MG Sets A & B Speed Control Sys
I-2105-07	Recirc MG Sets A & B Speed Control
I-2105-08	Schematic Diagram - Reactor Recirc Sys Loop A Annunc. Circuits
I-2105-09	Schematic Diagram - Reactor Recirc Sys Loop B Annun. Circuits
I-2105-15	Schematic Diagram - Recirc Pump Discharge Valves B3105-F031A(B) Jogging Circuit
I-2105-16	Schematic Diagram - Recirc MG Set A & B Gen. Field Breaker Trip Circuits
I-2105-21	Distributed Control Sys Reactor Recirc (DCS RR) External Connections
I-2105-22	Bailey Modules Functional Block Diagram (Reactor Recirc Sys)
I-2105-23	Schematic Diagram - Reactor Recirc Sys DCS Digital Inputs
I-2106-01	One line Diagram - Recirc Pump A Meter and Relay
M-2833	Reactor Recirculation System
M-5702-1	Reactor Recirculation System Functional Operating Sketch

3.0 PRECAUTIONS AND LIMITATIONS

3.1 For System Startup

3.1.1 When in Modes 1, 2, 3 or 4, do not start an RR MG Set unless the following criteria are satisfied, per Technical Specifications SR 3.4.10.3 and SR 3.4.10.4:

- The difference between reactor coolant temperature in the recirculation loop to be started and the RPV coolant temperature is ≤ 50°F.

AND

- The difference between bottom head coolant temperature and the RPV steam space coolant temperature is ≤ 145°F.

3.1.2 RR MG Set Drive Motor start criteria:

1. Two successive starts can be made with motor at ambient temperatures. Second start is made after motor has coasted to rest from first start.

2. Third and all subsequent starts may be made only if motor has been idle for a period of 60 minutes since last start, or motor has run a minimum of 30 minutes since last start.

3.1.3 Special considerations must be made for starting a RR MG Set when the Reactor is critical. Consult Station Nuclear Engineer for desired plant conditions and Control Rod configurations.

3.1.4 A RR MG Set should not be operated with Fluid Drive Oil Temperature < 80°F, or with cooling water < 70°F.

3.1.5 The Reactor is administratively limited to ≤ 90°F/hr heatup and cooldown rate to avoid exceeding the 100°F/hr heatup and cooldown rate of Technical Specifications, Section 3.4.10, RCS Pressure and Temperature (P/T) Limits.

CM 3.1.6 RR Pump Operation below 300 psig should be minimized to prolong seal life. Operation below 200 psig should be limited to less than 48 hours, operation below 100 psig should be avoided if practical and should be less than two hours cumulative. Operation of the RR Pumps below 300 psig may be required, for the following reasons:

1. Preventing temperature stratification in the Reactor Vessel.

2. Retaining solids in suspension until they can be removed by the Reactor Water Cleanup System to prevent their deposition in the bottom of the Reactor Vessel or the Control Rod Drive Mechanisms.

3.1.7 Do not start an RR MG Set with RHR operating in SDC mode. Core flow disturbances caused by simultaneous operation of the two systems have not been analyzed.

3.2 For RR Pump Seals

CM

3.2.1 RR Pump Seal Cavities must be vented prior to pump operation if:

1. Reactor RR Pump has been isolated and seal cavities have been partially or completely drained.

OR

2. Maintenance has been performed on seals.

OR

3. RR System has operated with RPV Pressure below 300 psig and RR Pump Seal Purge Flow has been isolated.

4. Never vent seal with RR Pump running or above 300 psig, to prevent de-staging seal.

3.2.2 Seal purge should be maintained whenever possible except when:

1. Seal purge is required to be isolated (auto or manual).

2. RR Pump is isolated.

3.2.3 If the CRD or RBCCW/EECW System is lost, seal temperatures should be monitored on B31-R601, Recirc System Coolant Temps Recorder, Pump "A" Points 1 and 2, Pump "B" Points 6 and 7 (COP H11-P603). Seal temperatures in excess of 200°F should be avoided.

CM

3.2.4 A RR MG Set should be stopped if RR Pump seal cavity temperature approaches or exceeds 200°F. Seal damage may occur.

3.2.5 Seal Purge Water Supply for the RR Pump Seals must be isolated by closing B3100-F008A (B), N (S) RR Pump Seal Wtr Iso Vlv, prior to isolating a Reactor RR Pump, to avoid pressurizing the casing with CRD Flow and lifting B3100-F015A (B), Supply Water to Loop A (B) Seal Cavity Relief Valves.

3.2.6 Low or changing RR Seal Water Temperatures may cause Secondary Seal Cavity Pressure oscillations. Seal Cavity Pressure is expected to stabilize when Seal Water Temperature is above 95°F and stable.

3.2.7 If Seal Purge or Seal Cooling Water Supply Temperatures drop below 60°F, write a CARD for an Engineering Evaluation of Seal Performance. Reference DSN SR-0841.

3.3 For Operating Conditions

CM

3.3.1 RR Pumps shall be operated within the following Technical Specification limits:

1. Recirculation Loop Jet Pump flow mismatch, with both RR Pumps in operation, shall be maintained within:

   - ≤ 10% of Rated Core Flow when operating at < 70% of Rated Core Flow

   - ≤ 5% of Rated Core Flow when operating at ≥ 70% of Rated Core Flow

3.3.2 Failure to verify that RR Limiter 2 and 3 is clear prior to placing the Recirc A & B Flow Limiter 2/3 Defeat Switch to NORMAL will result in a RR MG Set runback and plant transient, if RR MG Set speed is above the RR Limiter 2 or 3 setpoint posted on COP H11-P603.

3.3.3 A flow transient will occur if a deviation exists between Scoop Tube position and speed demand signal from N (S) RR MG Set Speed Controller when the Scoop Tube Lock is reset.

3.3.4 Control Room Operator should be in constant communication with the local licensed operator when the RR MG Set Speed is being adjusted in local manual control.

3.3.5 Because of RR MG Set speed oscillation, avoid steady-state operation of the RR MG Sets in the 22% to 26% and the 49% to 54% speed ranges. Recirculation Loop Jet Pump flows may be mismatched, within Technical Specification Limits, to transition through these speed ranges.

3.3.6 Spurious vibration-switch alarms occur near 89-90% RRP B speed. Steady operation near this speed should be avoided.

3.3.7 Recirc A & B Flow Limiter 2/3 Defeat Switch should be in NORMAL when reactor power is > 65% for the following reasons:

1. If reactor power is > 65%, a Low Reactor Water Level 3 Scram could result if a simultaneous loss of both Heater Drains Pumps and a single Reactor Feed Pump occurs with RR Limiters 2 and 3 defeated.

2. If reactor power is > 75%, a Low Reactor Water Level 3 Scram could result if a loss of both Heater Drains Pumps occurs with RR Limiters 2 and 3 defeated.

3.3.8 Except when deliberately mismatched as stated in Precautions and Limitations, 3.3.5, maintain Recirculation Loop Jet Pump flows matched.

3.3.9 An indicated RR MG Set speed mismatch of > 3% with Recirculation Loop Jet Pump flows matched, indicates the need to have the flow loops evaluated.

3.3.10 Steady State operation of the Reactor Recirculation pumps at generator indicated speeds between 512 and 826 rpm (46 to 74%) could possibly initiate cracking of Jet Pump internal sensing lines 6, 7, 16 or 17. Operation in this range is not prohibited, but should be minimized if possible.

3.3.11 If, while raising (lowering) RR MG Set speed, oscillations continue at the top (bottom) end of the oscillation region, then RR MG Set speed should be raised (lowered) ~1% to 2% to minimize the RR MG Set oscillations. For Reactor power maneuvers, this potential RR MG Set speed adjustment at the high (low) end of the oscillation region should be addressed in the pre-job brief.

3.3.12 The scoop tube clutch may require >1% deviation before the scoop tube motor will engage and enable speed changes from the Main Control Room.

3.4 Plant Shutdowns and Outages

3.4.1 During outages, the RR Pumps must be shut down before the RHR System is operating in the Shutdown Cooling Mode. Core Flow disturbances caused by simultaneous operation of the two systems has not been analyzed.

3.4.2 It is preferable to shut down the RR Pumps for a day or more and restart them if required, rather than to operate them continuously at low pressure to extend the RR Pump seal life.

CM

3.4.3 During RR System Outages, observe the following precautions:

1. Space Heaters for RR Pump Motor, MG Set Generator, and MG Set Motor should be aligned for automatic operation in accordance with Section 11.3, RR MG Set and RR Pump Space Heater Operation, to prevent moisture damage from condensation in the windings.

2. RR MG Set Exciter and Generator Brushes should be lifted if RR MG Set will be shutdown for four weeks or longer to prevent corrosion accumulating on the slip rings.

3. Before an RR MG Set is started, slip rings should be inspected and cleaned if necessary. The brushes, when returned to service, should be checked for tension, freedom of movement within the brush holder, sufficient length for sustained operation, loose brush leads, and loose gear.

3.5 Single Loop Operation

CM

3.5.1 If a RR Pump is shutdown in a hot loop, the isolation valves should be opened or throttled open, if possible, to prevent development of excessive closed seating forces on the pump isolation valves as the loop cools down.

3.5.2 During single loop operation, comply with the following requirements of TRM, Section TR 3.4.1, Recirculation Loops Operating, and Technical Specification 3.4.1, Recirculation Loops Operating:

- Thermal power must be ≤ 66.1 % of RTP.

- The operating RR MG Set speed must be ≤ 75%, to avoid unacceptable vibration of Reactor core internals.

3.5.3 During single loop operation in Modes 1 or 2, when Thermal Power is ≤ 30% RTP **or** when operating loop flow is ≤ 50% of rated loop flow (22,600 gpm), the following is required within 15 minutes prior to Thermal Power **or** Recirculation Flow increases:

- With one idle Recirculation Loop, verify the difference between Bottom Head coolant temperature and the RPV Steam Space coolant temperature is ≤ 145°F. Required by Technical Specification SR 3.4.10.5.

- With one non-isolated idle recirculation loop, verify the difference between reactor coolant temperature in the idle recirculation loop and the RPV coolant temperature is ≤ 50°F. Required by Technical Specification SR 3.4.10.6.

CM

3.5.4 To prevent stratification of a non-isolated idle Recirculation loop, avoid steady-state Single Loop Operation with core flow < 39%. Stratification can occur from a no-flow condition when the operating RR MG Set speed is reduced to the transition point between where the direction of flow in the idle Recirculation loop changes from reverse to forward, cooling down the idle Recirculation loop.

3.5.5 While in Single Loop Operation, avoid RR MG Set speeds < 45% because of B21-R613, Reactor Core DP & Jet Pump Total Flow Rec, being inaccurate. The Power to Flow Map can be used to approximate flow at a given power level.

3.5.6 RR Limiter 2 and RR Limiter 3 are automatically bypassed in Single Loop Operation unless RR Limiter 2 or RR Limiter 3 actuation preceded entry into Single Loop Operation.

END OF SECTION

4.2 RR MG Set Lube Oil Pump Shift

4.2.1 Prerequisites

1. One N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), is in RUN.

2. One N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), is in AUTO or OFF/RESET.

3. N (S) RR MG Set Emerg Oil Pump C (D), is in AUTO or OFF/RESET.

4.2.2 Detailed Procedure

NOTE (1): Unless otherwise noted, all controls and indications are located on COP H11-P603.

NOTE (2): The N (S) RR MG Set Lube Oil Pumps A1 (B1) and A2 (B2), are interlocked to prevent simultaneous operation.

NOTE (3): The following step will initiate tripped indication of the Standby Lube Oil Pump and cause 3D96, MOTOR TRIPPED, to alarm.

1. Place standby N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN.

NOTE: Step 4.2.2.2 will automatically switch running N(S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), with N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in standby.

2. Place running N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in OFF/RESET.

3. Verify N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in RUN, starts.

4. Place non-running N (S) RR MG Set Lube Oil Pump A1 (B1) or A2 (B2), in AUTO.

5. Verify Fluid Drive Bearing Oil Supply is 25 to 45 psig as indicated on B31-RA15A (B), North (South) RR MG Set Brg Oil Supply Press Ind (locally at RR MG Set gauge board).

END OF SECTION

Job Position RO	No. JP-OP-315-0118-231	Revision 0
JPM Title Predict Impact of Loss of AC on Motor-Driven Feedwater Pumps and Use Procedures to Correct (Alt Path)	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name: J. Walters / A. Snowberger_____

JPM Type: Normal / **Alternate Path /** Time Critical Start Time _____

Evaluation Method: **Perform** / Walkthrough / Discuss Stop Time _____

Location: Plant / **Simulator** / Classroom Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.				*** 11.**							
*** 2.**				12.							
*** 3.**											
4.											
5.											
6.											
*** 7.**											
8.											
9.											
10.											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

N2103 – Standby Feedwater System

Task:

02N2103008 – Operate breakers necessary to power SBFW from either division offsite electrical distribution system

References: Required (R) / Available (A)

20.300.120kV, Loss of 120kV, pages applicable to performance of Condition N (R)

23.107.01, Standby Feedwater (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are the Control Room LNO.
- A Loss of 120kV Offsite Power and Loss of High-Pressure Feedwater Injection has occurred.
- The EOPs have been entered.
- The status of High-Pressure Feed is as follows:
  - The Condenser pumps are tripped.
  - HPCI and RCIC have isolated.
  - The CRD Pumps are tripped.
  - The East SBFW Pump B has tripped.
- Transient Annunciator Response is in effect.

Initiating Cue(s):

The CRS directs you to perform 20.300.120kV Actions for Condition N to restore power to the West SBFW Pump A and maximize injection to the RPV from Standby Feedwater.

Terminating Cue(s):

SBFW is injecting to the vessel at >600 gpm and/or RPV water level is rising.

Task Standard:

The task is satisfactorily met when the examinee has aligned power to the East SBFW Pump A from its alternate source, started the East Standby Feedwater Pump, and opened the N2103-F003, SBFW 4” Disch Flow Ctrl Vlv, to achieve at least 600 gpm flow to the RPV and/or established sufficient flow to cause RPV water level to rise.

JPM Title Predict Impact of Loss of AC on Motor-Driven Feedwater Pumps and Use Procedures to Correct (Alt Path)	No.: JP-OP-315-0118-231 Revision: 0 Page 4

Licensed Operator Exam Information (Required for NRC Exams Only)

Safety Function:

2 – Reactor Water Inventory Control

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 259001 – Reactor Feedwater System

K/A STATEMENT:

A2 Ability to (a) predict the impacts of the following on the Feedwater System and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations

A2.06 Loss of AC electrical distribution ..... 3.5 / 3.4

Maintenance Rule Safety Classification:

N2103-01

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide examinee with the Cue and copy of 20.300.120kV pages for Condition N.**		
1.	[N.1]. Place SBFW Pump A in OFF/RESET.	1.	Verifies/places SBFW Pump A in OFF/RESET.
*** 2.**	[N.2]. Place Bus 64V Pos V1 in OPEN.	*** 2.**	Places Bus 64V Pos V1 in OPEN.
*** 3.**	[N.3]. Place Bus 64V Pos V3 in CLOSE.	*** 3.**	Places Bus 64V Pos V3 in CLOSE.
4.	[N.4]. Start SBFW Pump A.	4.	Refers to Hard Card to start SBFW Pump.
NOTE:	**WHEN 23.107.01, Enclosure A hard card located, provide a paper copy to the examinee.**		
5.	[1.1] Start N2103-C003A, West Pump A Aux Lube Oil Pump, if available.	5.	West Pump A Aux Lube Oil Pump cannot be started due to loss of power.
6.	[1.2] Start N2103-C003B, East Pump B Aux Lube Oil Pump.	6.	East Pump B Aux Lube Oil Pump cannot be started due to loss of power.
*** 7.**	[1.3] Start N2103-C001, West Standby Feedwater Pump A.	*** 7**.	Starts N2103-C001, West Standby Feedwater Pump A.
8.	[1.4] Start N2103-C002, East Standby Feedwater Pump B.	8.	Step is N/A due to tripped East Standby Feedwater Pump B.
9.	[1.5] Verify N2103-F001, SBFW Disch To RPV Iso Valve, automatically opens (first pump).	9.	Verifies N2103-F001, SBFW Disch To RPV Iso Valve, automatically opens (first pump).
	Alternate Path Begins Here		
NOTE: **CUE:**	**N2103-F002 breaker trips when the attempt is made to open the valve.** **IF examinee sends NO to power supply for N2103-F002 (2PC-1-5B), inform examinee that the power supply is tripped on Thermal Overload and will not reset.**		
10.	[1.6] Throttle open N2103-F002, SBFW 6" Disch Flow Ctrl Vlv, until desired flow is achieved.	10.	Depresses N2103-F002 OPEN pushbutton and notes that valve position indication is lost. Reports to the CRS that position indication lost on N2103-F002. May recommend using N2103-F003 to inject water to RPV.
CUE:	**Acknowledge Report. If necessary, ask the candidate for recommended action. If a recommendation is made, direct examinee to perform recommended actions.**		
*** 11.**	Throttle open N2103-F003, SBFW 4" Disch Flow Ctrl Vlv.	*** 11.**	Opens N2103-F003, SBFW 4" Disch Flow Ctrl Vlv.
12.	Report to CRS that N2103-F003 is fully open SBFW is injecting.	12.	Informs CRS that SBFW is injecting to the RPV.
CUE:	**Acknowledge Report.**		
CUE:	**Terminate JPM when SBFW is injecting with the N2103-F003 full open (>600 gpm).**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____ (*** Critical Step)**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee.

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

IC-20 or any full power IC.

Malfunctions:

Number	Title	Value	Delay	Ramp
R11MF0159	Loss of Div 1 Offsite Power	ACTIVE	0	0
N20MF0018/19/20	C/N/S Cond Pump Trip	ACTIVE	0	0
E41MF0005	HPCI Logic A Spurious Iso	ACTIVE	0	0
E51MF0002	Div II RCIC Logic Spurious Iso	ACTIVE	0	0
C11MF1118/1119	East/West CRD Pump Trip	ACTIVE	0	0
N21MF0033	East SBFW Pump B Trip	ACTIVE	0	0

Remote Functions:

Number	Title	Value	Delay	Ramp
N21RF0020	MOV N2103F002 Breaker cd='P601_A296_1 EQ 1'	OPEN	0	0

Override Functions:

Number	Title	Value	Delay	Ramp
None				

Special Instructions:

1. Load desired IC.
2. Place in **RUN.**
3. Open and execute Lesson 315-0118-231.lsn.
4. Place the Mode Switch in Shutdown.
5. Insert IRMs and SRM.
6. Allow the plant to stabilize (level on a slowly downward trend).
7. Place the simulator in **FREEZE**.
8. Save an IC to be used for multiple examinees, if desired. Enter IC number here: _____
9. Give examinee cue, and place simulator in **RUN** when examinee is ready.

Cue Sheet: (JP-OP-315-0118-002)

Initial Conditions:

- You are the Control Room LNO.
- A Loss of 120kV Offsite Power and Loss of High-Pressure Feedwater Injection has occurred.
- The EOPs have been entered.
- The status of High-Pressure Feed is as follows:
  - The Condenser pumps are tripped.
  - HPCI and RCIC have isolated.
  - The CRD Pumps are tripped.
  - The East SBFW Pump B has tripped.
- Transient Annunciator Response is in effect.

Initiating Cue(s):

The CRS directs you to perform 20.300.120kV Actions for Condition N to restore power to the West SBFW Pump A and maximize injection to the RPV from Standby Feedwater.

Cue Sheet: (JP-OP-315-0118-002)

Initial Conditions:

- You are the Control Room LNO.
- A Loss of 120kV Offsite Power and Loss of High-Pressure Feedwater Injection has occurred.
- The EOPs have been entered.
- The status of High-Pressure Feed is as follows:
  - The Condenser pumps are tripped.
  - HPCI and RCIC have isolated.
  - The CRD Pumps are tripped.
  - The East SBFW Pump B has tripped.
- Transient Annunciator Response is in effect.

Initiating Cue(s):

The CRS directs you to perform 20.300.120kV Actions for Condition N to restore power to the West SBFW Pump A and maximize injection to the RPV from Standby Feedwater.

DO NOT give the following to examinee until specified in Cue.

CAUTIONS - None

NOTES - None

COMPONENT DESCRIPTIONS

Bus 64V Pos V1, 4160V Normal Feed To Bus 64V (H11-P809)
Bus 64V Pos V3, 4160V X-Tie To Bus 65W (H11-P810)

N2103-C001, West Standby Feedwater Pump A (H11-P601)
N2102-C003, North RFPT West Oil Pump A (H11-P805)
N2102-C004, North RFPT East Oil Pump B (H11-P805)
N2102-C006, South RFPT Emerg Oil Pump (H11-P805)
N2102-C022, E. RFP Seal Water Inj Pump (H11-P805)
N2102-C023, W. RFP Seal Water Inj Pump (H11-P805)

N3013-C023, East Gland Seal Exhauster (H11-P804)
N3013-C024, West Gland Seal Exhauster (H11-P804)

N3014-C036, Main Turbine N Lube Oil Pmp (H11-P804)
N3014-C037, Main Turbine S Lube Oil Pmp (H11-P804)

N3032-C043, North H2 Seal Oil Pump (H11-P804)
N3032-C044, South H2 Seal Oil Pump (H11-P804)

N3033-C047, E Stator Wtr Cooling Pump (H11-P804)
N3033-C048, W. Stator Wtr Cooling Pump (H11-P804)

N6101-C003A, East MVP Lube Oil Pmp A (H11-P804)
N6101-C003B, East MVP Lube Oil Pmp B (H11-P804)
N6101-C004A, West MVP Lube Oil Pmp A (H11-P804)
N6101-C004B, West MVP Lube Oil Pmp B (H11-P804)

P5001-D001, East Station Air Comp (H11-P807)
P5001-D002, Center Station Air Comp (H11-P807)
P5001-D003, West Station Air Comp (H11-P807)

SUBSEQUENT ACTIONS (continued)

CONDITION	ACTION
N. SBFW Pump A required for Reactor Water level control. ❑	❑ N.1 Place SBFW Pump A in OFF/RESET. ❑ N.2 Place Bus 64V Pos V1 in OPEN. ❑ N.3 Place Bus 64V Pos V3 in CLOSE. ❑ N.4 Start SBFW Pump A.
O. Following equipment was in operation: • West Station Air Comp. ❑ • West RFP Seal Water Inj Pmp. ❑ • North RFPT East Oil Pmp B. ❑ • South RFPT in service. ❑ • Main Turbine S Lube Oil Pmp. ❑ • South H2 Seal Oil Pmp. ❑ • East Gland Seal Exhauster. ❑ • East Stator water Cooling Pmp. ❑ • East MVP Lube Oil Pmp B. ❑ • West MVP Lube Oil Pmp A. ❑ • East Off Gas Chiller Unit. ❑	❑ O.1 Verify associated standby equipment auto starts as required: ❑ East(Center) Station Air Comp. ❑ East RFP Seal Water Inj Pump. ❑ North RFPT West Oil Pump A. ❑ South RFPT Emerg Oil Pump. ❑ Main Turbine N Lube Oil Pmp. ❑ North H2 Seal Oil Pump. ❑ West Gland Seal Exhauster. ❑ West Stator Wtr Cooling Pump. ❑ East MVP Lube Oil Pmp A. ❑ West MVP Lube Oil Pmp B. ❑ W(C) Off Gas Chiller Unit.

(continued)

DO NOT give the following to examinee until specified in Cue.

SBFW MANUAL OPERATION
(H11-P601)

NOTE: Copy of this enclosure is located at panel H11-P601.

1.0 INITIATION

1. Start N2103-C003A, West Pump A Aux Lube Oil Pump, if available.
2. Start N2103-C003B, East Pump B Aux Lube Oil Pump, if available.
3. If available, start N2103-C001, West Standby Feedwater Pump A.
4. If available, start N2103-C002, East Standby Feedwater Pump B.
5. Verify N2103-F001, SBFW Disch To RPV Iso Valve, automatically opens.
6. Throttle open N2103-F002, SBFW 6" Disch Flow Ctrl Vlv, until desired flow is achieved.

2.0 SHUTDOWN

1. Close N2103-F002, SBFW 6" Disch Flow Ctrl Vlv.
2. Shutdown N2103-C001, West Standby Feedwater Pump A.
3. Shutdown N2103-C002, East Standby Feedwater Pump B.
4. Verify N2103-F001, SBFW Disch To RPV Iso Valve, automatically closes.

NOTE: Allow Aux Lube Oil Pumps to run five minutes following SBFW pump shutdown.

5. Shutdown N2103-C003A, West Pump A Aux Lube Oil Pump, if running.
6. Shutdown N2103-C003B, East Pump B Aux Lube Oil Pump, if running.

END

JOB PERFORMANCE MEASURE

Job Position SRO / RO	No. JP-OP-315-0105-232	Revision 0
JPM Title Automatic Depressurization System (ADS) Shutdown	Duration 8 minutes	Page 1

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name:_____

JPM Type: **Normal** / Alternate Path **/** Time Critical

Evaluation Method: **Perform** / Walkthrough / Discuss

(Circle method used) Plant / **Simulator** / Classroom

Start Time _____

Stop Time _____

Total Time: _____

PERFORMANCE EVALUATION SUMMARY							
Element	S	U	Comments	Element	S	U	Comments
1.							
*** 2.**							
3.							
*** 4.**							
5.							
6.							

_____ SATISFACTORY _____ UNSATISFACTORY

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ /

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

B2100 – Automatic Depressurization System

Task:

02B2104001 – Place Safety Relief Valves and Automatic Depressurization System Valves in Standby

References: Required (R) / Available (A)

23.201 (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are an extra licensed operator on shift.
- The reactor has been Emergency Depressurized due to loss of all High Pressure Injection.
- A condenser pump has been recovered and Reactor water level is being controlled at 173 – 214” on Condensate.
- Drywell Pressure is <1.68 psig.

Initiating Cue(s):

- The CRS directs you to shut down the ADS system in accordance with 23.201, Safety Relief Valves and Automatic Depressurization System, Section 6.3, ADS Shutdown.
- Transient annunciator response is in effect.

Terminating Cue(s):

Terminate the JPM when the examinee has verified ADS logic is reset by verifying alarms related to ADS logic are clear.

Task Standard:

The task is satisfactorily met when the examinee has pressed the ADS logic high drywell pressure reset pushbutton, simultaneously depressed ADS Logic A and B reset pushbuttons and then placed ADS Logic A and B Inhibit Switches to Normal.

JPM Title Automatic Depressurization System (ADS) Shutdown	No.: JP-OP-315-0105-232 Revision: 0 Page 4

Licensed Operator Exam Information (required for NRC exams)

Safety Function:

3 – Reactor Pressure Control

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 218000 SF3 ADS Automatic Depressurization System

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the control room (CFR: 41.7 / 45.5 to 45.8):

A4.03 ADS logic reset.....3.9

Maintenance Rule Safety Classification:

B2104-05

Maintenance Rule Risk Significant? (Yes or No)

No

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide the examinee with the Cue Sheet and copy of (applicable portions of) 23.201.**		
1.	[6.3.1] Verify ADS Logic can be reset as follows: a. Reactor water level is above Level 1 as indicated on B21-R623A (B), Post Accident Monitor Recorder. b. Drywell pressure is below the Hi Pressure Seal In pressure of 1.68 psig as indicated on narrow range of T50-R802A (B), Div 1 (2) PC Pressure Recorder.	1.	Verifies RPV water level is above Level 1 (~31.8") and Drywell Pressure is <1.68 psig.
*** 2.**	[6.3.2] Depress ADS Initiation Drywell High Pressure, RESET pushbutton.	*** 2.**	Presses ADS Initiation Drywell High Pressure, RESET pushbutton. .
3.	[6.3.3] Simultaneously depress the following pushbuttons: • ADS Division I Timer Logic RESET. • ADS Division II Timer Logic RESET.	3.	Presses Div 1 and Div 2 Timer Logic RESET pushbuttons at the same time.
*** 4.**	[6.3.4] Verify or place the following key switches in NORMAL: • ADS Inhibit Sw Logic A. • ADS Inhibit Sw Logic B.	*** 4.**	Places ADS Inhibit Sw Logic A and Logic B switches in NORMAL.
5.	[6.3.5] Verify the following valves are closed: • B2104-F013P, Div 1 MS Line D SRV. • B2104-F013J, Div 1 MS Line C SRV. • B2104-F013R, Div 1 MS Line C SRV. • B2104-F013H, Div 1 MS Line C SRV. • B2104-F013E, Div 1 MS Line C SRV.	5.	Verifies ADS SRVs P, J, R, H and E are closed.
6.	[6.3.6] Verify ADS logic is reset as follows: a. 1D40, ADS RELAY ENERGIZED, clears. b. 1D28, ADS DRYWELL HIGH PRESS SEAL IN, clears. c. 1D44, ADS TIMERS INITIATED, clears. d. 1D27, ADS OUT OF SERVICE A/B LOGIC, clears.	6.	Verifies these alarms are clear: 1D40 1D28 1D44 1D27
CUE:	**Terminate the JPM when the examinee has verified ADS logic is reset by verifying alarms related to ADS logic are clear.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

Manual valves are checked in the closed direction (MOP02 and MOP05). Valve stem position may aid in valve position determination, but cannot be used as Independent Verification (MOP02).

Ex.: Verify valve closed: "Valve handwheel indicates no valve movement in the clockwise direction."

Verify valve open: "Valve handwheel has been rotated slightly in the clockwise direction and returned to the original positions."

Closing a valve: "Valve handwheel has been rotated in the fully clockwise direction until no additional valve movement. Valve stem is down."

Opening a valve: "Valve handwheel has been rotated in the fully counterclockwise direction until no additional valve movement, valve stem is out."

Controllers have an Auto light that is GREEN when selected and AMBER (YELLOW) when Manual is selected. When in Manual, the open and closed pushbuttons control the parameter to be changed by adjusting position or speed. When the deviation meter is nulled, then the process can be shifted to Auto to allow the desired setpoint to control the process.

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee that time compression may be used for activities performed outside of the Control Room.

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

IC# _____ saved with the setup below.

Malfunctions:

Number	Title	Value	Delay	Ramp

Remote Functions:

Number	Title	Value	Delay	Ramp

None

Override Functions:

Number	Title	Value	Delay	Ramp

Special Instructions:

1. Set the Simulator IC-6, Ready for Gland Steam (~1% power and 15 psig RPV pressure).
2. Place the Simulator in RUN.
3. Open and execute lesson JP-OP-315-0105-242 – Reset ADS Logic.lsn
4. Trigger “Setup” step, which will cause HPCI & RCIC Isolations and a small LOCA (~0.5%).
5. Allow Drywell Pressure to slowly rise to 1.68 psig (~11 min), then reduce leak size to 0%.
6. While DWP is rising, turn OFF all RHR and Core Spray Pumps.
7. Turn off all but one Condenser Pump.
8. When DWP goes above 1.68 psig, perform the following:
   - Place the MS in Shutdown.
   - Insert IRMs and SRMs.
   - Inhibit ADS.
   - Close Core Spray injection valves.
   - Close E1150-F010.
   - Place 1 division 1 RHR in TC/TS. Place Div 2 RHR in TC and maximize.
   - Wait 10 minutes then close the RHR injection valves.
   - Allow DWP to lower below 1.68 psig (may have to spray the DW then remove DW sprays).
9. Place the Simulator in Freeze.
10. Save an IC for future use, if desired. Record IC Number Here: _____
11. Allow examinee to enter the Simulator.
12. Place Simulator in RUN at the direction of the JPM evaluator.

Cue Sheet (JP-OP-315-0105-232)

Initial Conditions:

- You are an extra licensed operator on shift.
- The reactor has been Emergency Depressurized due to loss of all High Pressure Injection.
- A condenser pump has been recovered and Reactor water level is being controlled at 173 – 214” on Condensate.
- Drywell Pressure is <1.68 psig.

Initiating Cue(s):

- The CRS directs you to shut down the ADS system in accordance with 23.201, Safety Relief Valves and Automatic Depressurization System, Section 6.3, ADS Shutdown.
- Transient annunciator response is in effect.

Cue Sheet (JP-OP-315-0105-232)

Initial Conditions:

- You are an extra licensed operator on shift.
- The reactor has been Emergency Depressurized due to loss of all High Pressure Injection.
- A condenser pump has been recovered and Reactor water level is being controlled at 173 – 214” on Condensate.
- Drywell Pressure is <1.68 psig.

Initiating Cue(s):

- The CRS directs you to shut down the ADS system in accordance with 23.201, Safety Relief Valves and Automatic Depressurization System, Section 6.3, ADS Shutdown.
- Transient annunciator response is in effect.

Revision Summary

1) Added note to Enclosure B per CARD 20-30466.

Attachments

1	042503	Safety Relief Valves And Automatic Depressurization System Valve Lineup
2	030305	Safety Relief Valves And Automatic Depressurization System Electrical Lineup
3	121800	Safety Relief Valves And Automatic Depressurization System Instrument Lineup
4	011110	Safety Relief Valves And Automatic Depressurization System Standby Verification Checklist

Enclosure

A	091297	Safety Relief Valve Matrix
B	030221	Manual SRV Operation To Initiate Low Low Set (H11-P601)

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operating Main Steam Line Safety/Relief Valves (SRVs) including Automatic Depressurization System (ADS) valves.

1.1 System Description

The Nuclear Boiler System includes fifteen SRVs located on the Main Steam Lines between the Reactor Pressure Vessel and Inboard Main Steam Isolation Valves. SRVs discharge through ten inch lines which direct the steam below the water level in the Torus. The discharge lines are equipped with Vacuum Relief Valves to equalize pressure between the Torus and the discharge line. Five of the SRVs make up ADS. These valves open to reduce Reactor pressure, allowing the Low Pressure Injection Systems to inject water in the event of High Pressure Coolant Injection (HPCI) System failure. Two keylock switches (ADS Inhibit Sw Logic A and ADS Inhibit Sw Logic B) allow for manual override of the ADS actuation signal prior to initiation. Thermocouples detect SRV leakage during Reactor operation. The readout from these thermocouples is on B21-R614, SRV Tail Pipe Temperature Recorder (RR H11-P614). 1D61, SRV OPEN, in alarm indicates SRV leakage. Low Low Set logic is activated, when both signals have sealed in; any SRV open and Reactor pressure greater than high Reactor Vessel Steam Dome Pressure Scram setpoint of 1093 psig. The logic opens and closes B2104-F013A, Div 1 MS Line D SRV, and B2104-F013G, Div 2 MS Line B SRV, so Reactor pressure is controlled automatically. SRV A controls Reactor pressure between 905 and 1017 psig, and SRV G controls Reactor pressure between 935 and 1047 psig.

2.0 REFERENCES

2.1 Use References

2.1.1 23.205, Residual Heat Removal System

2.1.2 24.000.01, Situational Surveillances/LCO Action Tracking

2.2 Potential Use References

2.2.1 Technical Specifications/TRM

- Technical Specifications, Section 3.3.3.2, Remote Shutdown System
- Technical Specifications, Section 3.3.5.1, Emergency Core Cooling System (ECCS) Instrumentation

- Technical Specifications, Section 3.3.6.3, Low-Low Set (LLS) Instrumentation
- Technical Specifications, Section 3.4.3, Safety Relief Valves (SRVs)
- Technical Specifications, Section 3.5.1, ECCS - Operating
- Technical Specifications, Section 3.6.1.6, Low-Low Set (LLS) Valves
- Technical Specifications, Section 3.6.1.8, Suppression Chamber-to-Drywell Vacuum Breakers
- Technical Specifications, Section 3.6.2.1, Suppression Pool Average Temperature
- TRM Section TR 3.3.3, Accident Monitoring Instrumentation
- TRM Section TR 3.3.5.1, Emergency Core Cooling System (ECCS) Instrumentation
- TRM Section TR 3.3.6.3, Low-Low Set (LLS) Instrumentation
- TRM Section TR 3.4.2, Safety Relief Valve (SRV) Position Indication
- TRM Section TR 3.7.7, Appendix R Alternative Shutdown Auxiliary Systems

2.2.2 Drawings

M-2089	Diagram - Nuclear Boiler System
I-2095-01 through 09	Schematic Diagrams - Automatic Depressurization System
I-2095-38	Schematic Diagram - Low Low Set Logic Div. I & II
M-5701-01	Nuclear Boiler System FOS

2.2.3 Procedures

- 1D27, ADS OUT OF SERVICE A/B LOGIC
- 1D28, ADS DRYWELL HIGH PRESS SEAL IN

- 1D32, ADS REACTOR H_2O LEVEL L3
- 1D36, ADS ECCS PUMP CH B PERMISSIVE
- 1D38, DIV I/II LOW - LOW SET ARMED
- 1D40, ADS RELAY ENERGIZED
- 1D44, ADS TIMERS INITIATED
- 1D48, ADS ECCS PUMP CH A PERMISSIVE
- 1D49, ADS STATUS TEST
- 1D57, ADS/SRV/EECW TCV POWER SUPPLY FAILURE
- 1D61, SRV OPEN
- 24.402.01, Drywell and Suppression Chamber Vacuum Breaker Operability Test

3.0 PRECAUTIONS AND LIMITATIONS

3.1 If Suppression Pool average water temperature is ≥ 95°F, comply with Technical Specifications, 3.6.2.1, Suppression Pool Average Temperature.

3.2 When several manual openings of SRVs are required, the same valve should **not** be opened repeatedly. This prevents localized heating in the Torus.

3.3 If more than one SRV is to be opened manually at the same time, separate discharges to ensure mixing and uniform heating of the Torus. Enclosure A, Safety Relief Valve Matrix, provides relative location of SRV/ADS discharges.

3.4 Within 12 hours after any discharge of steam to the Torus, the Drywell-Suppression Chamber Vacuum Breakers must be demonstrated operable by performance of 24.402.01, "Drywell and Suppression Chamber Vacuum Breaker Operability Test."

3.5 Reactor Water Level should be as near to normal level as possible during manual SRV operation to prevent inadvertent Reactor Hi Level trips due to swell.

CM

3.6 When operating SRVs, Drywell Pressure may be less than Torus Pressure, and Torus to Drywell Vacuum Breakers may open. If Torus to Drywell Vacuum Breakers open, comply with Technical Specifications, Section 3.6.1.8, Suppression Chamber-to-Drywell Vacuum Breakers

END OF SECTION

4.0 GENERAL PREREQUISITES

4.1 SRV/ADS Valve Lineup has been completed in accordance with Attachment 1.

4.2 SRV/ADS Electrical Lineup has been completed in accordance with Attachment 2.

4.3 SRV/ADS Instrument Lineup has been completed in accordance with Attachment 3.

4.4 Primary Containment Pneumatic Supply System is in operation to support SRV and ADS operation.

END OF SECTION

6.3 Automatic Depressurization System Shutdown

6.3.1 Specific Prerequisites

1. Reactor blowdown is complete or ADS is no longer required.
2. Adequate core cooling is assured.

6.3.2 Detailed Procedure

1. Verify ADS Logic can be reset as follows:
   a. Reactor water level is above Level 1 as indicated on B21-R623A (B), Post Accident Monitor Recorder.
   b. Drywell pressure is below the Hi Pressure Seal In pressure of 1.68 psig as indicated on narrow range of T50-R802A (B), Div 1 (2) PC Pressure Recorder.
2. Depress ADS Initiation Drywell High Pressure, RESET pushbutton.
3. Simultaneously depress the following pushbuttons:
   - ADS Division I Timer Logic RESET.
   - ADS Division II Timer Logic RESET.
4. Verify or place the following key switches in NORMAL:
   - ADS Inhibit Sw Logic A.
   - ADS Inhibit Sw Logic B.
5. Verify the following valves are closed:
   - B2104-F013P, Div 1 MS Line D SRV.
   - B2104-F013J, Div 1 MS Line C SRV.
   - B2104-F013R, Div 1 MS Line C SRV.
   - B2104-F013H, Div 1 MS Line C SRV.
   - B2104-F013E, Div 1 MS Line C SRV.

6. Verify ADS logic is reset as follows:

   a. 1D40, ADS RELAY ENERGIZED, clears.

   b. 1D28, ADS DRYWELL HIGH PRESS SEAL IN, clears.

   c. 1D44, ADS TIMERS INITIATED, clears.

   d. 1D27, ADS OUT OF SERVICE A/B LOGIC, clears.

7. To reset Low Low Set logic, refer to Section 6.2, Low Low Set Shutdown.

8. WHEN all SRV discharge temperatures decrease to less than the alarm setpoint, 220°F as indicated on B21-R614, SRV Tail Pipe Temperature Recorder (RR H11-P614), verify 1D61, SRV OPEN, clears.

9. **WHEN** Torus temperature is less than 95°F **and** directed by the SM, remove Torus Cooling mode of RHR from service; refer to 23.205, "Residual Heat Removal System."

10. Unless otherwise directed by the SM, place SRV/ADS in Standby; refer to Section 5.1, SRVs And ADS Valves Standby Mode.

END OF TEXT

Job Position SRO / RO	No. JP-OP-315-0169-231	Revision 0
JPM Title Shutdown TWMS from the Cleanup Mode	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name: R. Roberts / J. Walters

JPM Type: **Normal** / Alternate Path / Time Critical — Start Time _____

Evaluation Method: **Perform** / Walkthrough / Discuss — Stop Time _____

Location: Plant / **Simulator** / Classroom — Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
*** 1.**				*** 7.**							
*** 2.**				8.							
*** 3.**				9.							
*** 4.**				10.							
*** 5.**				11.							
*** 6.**											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ **PASS** _____ **FAIL**

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Title Shutdown TWMS from the Cleanup Mode	No.: JP-OP-315-0169-231 Revision: 0 Page 3

JPM Information

System:

G5100 – Torus Water Management System

Task:

02G510001 Operate the Torus Water Management System

References: Required (R) / Available (A)

Marked up copy of 23.144, Torus Water Management System (R)

Mark section 6.0 through Step 6.2.1.4 as complete.

Tools and Equipment Required:

None

Initial Conditions:

You are the CRLNO.

The Torus Water Management System is in the Cleanup Mode.

Initiating Cue(s):

The CRS directs you to shut down the Torus Water Management System, from the Cleanup Mode, IAW 23.144.

Terminating Cue(s):

End JPM when CRS is informed that the Torus Water Management System is shut down.

Task Standard:

The task is satisfactorily met when the examinee transfers the TWMS from the Cleanup Mode to the Bypass Mode by:

- Closing the G5100-F611.
- Opening the G5100-F609.
- Closing the G5100-F033.

And then shuts down the TWMS by:

- Stopping both TWMS pumps.
- Closing the G5100-F609, G5100-F606, G5100-F600 and G5100-F602.

JPM Title Shutdown TWMS from the Cleanup Mode	No.: JP-OP-315-0169-231 Revision: 0 Page 4

Licensed Operator Exam Information (required for NRC exams)

Safety Function/Category:

5 – Containment Integrity

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 212000 – Primary Containment System and Auxiliaries

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the control room:

A4.16 Suppression pool cleanup system 2.5

Maintenance Rule Safety Classification:

G5100-02

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT	STANDARD
CUE: Provide examinee with Cue Sheet and a marked up copy of 23.144.	
NOTE: Examinee should start with Section 6.2 TWMS Cleanup Mode to return the system to the Bypass Mode (from the Cleanup Mode).	
*** 1.** [6.2.2.1] Close G5100-F611, TWMS Cond to Torus Makeup Vlv.	*** 1.** Depresses closed pushbutton for G5100-F611, TWMS Cond to Torus Makeup Vlv.
*** 2.** [6.2.2.2] Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.	*** 2.** Depresses open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv and monitors TWMS Pump ammeters.
*** 3.** [6.2.2.3] When TWMS Pumps ammeters indicates approximately 95 amps, close G5100-F033, TWMS to Cndr Iso Vlv.	*** 3.** Monitors TWMS Pump ammeters and depresses closed pushbutton for G5100-F033, TWMS to Cndr Iso Vlv when pump amps indicate (raise to) approximately 95 amps.
NOTE: The examinee should now refer to Section 10.0 to shut down the TWMS System (from the Bypass Mode).	
*** 4.** [10.2.1] Stop G5100-C001 North TWMS Pump.:	*** 4**. Rotates CMC Switch for G5100-C001 North TWMS Pump to OFF-RESET.
*** 5.** [10.2.2] Wait approximately five seconds before stopping G5100-C002 South TWMS Pump.	*** 5**. After approximately 5 seconds, rotates CMC Switch for G5100-C002 South TWMS Pump to OFF-RESET.
*** 6.** [10.2.3] Wait approximately five seconds before closing or verifying closed G5100-F609, TWMS Recirc Line Iso Vlv.	*** 6**. After approximately 5 seconds, depresses closed pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.
*** 7.** [10.2.4] Close or verify closed the following valves: • G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv. • G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv. • G5100-F600, S TWMS Pump Inbd Suct Iso Vlv. • G5100-F602, N TWMS Pump Inbd Suct Iso Vlv.	*** 7**. Depresses Closed pushbutton for the following valves: • G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv (***Critical Step Element**) • G5100-F600, S TWMS Pump Inbd Suct Iso Vlv (***Critical Step Element**) • G5100-F602, N TWMS Pump Inbd Suct Iso Vlv (***Critical Step Element**) Verifies G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.
8. [10.2.5] If Condensate System is supplying CRD Pump Suction Line, verify G5100-F613, TWMS Sec Cntm Otbd Iso Vlv, is open.	8. Verifies G5100-F613, TWMS Sec Cntm Otbd Iso Vlv, is open.

ELEMENT		STANDARD	
9.	[10.2.6] If Condensate System is supplying CRD Pump Suction Line, verify G5100-F612, TWMS Sec Cntm Inbd Iso Vlv, is open.	9.	Verifies G5100-F612, TWMS Sec Cntm Inbd Iso Vlv, is open.
10.	[10.2.7] Verify or place TWMS Drain Mode Selector Switch in LOCK.	10.	Verifies TWMS Drain Mode Selector Switch is in LOCK.
11.	Inform CRS when the Torus Water Management System has been shut down.	11.	Informs CRS that the Torus Water Management System is shut down.
CUE:	**End JPM when CRS is informed that the Torus Water Management System is shut down.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

None

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee that time compression may be used for activities performed outside of the Control Room. Notify Examinee if JPM is Time Critical (only if JPM is **NOT** Alternate Path.)

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any Power IC or IC set up specifically for this JPM.

Malfunctions:

Number	Title	Value	Delay	Ramp

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp

Special Instructions:

1. Place the Simulator in RUN.
2. Startup TWMS in the Bypass Mode as follows (from 23.144 Section 5.0):
    a. Open the following valves:
        • G5100-F602, N TWMS Pump Inbd Suct Iso Vlv.
        • G5100-F600, S TWMS Pump Inbd Suct Iso Vlv
    b. Open G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv
    c. Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.
    d. Three seconds after dual indication is observed on G5100-F609, start North TWMS Pump
    e. Verify G5100-F609, TWMS Recirc Line Iso Vlv, is fully open.
    f. Start South TWMS Pump.
3. Place TWMS in the Cleanup Mode as follows:
    a. Depress Open pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.
    b. When TWMS Pumps ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.
    c. Open or verify open G5100-F613, TWMS Sec Cntm Otbd Iso Vlv.
    d. Throttle open G5100-F611, TWMS Cond to Torus Makeup Vlv, until G51 R401, TWMS Return Flow Indicator, indication is approximately equal to G51-R400, TWMS Pumps Disch Flow Ind
4. Save an IC for later use, if desired.

    IF an IC is saved, enter IC number to use for JPMs here: _____.
5. Allow examinee to enter the Simulator at the direction of the lead examiner.

Cue Sheet: (JP-OP-315-0127-191)

Initial Conditions:

You are the CRLNO.

The Torus Water Management System is in the Cleanup Mode.

Initiating Cue(s):

The CRS directs you to shut down the Torus Water Management System, from the Cleanup Mode, IAW 23.144.

Cue Sheet: (JP-OP-315-0127-191)

Initial Conditions:

You are the CRLNO.

The Torus Water Management System is in the Cleanup Mode.

Initiating Cue(s):

The CRS directs you to shut down the Torus Water Management System, from the Cleanup Mode, IAW 23.144.

TORUS WATER MANAGEMENT SYSTEM

Revision Summary

1) Added the new ISFSI box to the ARMS stamp as per step 2.2.2 of the Writer's Guide. No rev bar used.
2) Added direction to go to 29.ESP.21 to manage torus level in the EOPs.

Attachments

1 031110 TWMS Valve Lineup
2 010807 TWMS Electrical Lineup
3 041309 TWMS Instrument Lineup

Enclosures - None

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #**	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	JP-OP-315-0169-231	59		19-0641	1703.02	I	N	

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operating the Torus Water Management System (TWMS).

1.1 System Description

The TWMS provides a means of maintaining water quality in the Torus and a means of recirculation for thermal mixing. The TWMS also provides a means of draining and filling the Torus for maintenance.

It consists of two pumps and associated valves and piping. Each pump takes suction from the Torus through an independent suction line. Suction lines connect to the Torus approximately 180° apart. Pumps discharge into a common 6 in. header which divides into 3 full capacity 6 in. lines downstream of the TWMS Pumps Discharge Header Flow Element (G51-N400).

The first line routes Torus water to the Main Condenser through G5100-F033, TWMS to Cndr Iso Vlv. This is the normal flowpath and also used for draining. The second line recirculates Torus water back to the Torus for thermal mixing, using G5100-F609, TWMS Recirc Line Iso Vlv. The third line routes water to the Condensate Polishing Demineralizers influent using G5100-F610, TWMS to CFD Inlet Hdr Iso Vlv. This is an abnormal lineup.

Return flow to the Torus is routed through the RHR and Core Spray Test Lines. The TWMS return header divides into two 4 in. lines. The first line is connected to the RHR Test Line, the second line is connected to the Core Spray Test Line. RHR and Core Spray Test Lines are connected to the Torus approximately 180° apart.

2.0 REFERENCES

2.1 Use References

None

2.2 Potential Use References

2.2.1 Technical Specifications

- Section 3.5.2, Reactor Pressure Vessel (RPV) Water Inventory Control
- Section 3.6.1.8, Suppression Chamber-to-Drywell Vacuum Breakers
- Section 3.6.2.2, Suppression Pool Water Level

2.2.2 Drawings

I-2781-01, through 11	Schematic Diagrams - Torus Water Management System
M-5713	Diagram - Torus Water Management System Functional Operating Sketch

2.2.3 Procedures

- 46.000.046, Filling Reactor Instrumentation Sensing Line and Operation of the Reactor Reference Leg Backfill System
- 7D64, TWMS DRAIN MODE KEY SWITCH OPERATE POS
- 7D71, TORUS WATER LEVEL TROUBLE

3.0 PRECAUTIONS AND LIMITATIONS

3.1 If TWMS is not filled and vented, a Turbine Generator trip could occur due to a loss of Condenser vacuum by opening G5100-F033, TWMS to Cndr Iso Vlv.

CM

3.2 Normal CRD Supply is through G5100-F612, TWMS Sec Cntm Inbd Iso Vlv, and G5100-F613, TWMS Sec Cntm Otbd Iso Vlv. If either valve is closed, CRD suction shifts to the CST. If this occurs, the Reference Leg Backfill System must be shutdown in accordance with 46.000.046, "Filling Reactor Instrumentation Sensing Line and Operation of the Reactor Reference Leg Backfill System."

3.3 While operating in the Cleanup Mode, if Annunciator 7D71, TORUS WATER LEVEL TROUBLE, alarms High-High (+2.0 inches increasing), G5100-F611, TWMS Cond to Torus Makeup Vlv (Throttle Valve), will receive a CLOSE signal for as long as the High-High condition exists. If this High-High alarm has been received, TWMS influent and effluent flows must be monitored. G5100-F611, TWMS Cond to Torus Makeup Vlv, will need to be throttled open to balance flows once the High-High alarm clears.

3.4 When operating TWMS, Drywell pressure may be less than Torus pressure, and Torus to Drywell Vacuum Breakers may open. If Torus to Drywell Vacuum Breakers open, comply with Technical Specification, Section 3.6.1.8, Suppression Chamber-to-Drywell Vacuum Breakers.

3.5 Leakage past the closed G5100-F010, Demin Water Makeup To TWMS Iso Vlv, has been the source of Tritium contamination of the reactor building demin water system. Flushing ~500 gallons of demin water to the Torus during TWMS filling and venting evolutions should minimize the sediment buildup near the G5100-F036, Demin Water Makeup To TWMS Drain Vlv, sample point.

END OF SECTION

4.0 FILL AND VENT

4.1 Prerequisites

4.1.1 TWMS Valve Lineup has been completed in accordance with Attachment 1.

4.1.2 TWMS Electrical Lineup has been completed in accordance with Attachment 2.

4.1.3 TWMS Instrument Lineup has been completed in accordance with Attachment 3.

4.1.4 Condensate Storage and Transfer System is available to support the TWMS operation.

4.2 Detailed Procedure

4.2.1 Start the non-selected P1100-C004A (B) West (East) Demin Strg Trans Pump.

4.2.2 Open P1100-F153, Demin Water Supply to Torus Water Management System Iso Valve (RB1-G9).

4.2.3 Unlock and open G5100-F010, Demin Water Makeup to TWMS Iso Vlv.

4.2.4 Vent through G5100-F011, TWMS Cond to Torus Makeup Vent Vlv, when air free water is present, close G5100-F011.

4.2.5 When vent is complete at G5100-F011, flush the lines as follows to remove any corrosion products:

1. Open G5100-F604, TWMS Rtrn To RHR Inbd Iso Vlv.

2. Open G5100-F606, TWMS Rtrn To CS Inbd Iso Vlv.

3. When a 0.1” rise in torus water level indication (or > 500 gallons from DST level), stop the flush.

4. Close G5100-F604, TWMS Rtrn To RHR Inbd Iso Vlv.

5. Close G5100-F606, TWMS Rtrn To CS Inbd Iso Vlv.

6. Shutdown P1100-C004A (B) West (East) Demin Strg Trans Pump started in Step 4.2.1.

NOTE: CARDs 02-12240 and 04-22089 document tritium in Demin water supply. Each time the source was G5100-F010 ≈ 1/16 turn open.

4.2.6 Chain lock close G5100-F010, Demin Water Makeup to TWMS Iso Vlv.

4.2.7 Open G5100-F037A, North TWMS Pump Suction Strainer Inlet Flush Vlv.

4.2.8 Open G5100-F037B, South TWMS Pump Suction Strainer Inlet Flush Vlv.

4.2.9 Vent through G5100-F031, TWMS to Cond Header Vent Valve.

4.2.10 Close G5100-F037A, North TWMS Pump Suction Strainer Inlet Flush Vlv.

4.2.11 Close G5100-F037B, South TWMS Pump Suction Strainer Inlet Flush Vlv.

4.2.12 Close P1100-F153, Demin Water Supply to Torus Water Management System Iso Valve (RB1-G9).

END OF SECTION

5.0 STARTUP TO BYPASS MODE

NOTE: Unless otherwise noted, all controls and indications for the Torus Water Management System are located on COP H11-P807.

5.1 Prerequisites

5.1.1 TWMS has been filled and vented in accordance with Section 4.0, Fill and Vent.

5.1.2 RHR or Core Spray are not in use.

5.2 Detailed Procedure

5.2.1 For torus level control directed by 29.100.01 Sheet 2, Primary Containment Control, exit this procedure and enter 29.ESP.21, Defeat of Torus Water Management Isolations and Torus Level Control.

NOTE: The following step alarms Annunciator 7D64, TWMS DRAIN MODE KEY SWITCH OPERATE POS, and allows TWMS pumps to operate with G5100-F033, TWMS To Cndr Iso Vlv, open and a low low level alarm in.

5.2.2 If not in Modes 1, 2 or 3 and Torus Water Level is less than -2 inches, place TWMS Drain Mode Selector Switch in OPERATE.

5.2.3 Open the following valves:

- G5100-F602, N TWMS Pump Inbd Suct Iso Vlv.
- G5100-F600, S TWMS Pump Inbd Suct Iso Vlv.

CAUTION

Due to excessive vibration of the piping, G5100-F604 and F606 should not both be open at the same time during system operation.

5.2.4 Using a Torus Return Line which is not currently in use, perform one of the following:

- **RHR Test Line**, open G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.
- **CS Test Line**, open G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv.

NOTE: G5100-F609 is a full stroke valve. High current indication will go away after flow balances.

5.2.5 Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.

5.2.6 Three seconds after dual indication is observed on G5100-F609, TWMS Recirc Line Iso Vlv, start North(South) Torus Water Management Pump.

NOTE: System flows into and out of Torus, will take approximately 15 seconds to equalize.

5.2.7 Verify equal flows, into and out of Torus, at greater than 250 gpm, as indicated on G51-R400, TWMS Pumps Disch Flow Ind, and G51-R401, TWMS Return Flow Indicator.

NOTE: Normal operation will be with both Torus Water Management Pumps running, Do not start the second Torus Water Management Pump until G5100-F609, TWMS Recirc Line Iso Vlv, is full open.

5.2.8 Verify G5100-F609, TWMS Recirc Line Iso Vlv, is fully open. If operating only one TWMS pump, proceed to Step 5.2.10.

5.2.9 Start South(North) Torus Water Management Pump.

5.2.10 Verify equal flows into and out of Torus, at greater than 500 gpm, (250 gpm for single pump operation) as indicated on G51-R400, TWMS Pumps Disch Flow Ind, and G51-R401, TWMS Return Flow Indicator.

END OF SECTION

6.0 TWMS CLEANUP MODE

6.1 Prerequisites

6.1.1 TWMS in Bypass Mode in accordance with Section 5.0, Start Up to Bypass Mode.

6.1.2 A Condensate Polishing Demin is in service to prevent sending potentially bad water to the Control Rod Drive System and/or the Condensate Storage Tank when G5100-F613, TWMS Sec Cntm Otbd Iso Vlv, is opened.

6.1.3 The following systems are in operation to support TWMS operation:

1. Condensate System.
2. Condensate Polishing Demineralizer System.

6.2 Detailed Procedure

6.2.1 Transfer TWMS from Bypass Mode to Cleanup Mode as follows:

CAUTION

If TWMS is not filled and vented, a Turbine Generator trip could occur due to a loss of Condenser vacuum by opening G5100-F033, TWMS to Cndr Iso Vlv.

1. Depress Open pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.
2. When TWMS Pumps ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.
3. Open or verify open G5100-F613, TWMS Sec Cntm Otbd Iso Vlv.

NOTE: If Annunciator 7D71, TORUS WATER LEVEL TROUBLE, alarms High-High (+2.0 inches increasing), G5100-F611, TWMS Cond to Torus Makeup Vlv (Throttle Valve), will receive a CLOSE signal for as long as the High-High condition exists. If this High-High alarm has been received, TWMS influent and effluent flows must be monitored. G5100-F611, TWMS Cond to Torus Makeup Vlv, will need to be throttled open to balance flows once the High-High alarm clears.

CM

4. To prevent CRD Pump from tripping on low suction pressure, slowly throttle open G5100-F611, TWMS Cond to Torus Makeup Vlv, until G51-R401, TWMS Return Flow Indicator, indication is approximately equal to G51-R400, TWMS Pumps Disch Flow Ind.

6.2.2 To return to Bypass Mode from Cleanup Mode:

NOTE: If the Off Gas System is in service, a short duration increase in Off Gas Flow may occur approximately 10 to 15 minutes after TWMS Flow to the Condenser is stopped.

1. Close G5100-F611, TWMS Cond to Torus Makeup Vlv.

2. Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.

3. When TWMS Pumps ammeters indicates approximately 95 amps, close G5100-F033, TWMS to Cndr Iso Vlv.

END OF SECTION

7.0 TWMS DRAIN MODE

NOTE: TWMS Drain Mode is not intended to be used for normal Torus level control.

7.1 Prerequisites

7.1.1 TWMS in Bypass or Cleanup Mode.

7.1.2 Applicable requirements of the following Technical Specifications have been met to allow Torus drainage:

- Section 3.5.2, Reactor Pressure Vessel (RPV) Water Inventory Control
- Section 3.6.2.2, Suppression Pool Water Level

7.2 Detailed Procedure

7.2.1 To place TWMS from Bypass Mode to Drain Mode:

NOTE: The following step alarms Annunciator 7D64, TWMS DRAIN MODE KEY SWITCH OPERATE POS, and allows TWMS Pumps to operate with G5100-F033, TWMS to Cndr Iso Vlv, open and a Low Low Level alarm in.

1. Place TWMS Drain Mode Selector Switch in OPERATE.
2. Depress Open pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.
3. When TWMS Pumps ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.
4. Monitor T50-R804A, Div 1 Torus Level Recorder, while Torus is being drained (COP H11-P601).

7.2.2 To place TWMS from Cleanup Mode to Drain Mode:

NOTE: The following step alarms Annunciator 7D64, TWMS DRAIN MODE KEY SWITCH OPERATE POS, and allows TWMS Pumps to operate with G5100-F033, TWMS to Cndr Iso Vlv, open and a Low Low Level condition.

1. Place TWMS Drain Mode Selector Switch in OPERATE.
2. Slowly close G5100-F611, TWMS Cond to Torus Makeup Vlv.
3. While Torus is draining, monitor T50-R804A, Div 1 Torus Level Recorder (COP H11-P601).

7.2.3 If Torus is to be partially drained, return TWMS to Bypass Mode when desired Torus Level is reached as follows:

1. Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.

NOTE: If the Off Gas System is in service, a short duration increase in Off Gas Flow may occur approximately 10 to 15 minutes after TWMS Flow to the Condenser is stopped.

2. When TWMS Pumps ammeters indicate approximately 95 amps, close G5100-F033, TWMS to Cndr Iso Vlv.

7.2.4 If Torus is to be completely drained:

CAUTION

As level approaches -144 inches, pump cavitation may occur. If cavitation is noted, flow should be reduced or stopped to prevent pump damage.

1. Monitor T50-R804A and B, Div 1 and Div 2 Torus Level Recorder (COP H11-P601 and P602).

2. When at -144 inches Torus Level or if cavitation is noted, stop draining as follows:

   a. Stop G5100-C001 North TWMS Pump.

   b. Stop G5100-C002 South TWMS Pump.

   c. Close or verify closed G5100-F033, TWMS to Cndr Iso Vlv.

   d. Close or verify closed G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv.

   e. Close or verify closed G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.

   f. Close or verify closed G5100-F600, S TWMS Pump Inbd Suct Iso Vlv.

   g. Close or verify closed G5100-F602, N TWMS Pump Inbd Suct Iso Vlv.

   h. Close or verify closed G5100-F611, TWMS Cond to Torus Makeup Vlv.

END OF SECTION

8.0 TORUS FILL

8.1 Prerequisites

8.1.1 TWMS Valve Lineup has been completed in accordance with Attachment 1.

8.1.2 TWMS Electrical Lineup has been completed in accordance with Attachment 2.

8.1.3 TWMS Instrument Lineup has been completed in accordance with Attachment 3.

8.1.4 The following systems are in operation to support the TWMS operation:

1. Condensate System
2. Condensate Polishing Demineralizer System

8.1.5 A sufficient volume of water is available to fill Torus to desired level.

8.2 Detailed Procedure

8.2.1 For torus level control directed by 29.100.01 Sheet 2, Primary Containment Control, exit this procedure and enter 29.ESP.21, Defeat of Torus Water Management Isolations and Torus Level Control.

CAUTION

Due to excessive vibration of the piping, G5100-F604 and F606 should not both be open at the same time during system operation.

8.2.2 Using a Torus Return Line which is not currently in use, perform one of the following:

- **RHR Test Line**, open G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.
- **CS Test Line**, open G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv.

CM

8.2.3 To prevent the CRD pump from tripping on low suction pressure, slowly open G5100-F611, TWMS Cond to Torus Makeup Vlv, until desired influent flow is achieved.

NOTE: Normal Torus Water Level is between -1.5 inches and +1.5 inches.

8.2.4 When desired Torus level is achieved:

1. Close G5100-F611, TWMS Cond to Torus Makeup Vlv.
2. Close or verify closed G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv.
3. Close or verify closed G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.

END OF SECTION

9.0 TWMS OPERATION TO LOWER TORUS WATER LEVEL

9.1 Prerequisites

9.1.1 TWMS is in Bypass Mode in accordance with Section 5.0, Startup to Bypass Mode.

9.2 Detailed Procedure

9.2.1 For torus level control directed by 29.100.01 Sheet 2, Primary Containment Control, exit this procedure and enter 29.ESP.21, Defeat of Torus Water Management Isolations and Torus Level Control.

CAUTION

If TWMS is not filled and vented, a Turbine Generator Trip could occur due to loss of Condenser Vacuum by opening G5100-F033, TWMS to Cndr Iso Vlv.

9.2.2 Transfer TWMS from Bypass Mode to lower level as follows:

1. Depress Open pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.

2. When TWMS Pump ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.

NOTE: Normal Torus Water Level is between -1.5 inches and +1.5 inches.

9.2.3 When the desired Torus Water Level is reached:

NOTE: If the Off Gas System is in service, a short duration increase in Off Gas Flow may occur approximately 10 to 15 minutes after TWMS Flow to the Condenser is stopped.

1. Depress Open pushbutton for G5100-F609, TWMS Recirc Line Iso Vlv.

2. When TWMS Pump ammeters indicate approximately 95 amps, depress CLOSE pushbutton for G5100-F033, TWMS to Cndr Iso Vlv.

END OF SECTION

10.0 SHUTDOWN

10.1 Prerequisites

10.1.1 TWMS is in Bypass Mode.

10.2 Detailed Procedure

10.2.1 Stop G5100-C001 North TWMS Pump.

10.2.2 Wait approximately five seconds before stopping G5100-C002 South TWMS Pump.

10.2.3 Wait approximately five seconds before closing or verifying closed G5100-F609, TWMS Recirc Line Iso Vlv.

10.2.4 Close or verify closed the following valves:

- G5100-F606, TWMS Rtrn to CS Inbd Iso Vlv.
- G5100-F604, TWMS Rtrn to RHR Inbd Iso Vlv.
- G5100-F600, S TWMS Pump Inbd Suct Iso Vlv.
- G5100-F602, N TWMS Pump Inbd Suct Iso Vlv.

10.2.5 If Condensate System is supplying CRD Pump Suction Line, verify G5100-F613, TWMS Sec Cntm Otbd Iso Vlv, is open.

10.2.6 If Condensate System is supplying CRD Pump Suction Line, verify G5100-F612, TWMS Sec Cntm Inbd Iso Vlv, is open.

10.2.7 Verify or place TWMS Drain Mode Selector Switch in LOCK.

END OF SECTION

JOB PERFORMANCE MEASURE

Job Position NO	No. JP-OP-315-0165-231	Revision 0
JPM Title Start an EDG and Respond to Low DGSW Flow	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO / NO

Evaluator: _____

Validating Representatives Name: D. Roberts / J. Walters

JPM Type: Normal / **Alternate Path /** Time Critical Start Time _____

Evaluation Method: **Perform** / Walkthrough / Discuss Stop Time _____

Location: Plant / **Simulator** / Classroom Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.											
*** 2.**											
3.											
4.											
5.											
6.											
7.											
*** 8.**											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

R3000 - Emergency Diesel Generator System

Task:

02R3000004 - Parallel an EDG from the Control Room

02R3000048 – Control EDG output voltage in automatic voltage regulation from the Control Room

References: Required (R) / Available (A)

23.307, Emergency Diesel Generator System (R)

10D4, EDG Serv H20 Pump D Water Flow Low (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are the CRLNO.
- EDG-14 is to be started and paralleled in preparation for emergent maintenance on 65F Pos F6, 4160V Normal Feed to Bus 65F.
- EDG-14 is currently in standby IAW 23.307 section 5.8.
- All applicable Technical Specification requirements are met to allow running EDG-14.
- All 23.307 pre-requisites are met for starting/loading EDG-14.
- The Outside Rounds NO is standing by locally to support run of EDG-14.

Initiating Cue(s):

The CRS directs you to fast start and parallel EDG-14 per 23.307, Emergency Diesel Generator System, sections 5.14 and 6.1.

- The SM has given permission for the EDG to be paralleled.
- The Central System Supervisor has been notified that the EDG is to be paralleled with the system.
- An operator is on station locally at EDG 14.

Terminating Cue(s):

EDG 14 is shut down (tripped).

Task Standard:

The task is satisfactorily met when the examinee has fast started EDG 14, recognized that the EDG 14 Service Water Pump is not developing proper flow, and then tripped EDG 14 due to low service water flow before the EDG trips automatically (approximately 5 minutes).

JPM Title Start an EDG and Respond to Low DGSW Flow	No.: JP-OP-315-0165-231 Revision 0 Page 4

Licensed Operator Exam Information (required for NRC exams)

Safety Function:

6 - Electrical

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 264000 Emergency Generators (Diesel/Jet)

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the Control room:

A4.04 Starting, loading, unloading, and stopping of emergency generator……... 4.1

A3. Ability to monitor automatic operation of the Emergency Generators, including:

A3.06 Cooling water system operation…….....….3.6

Maintenance Rule Safety Classification:

R3000-01

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

	ELEMENT		STANDARD
CUE:	**Provide examinee with Cue Sheet and a copy of (applicable sections of) 23.307. DO NOT provide copy of ARP 10D4 with the Cue Sheet.**		
1.	[5.14.1] Verify EDG in standby, in accordance with Section 5.8, Standby Mode EDG 14.	1.	Verifies EDG-14 is in standby mode (from initial conditions).
*** 2.**	[5.14.2.1] Place EDG 11 (12, 13, 14) Start/Stop control switch in START (COP H11-P809/P810)	*** 2.**	Places EDG-14 Start/Stop control switch in START.
CUE:	**IF contacted as local NO, state that EDG 14 is ready for a start and you are standing by EDG 14.**		
3.	[5.14.2.2] After start, verify the following: a. Respective EDG Service Water Pump has automatically started. b. Verify respective EDG Ventilation System operating by verifying the following fans are running (H11-P808 or P817). • RHR EDG Switchgear Room Vent Supply Fans North and/or South. • RHR Div 1 (2) Pump Room Vent Supply Fans North and/or South. • RHR EDG Room Vent Supply Fans East and/or West. c. Selected Fuel Oil Transfer Pump has started. d. EDG is being maintained at 60 Hz (59.7 Hz – 60.3 Hz). e. EDG Output Voltage is 120V (117V to 124V	3.	Verifies: ☐ Respective EDG Service Water Pump has automatically started. **NOTE**: DGSW Pump will start (breaker will close) but will not develop proper flow. After ~10 seconds, 10D4 will alarm. ☐ Verify respective EDG Ventilation System operating by verifying the following fans are running (H11-P808 or P817). ☐ RHR EDG Switchgear Room Vent Supply Fans North and/or South. ☐ RHR Div 1 (2) Pump Room Vent Supply Fans North and/or South. ☐ RHR EDG Room Vent Supply Fans East and/or West. ☐ Selected Fuel Oil Transfer Pump has started. ☐ EDG is being maintained at 60 Hz (59.7 Hz – 60.3 Hz). ☐ EDG Output Voltage is 120V (117V to 124V
	Alternate Path Starts Here		
	CUE: When examinee locates ARP 10D4, provide examinee with a copy of 10D4. NOTE: Examinee may promptly recognize low DGSW flow condition and elect to trip EDG 14 without referring to ARP 10D4.		
4.	Responds to ARP 10D4, EDG Service Water Pump D Water Flow Low.	4.	Acknowledges 10D4 and refers to ARP.

ELEMENT		STANDARD	
5.	[10D4 NOTE] If EDG Service water flow is confirmed to be low, consideration should be made to trip the EDG, damage to the EDG could occur in as little as three minutes with no service water flow.	5.	Acknowledges NOTE in 10D4 and signifies acknowledgment by slashing through the note.
6.	[10D4 Step 1] Verify the following (COP H11-P602): • R30-R850D, EDG 14 DGSW Pump D Flow Ind, is less than 800 gpm. • Diesel Generator Service Water Pump D, is operating.	6.	Recognizes on H11-P602: ☐ EDG 14 DGSW Pump Breaker is closed (shows running) but with low amps. ☐ EDG 14 DGSW Flow is 0 gpm.
NOTE:	**Examinee may skip these steps and go straight to tripping EDG 14.**		
7.	[10D4 Step 2] If only EDG 14 DGSW is operating, direct an operator to EDG 14 to perform the following: • Verify Diesel Generator Service Water Pump D (EDG 14 Control Panel R30-S008) in RUN. • Verify Diesel Generator Service Water Pump D Flow, R30-N569D, less than 800 gpm. • Attempt to increase Service Water Flow greater than 800 gpm by throttling open R3000-F140D, EDG 14 Heat Exch's DGSW Inlet Iso Vlv. • Write a CARD to have EDG 14 DGSW flow surveillance performed to verify flow.	7.	May direct operator to: ☐ Verify DGSW Pump D is in RUN locally. ☐ Verify DGSW Pump D Flow, R30-N569D, less than 800 gpm. ☐ Attempt to increase DGSW Flow greater than 800 gpm.
CUE:	**As N.O., acknowledge directions given and report back, as applicable:** **IF asked to verify, report DGSW Pump D is in Run at the local control panel.** **IF asked to verify, report DGSW Pump Flow is 0 gpm locally.** **IF asked to inspect DGSW Pump D, report pump is running but is very quiet.** **IF asked to attempt to increase DGSW Flow, report that the throttle valve is full open.**		
* **8.**	[10D4 NOTE] If EDG Service water flow is confirmed to be low, consideration should be made to trip the EDG, damage to the EDG could occur in as little as three minutes with no service water flow.	* **8.**	Recognizes loss of EDG 14 Service water flow and recommends/trips EDG 14 by placing EDG-14 Start/Stop control switch in STOP:
CUE:	**As CRS, acknowledge recommendation and concur with tripping EDG 14.**		
CUE:	**End the JPM when EDG 14 has been shutdown (tripped).**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Controllers have an Auto light that is GREEN when selected and AMBER (YELLOW) when Manual is selected. When in Manual, the open and closed pushbuttons control the parameter to be changed by adjusting position or speed. When the deviation meter is nulled, then the process can be shifted to Auto to allow the desired setpoint to control the process.

System Specific Notes and Cues:

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. **Notify Examinee if time compression is used for activities performed outside of the Control Room.**

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any IC

Malfunctions:

Number	Title	Value	Delay	Ramp
EB04R3001C008_MTFSHEAR	EDG 14 DGSW Pump Shaft Shear	TRUE	N/A	N/A

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp
H_P602_B075_1	DGSW Pump D Ammeter	0.0	N/A	N/A

Special Instructions:

N/A

Cue Sheet: (JP-OP-315-0165-231)

Initial Conditions:

- You are the CRLNO.
- EDG-14 is to be started and paralleled in preparation for emergent maintenance on 65F Pos F6, 4160V Normal Feed to Bus 65F.
- EDG-14 is currently in standby IAW 23.307 section 5.8.
- All applicable Technical Specification requirements are met to allow running EDG-14.
- All 23.307 pre-requisites are met for starting/loading EDG-14.
- The Outside Rounds NO is standing by locally to support run of EDG-14.

Initiating Cue(s):

The CRS directs you to fast start and parallel EDG-14 per 23.307, Emergency Diesel Generator System, sections 5.14 and 6.1.

- The SM has given permission for the EDG to be paralleled.
- The Central System Supervisor has been notified that the EDG is to be paralleled with the system.
- An operator is on station locally at EDG 14.

Cue Sheet: (JP-OP-315-0165-231)

Initial Conditions:

You are the CRLNO.

EDG-14 is to be started and paralleled in preparation for emergent maintenance on 65F Pos F6, 4160V Normal Feed to Bus 65F.

EDG-14 is currently in standby IAW 23.307 section 5.8.

All applicable Technical Specification requirements are met to allow running EDG-14.

All 23.307 pre-requisites are met for starting/loading EDG-14.

The Outside Rounds NO is standing by locally to support run of EDG-14.

Initiating Cue(s):

The CRS directs you to start and parallel EDG-14 per 23.307, Emergency Diesel Generator System, sections 5.14 and 6.1.

- The SM has given permission for the EDG to be paralleled.
- The Central System Supervisor has been notified that the EDG is to be paralleled with the system.
- An operator is on station locally at EDG 14.

EMERGENCY DIESEL GENERATOR SYSTEM

Revision Summary

1) Added indicator PIS# per CARD 22-26863.

Attachments (see page 2)

Enclosures (see page 2)

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #**	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	JP-OP-315-0165-231	135	7/6/2022	22-0498	1703.02	I	N	

Attachments

1A	033120	EDG 11 Valve Lineup
1B	033120	EDG 12 Valve Lineup
1C	033120	EDG 13 Valve Lineup
1D	033120	EDG 14 Valve Lineup
1E	021720	EDG Fuel Oil Unloading Valve Lineup
1F	020108	EDG Lube Oil Unloading Valve Lineup
2A	111909	EDG 11 Electrical Lineup
2B	102306	EDG 12 Electrical Lineup
2C	102306	EDG 13 Electrical Lineup
2D	111909	EDG 14 Electrical Lineup
2E	092419	EDG Fuel Oil Unloading Electrical Lineup
3A	112905	EDG 11 Instrument Lineup
3B	092806	EDG 12 Instrument Lineup
3C	092806	EDG 13 Instrument Lineup
3D	092806	EDG 14 Instrument Lineup
4A	050907	EDG 11 Switchgear Rm Relay Targets
4B	050907	EDG 12 Switchgear Rm Relay Targets
4C	050907	EDG 13 Switchgear Rm Relay Targets
4D	050907	EDG 14 Switchgear Rm Relay Targets
5	050907	EDG Fuel Oil Unloading Data Sheet (Using Unloading Station)
6	111100	EDG Lube Oil Unloading Data Sheet
7A	101718	EDG 11 Operating Log
7B	101718	EDG 12 Operating Log
7C	101718	EDG 13 Operating Log
7D	101718	EDG 14 Operating Log
8A	011905	EDG 11 Meter Comparison Check
8B	011905	EDG 12 Meter Comparison Check
8C	011905	EDG 13 Meter Comparison Check
8D	011905	EDG 14 Meter Comparison Check
9	052316	Emergency Diesel Generator - Start/Failure Log
10A	101719	EDG 11 Standby Lineup Verification
10B	101719	EDG 12 Standby Lineup Verification
10C	101719	EDG 13 Standby Lineup Verification
10D	101719	EDG 14 Standby Lineup Verification

Enclosures

A	050907	EDG Trip/Setpoint List
B	011905	EDG Trips
C	050907	EDG Operating Parameters
D	112905	EDG Generator Curve
E	042398	EDG Fuel Oil Day Tank Capacity
F	012304	Emergency Diesel Generator Start/Failure Log Instructions
G	011314	Emergency Diesel Generator Draining Guidelines

TABLE OF CONTENTS

Section/Title **Page**

7.0 UNUSUAL OPERATIONS

8.0 SHUTDOWN

1.0 PURPOSE

To prescribe the method for operating all modes of the Emergency Diesel Generator (EDG) System.

1.1 System Description

EDGs provide a reliable source of onsite power for safe Reactor shutdown under all conditions including the design basis Loss of Coolant Accident (LOCA) coincident with a Loss of the normal Offsite Power supply (LOP). If a Low Reactor Water Level, High Drywell Pressure, or an ESS Bus undervoltage condition occurs, the EDGs receive an automatic start signal. However, the EDG Breaker remains open and the EDGs unloaded at rated speed unless undervoltage conditions occur on the ESS Bus.

The EDG System consists of two divisions with two EDGs per division, each rated at 2850 kW continuous. The design uses individual busses for each EDG; there is no paralleling of the two EDGs in a division. Each EDG is provided with the following subsystems to make it completely independent from the other units:

- Governor Control System.
- Starting Air System.
- Fuel Oil System including Fuel Oil Storage.
- Lube Oil System and Lube Oil Storage.
- Air Coolant System (ACS).
- Jacket Coolant System (JCS).
- Diesel Generator Service Water System (DGSW).

Under frequency protection is provided only when the EDG is operating in parallel with the offsite power grid. The EDG non-essential trips are removed whenever the Normal Feed Breaker (B6, C6, E6 and F6) and Maintenance Tie Breaker (B9, C9, E9 and F9) for that bus are open. When in Bypass, the Emergency Signal Bypass Keylock Selector Switch will prevent an auto start of the EDG on Level 1 or High Drywell signals, but will still allow an auto start due to under voltage.

2.0 REFERENCES

2.1 Use References

2.1.1 Procedures

- MCE06, Non-Radiological Environmental Protection
- MCE07, Hazardous and Mixed Waste Storage and Disposal

2.2 Potential Use References

2.2.1 Procedures

- 23.104, Condensate Storage and Transfer System
- 23.208, RHR Complex Service Water System
- 23.321, Engineered Safety Features Auxiliary Electrical Distribution System
- 23.420, RHR Complex Heating and Ventilation
- 23.501.02, CO2 Fire Suppression System
- 24.000.01, Situational Surveillances/LCO Action Tracking
- 74.000.18, Chemistry Shiftly, 72 Hour, and Situation Surveillances
- 9D34, DIV I EDG 11 IN LOCAL CONTROL
- 9D58, DIV I EDG 12 IN LOCAL CONTROL
- 10D34, DIV II EDG 13 IN LOCAL CONTROL
- 10D10, DIV II EDG 14 IN LOCAL CONTROL

2.2.2 Vendor Manual

- VME8-1.1

2.2.3 Technical Specifications/TRM

- Technical Specifications, Section 3.3.8.1, Loss of Power (LOP) Instrumentation
- Technical Specifications, Section 3.5.1, ECCS - Operating
- Technical Specifications, Section 3.5.2, Reactor Pressure Vessel (RPV) Water Inventory Control
- Technical Specifications, Section 3.8.1, AC Sources - Operating
- Technical Specifications, Section 3.8.2, AC Sources - Shutdown
- Technical Specifications, Section 3.8.3, Diesel Fuel Oil, Lube Oil, and Starting Air
- TRM Section TR 3.3.8.1, Loss of Power (LOP) Instrumentation
- TRM Section TR 3.8.3, AC Sources
- MMR12, Equipment Out Of Service Risk Management.

2.2.4 Drawings

I-N-2711-18 through 22	Schematic Diagram Diesel Generator 11
I-N-2711-24 through 28	Schematic Diagram Diesel Generator 12
I-N-2711-30 through 34	Schematic Diagram Diesel Generator 13
I-N-2711-36 through 40	Schematic Diagram Diesel Generator 14
M-N-2046 through 49	P&ID Diesel Generator System
SD-2500-01	One Line Diagram, Plant 4160V & 480V System Service
M-5734	Emergency Diesel Generator System FOS

3.0 PRECAUTIONS AND LIMITATIONS

3.1 JCS Expansion Tank should never be filled completely since there must be room for expansion of the coolant when the EDG is running.

3.2 If the engine has tripped due to crankcase pressure, do not remove any covers for ten minutes, and do not attempt to restart the engine until the cause of the trip has been determined and corrected. If air is allowed to enter, an explosion may result.

3.3 If the EDG has been prelubed and not started within 30 minutes, hand bar the engine one revolution.

3.4 Refer to applicable Technical Specifications Limiting Conditions for Operation after EDG operation, in event of a failure, when declared inoperable, or prior to removing from service.

3.5 Do not exceed the following individual EDG ratings:

- Continuous - 2850kW.
- 2000 hour - 3100kW.
- 300 hour - 3250kW.
- 30 minutes - 3500kW.
- 3135kW for 2 hours out of 24 hours.

3.6 Do **not** synchronize the EDG with the electrical grid under conditions of grid instability. This may cause plant safety to be degraded.

3.7 If maintenance has been performed on the fuel system which may have introduced air into the system, a No Credit Run should be performed to verify all air has been purged from the system. The No Credit Run will ensure trapped air in the system will not affect the start time of the EDG and result in a Start Failure.

NOTE: EDG should be loaded to at least 600kW load for at least one hour anytime the engine is started (both manual and automatic starts) or loaded as written in the PMT section (following maintenance). During extended run times, the EDG must be loaded for at least one hour out of every eight hours. This will prevent fuel oil and lube oil buildup in the exhaust stack, which could cause a fire during a sudden increase in load. It is preferred to load the EDG for one hour, allowing cylinder exhaust, jacket cooling system, and lube oil temperatures to stabilize.

3.8 During non-emergency operation, EDG should be loaded to greater than 600kW within 8 hours of reaching 900 rpm (850-950 rpm is acceptable range) to prevent excessive buildup of fuel oil and lube oil in the exhaust manifold.

3.9 Closely monitor JCS Expansion Tank Level during the initial run following drain down and refill for maintenance or other evolutions. EDG trip may result due to inability to fully vent system.

3.10 Whenever an EDG output breaker is closed, the Undervoltage Relaying for the associated 4160V ESF busses is disabled. If the EDG is operating in synchronous mode (parallel to the system), declare Undervoltage Relaying for associated 4160V ESF busses inoperable and perform the following:

- Comply with Technical Specifications, Section 3.3.8.1, Loss of Power (LOP) Instrumentation.
- MMR12, Equipment Out Of Service Risk Management.

3.11 With the Exciter Bypass switch in BYPASS, the EDG will auto start on an emergency start signal. However, because the generator will not excite, the EDG should be considered inoperable. The following must be complied with as appropriate:

- Technical Specifications, Section 3.8.1, AC Sources - Operating.
- Technical Specifications, Section 3.8.2, AC Sources - Shutdown.
- MMR12, Equipment Out Of Service Risk Management.

3.12 With EDG Starting Air Compressors cross connected, ensure Receiver Pressure is being restored upon receipt of Low Pressure Alarm or manually start the Air Compressor in accordance with applicable steps of Section 7.1, (7.2, 7.3, 7.4) Supplying EDG 11 (12, 13, 14) with EDG 12 (11, 14, 13) Starting Air Compressor.

3.13 Jacket Water temperatures below 85°F have been shown to cause liner scuffing and seizure. Low temperatures may cause the engine to not perform its intended ten second start to full RPM within the time frame. Below 85°F the EDG should be considered inoperable.

3.14 Excessive intercooler air temperature requires EDG derate. If R30-RA23A (B, C, D) exceeds 140°F, perform the following:

3.14.1 Verify temperature on R30-RA18A (B, C, D) (by gage panel) also exceeds 140°F.

3.14.2 Apply engine derate as follow:

(_____ - 110) x 0.00125 = _____
RA24 Derate Factor

2850kW * _____ = _____
Derate Factor Derate in kW

2850kW - _____ = _____
Derate in kW Derated Continuous Rating

3.14.3 Verify that R3000-F023A (B, C, D), EDG-11 (12, 13, 14) / ACS Heat Exchanger 3-Way TCV is in the full cooling position (local indicator at top of scale). If Not, close R3000-F044A (B, C, D) and R3000-F045A (B, C, D) to isolate air to temperature controller. This should fail R3000-F023A (B, C, D) to full cooling.

3.15 If a confirmed failure of the Diesel Generator Service Water (DGSW) system occurs under non-emergency conditions, promptly shutdown / trip the engine. Damage to the EDG can occur in as little as three minutes on a loaded engine if the DGSW system is not providing cooling to the EDG.

END OF SECTION

4.0 GENERAL PREREQUISITES

4.1 The following systems are in service to support EDG operation:

- Condensate Storage and Transfer System is operating in accordance with 23.104, "Condensate Storage and Transfer System."
- RHR Complex HVAC is lined up for automatic operation in accordance with 23.420, "RHR Complex Heating And Ventilation."
- Respective DGSW Pump is lined up for automatic operation in accordance with 23.208, "RHR Complex Service Water System."
- CO_2 Fire Suppression System is lined up for standby operation in accordance with 23.501.02, "CO_2 Fire Suppression System."

4.2 The following Attachments have been completed:

- EDG 11 (12, 13, 14) Valve Lineup for respective EDG has been completed in accordance with Attachment 1A (1B, 1C, 1D).
- EDG 11 (12, 13, 14) Electrical Lineup for the respective EDG has been completed in accordance with Attachment 2A (2B, 2C, 2D).
- EDG 11 (12, 13, 14) Instrumentation Lineup for the respective EDG has been completed in accordance with Attachment 3A (3B, 3C, 3D).

4.3 Applicable Relay Targets are reset in accordance with MOP04, “Shift Operations,” and document on Attachment 4A (B, C, D).

4.4 Starting Air Compressor oil level is at full mark, on bayonet oil level gauge.

END OF SECTION

5.14 Fast Control Room Startup

NOTE (1): An EDG will automatically start even if it has been previously tripped by a non-essential trip (refer to Enclosure B for EDG Trips).

NOTE (2): EDG should be loaded to at least 600kW load for at least one hour anytime the engine is started (both manual and automatic starts) or loaded as given out in the PMT section (following maintenance). During extended run times, the EDG must be loaded for at least one hour out of every eight hours. This will prevent fuel oil and lube oil buildup in the exhaust stack, which could cause a fire during a sudden increase in load. It is preferred to load the EDG for one hour, allowing cylinder exhaust, jacket cooling system, and lube oil temperatures to stabilize. For multiple starts (such as adjusting the governor), the requirements pertains only to the final run in the series provided that cylinder exhaust temperatures stabilize prior to each intermediate shutdown.

NOTE (3): Upon starting the engine, an Air Receiver Pressure Low Alarm may actuate. This is an expected alarm that should clear itself.

5.14.1 Specific Prerequisites

- EDG in standby, in accordance with Section 5.5 (5.6, 5.7, 5.8), Standby Mode EDG 11 (12, 13, 14).

5.14.2 Detailed Procedure

NOTE: When operating, the EDG should be manned locally.

1. Place EDG 11 (12, 13, 14) Start/Stop control switch in START (COP H11-P809/P810).

2. After start, verify the following:

   a. Respective EDG Service Water Pump has automatically started.

b. Verify respective EDG Ventilation System operating by verifying the following fans are running (H11-P808 or P817).

- RHR EDG Switchgear Room Vent Supply Fans North and/or South.
- RHR Div 1 (2) Pump Room Vent Supply Fans North and/or South.
- RHR EDG Room Vent Supply Fans East and/or West.

c. Selected Fuel Oil Transfer Pump has started.

d. EDG is being maintained at 60 Hz (59.7 Hz – 60.3 Hz).

e. EDG Output Voltage is 120V (117V to 124V).

3. Direct an operator to man the EDGs that started, and perform inspection and Attachments 7 and 9 as soon as possible.

4. Place EDG Service Water Pump in RUN at the EDG Local Panel.

5. If desired, load the EDG in accordance with Section 6.1 or 6.2, Paralleling From the Control Room or Paralleling From the Local Control Panel.

END OF SECTION

6.0 NORMAL OPERATIONS

6.1 Paralleling From the Control Room

6.1.1 Specific Prerequisites

1. Speed of EDG is such that frequency is 60 Hz (60 to 60.2).

2. Output voltage of EDG is nominal 4160 (50 volts higher than bus voltage) 117-124V indicated in the Control Room.

3. The Shift Manager has given permission for EDG to be paralleled.

4. Central System Supervisor has been notified that EDG is to be paralleled with the system.

6.1.2 Detailed Procedure

CAUTION

If a loss of offsite power occurred, paralleling EDG with an accident signal present may jeopardize load sequencing.

1. Declare the Undervoltage Relaying for the associated 4160V ESF busses inoperable and comply with the following:

   - Technical Specifications, Section 3.3.8.1, Loss of Power (LOP) Instrumentation.

   - MMR12, Equipment Out Of Service Risk Management.

CAUTION

Synchronizing the EDG with the Electrical System under conditions of Electrical System instability may degrade plant safety.

2. Place respective Control Room Synchronize switch for EDG 11 (12, 13, 14) Breaker Position EA3 (EB3, EC3, ED3) in ON.

3. Place respective Auto Manual select switch for EDG Output Breaker in MANUAL.

NOTE: The Synchronizing Check Circuit requires the Synchroscope to be rotating < 2.9 rpm (approximately 1 revolution in 20 to 60 seconds) prior to closing the Output Breaker.

4. Adjust speed of EDG, using EDG Governor Control switch, until Synchroscope Pointer is revolving slowly (< 2.9 rpm) in FAST direction.

5. If necessary, adjust EDG Output Voltage until SYNCH BUS Starting Volts are approximately 3 volts higher than SYNCH BUS Running Volts

NOTE: The respective EDG Output Breaker will not close if its Sync-Check Relay is not picked up.

6. When synchroscope pointer is approximately 5 minutes before reaching top dead center (vertical) position, close respective EDG Output Breaker.

CRITICAL STEP

7. Immediately apply at least a 750 to 1000kW load to EDG using EDG Governor Control switch with VARS greater than zero.

8. Apply KVARS of 200 to 400 using EDG Voltage Control switch.

9. Place Control Room Synchronize switch for EDG 11 (12, 13, 14) Breaker Position EA3 (EB3, EC3, ED3) in OFF.

10. Maintain this load for five minutes, if running EDG is for transfer of electrical buses and another run is scheduled within 72 hours that loads the EDG to 1750kw, the EDG may be shutdown, otherwise continue.

CAUTION

Operating below a Generator Power Factor of 0.75 will cause excessive wear on the EDG Generator and Diesel.

11. Increase load as follows:

    a. Increase load to 1750 to 1850kW with KVARS of 1100 to 1350 at a gradual rate over a five minute period.

    b. Perform Attachment 8A (B, C, D), EDG 11 (12, 13, 14) Meter Comparison Check.

NOTE: It is desirable to operate the EDG at approximately 1800kW, to obtain consistent operating data for future trending.

c. Allow temperatures to stabilize. Once stabilized (approximately 15 minutes), immediately record one full set of operating data on Handheld Computer with eSOMS Operator Rounds. Continue to log data every 30 minutes thereafter.

d. Run EDG at 1750 to 1850kW for approximately one hour after stabilization or for a duration of time as agreed to by System Engineering.

e. If required, load may be increased by gradually raising load to 2500 to 2750kW and 1300 to 1700 KVARS over approximately 5 minutes.

f. Load EDG to > 2750kW if required by post maintenance testing.

12. If desired to change from remote control of EDG to local control of EDG, perform Section 7.6, EDG Control Transfer From Remote To Local.

13. Document operation of the selected EDG on Attachment 9, Emergency Diesel Generator Start/Failure Log, in accordance with instructions provided in Enclosure F, Emergency Diesel Generator Start/Failure Log Instructions.

14. Download Diesel Rounds and review with eSOMS Operator Rounds or, forward a copy of paper logs to System Engineer. Original sent to Operations Support for retention and vaulting.

END OF SECTION

EDG 14 METER COMPARISON CHECK

1.0 Perform an accuracy check of the local and the Control Room EDG Meters by recording the following and comparing readings.

Meter	Local Panel R3000-S008	Control Room Panel H11-P810	Maximum Expected Difference
Kilowatt	KW	KW	± 100 KW
Kilovar	KVAR	KVAR	± 100 KVAR
AC Ampmeter	AC AMPS	AC AMPS	± 15 AC AMPS
DC Field Voltmeter	DC VOLTS	DC VOLTS	± 15 DC VOLTS
DC Field Ampmeter	DC AMPS	DC AMPS	± 3 DC AMPS

2.0 Perform an accuracy check of the following voltmeters:

R30-R004D EDG #14 Generator Voltmeter	R30-R005D EDG ESS Bus 14ED Voltmeter	Maximum Expected Difference
_____ AC Volts	_____ AC Volts	± 100 Volts

_____ _____
Signature **Date**

3.0 Verify the maximum expected difference is not exceeded on any of the above meters.

4.0 If maximum expected difference is exceeded, immediately inform the Shift Manager.

5.0 Send completed form to the System Engineer (205 AIB) for evaluation.

Section Divider

DO NOT give the following to examinee until specified in Cue.

EDG SERV H2O PUMP D WATER FLOW LOW

AUTO ACTIONS - None

INITIAL RESPONSE

NOTE: If EDG Service water flow is confirmed to be low, consideration should be made to trip the EDG, damage to the EDG could occur in as little as three minutes with no service water flow.

1. Verify the following (COP H11 -P602):
   - R30-R850D, EDG 14 DGSW Pump D Flow Ind, is less than 800 gpm.
   - Diesel Generator Service Water Pump D, is operating.
2. If only EDG 14 DGSW is operating, direct an operator to EDG 14 to perform the following:
   - Verify Diesel Generator Service Water Pump D (EDG 14 Control Panel R30-S008) in RUN.
   - Verify Diesel Generator Service Water Pump D Flow, R30-N569D, less than 800 gpm.
   - Attempt to increase Service Water Flow greater than 800 gpm by throttling open R3000-F140D, EDG 14 Heat Exch's DGSW Inlet Iso Vlv.
   - Write a CARD to have EDG 14 DGSW flow surveillance performed to verify flow
3. If other RHR complex Service Water pumps are operating in same division, verify EDG 14 DGSW flow > 650 gpm.
4. **IF** Diesel Generator Service Water Pump D has tripped, attempt to restart by placing CMC switch in OFF/RESET, then back in AUTO or RUN.

SUBSEQUENT ACTIONS

1 Comply with Technical Specifications, Section 3.7.8, Emergency Diesel Generator Service Water (EDGSW) System.

INITIATING DEVICE/SETPOINTS

R30-N569D EDG 14 DGSW Pump D Low Flow Switch	50 inches wc (800 gpm) decreasing with 10 second T.D.

REFERENCES

I-2080-28 IN-271 1-37

END

Information and Procedures							
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #**	**File #**	**IP Code:**	**Recipient**
TPARP	10D4	10	**11-08-2010**	10-1133	1703.02	I	

Job Position SRO / RO	No. JP-OP-315-0127-191	Revision 1
JPM Title Reset Reactor Scram	Duration 20 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name: J. Walters / A. Snowberger

JPM Type: **Normal** / Alternate Path / Time Critical

Evaluation Method: **Perform** / Walkthrough / Discuss

Location: Plant / **Simulator** / Classroom

Start Time _____

Stop Time _____

Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.				*** 7.**				13.			
2.				8.				14.			
3.				*** 9.**							
*** 4.**				10.							
*** 5.**				11.							
6.				12.							

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ **PASS** _____ **FAIL**

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Title Reset Reactor Scram	No.: JP-OP-315-0127-191 Revision: 1 Page 3

JPM Information

System:

C7100 – Reactor Protection System

Task:

02A0001011 Recognize and respond to Reactor Scram

References: Required (R) / Available (A)

23.610, Reactor Protection System (R)

Tools and Equipment Required:

None

Initial Conditions:

You are The P603 Operator.

The Mode Switch has just been taken to Shutdown for the start of the next Refueling Outage.

The scram report was as follows:

- The Mode Switch is in Shutdown.
- All Control Rods are fully inserted.
- Reactor Power is 0% and lowering.
- RPS has actuated.
- The Main Turbine is tripped.
- Transient annunciator response is in effect.

Also:

- The SRM/IRM detectors have been inserted.
- No fuel damage is suspected.
- D065 sump pumps have power.

Initiating Cue(s):

The CRS directs you to Reset the Reactor Scram IAW 23.610.

Terminating Cue(s):

End JPM when CRS is informed that the Reactor Scram is Reset.

Task Standard:

The task is satisfactorily met when the examinee has bypassed the High Discharge Water Volume High Level Channel Trip, Reset both RPS A and B, verified the Scram Discharge Volume has properly drained by verifying the Discharge Volume High Level Channel Trip has cleared, and restores the Scram Discharge Volume High Level Trip to normal without causing a subsequent scram.

JPM Title Reset Reactor Scram	No.: JP-OP-315-0127-191 Revision: 1 Page 4

Licensed Operator Exam Information (required for NRC exams)

Safety Function/Category:

7 – Instrumentation
11 – Abnormal Plant Evolutions

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 212000 - Reactor Protection System
K/A STATEMENT:
A4. Ability to manually operate and/or monitor in the control room:
A4.14 System reset 3.8

K/A EVOLUTION: 295006 - SCRAM
K/A STATEMENT:
AA1. Ability to operate and/or monitor the following as they apply to SCRAM:
AA1.01 RPS 4.3

Maintenance Rule Safety Classification:

C7100-02

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide examinee with Cue Sheet.**		
CUE:	**When examinee locates 23.610, provide examinee with a copy of 23.610.**		
1.	Verify or place Reactor Mode Switch in SHUTDOWN or REFUEL.	1.	Verifies Mode Switch is in SHUTDOWN.
2.	Verify Annunciator 3D6, SCRAM VALVE PILOT AIR HDR PRESS HIGH/LOW, is in alarm.	2.	Verifies Annunciator 3D6, SCRAM VALVE PILOT AIR HDR PRESS HIGH/LOW, is in alarm.
3.	Verify Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, alarms.	3.	Verifies Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, is in alarm.
*** 4.**	Place C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in BYPASS: • Verify Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, alarms.	*** 4**.	Places C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in BYPASS and verifies Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, alarms.
*** 5.**	Cycle C7100-M605, Scram Reset Switch, to both positions (GP 1/4, GP 2/3), and release: • Verify Trip System A and B blue Pilot Scram Valve Solenoid lights are ON. • Verify alarm is reset for RPS Channels A and B: - 3D73, TRIP ACTUATORS A1/A2 TRIPPED. - 3D74, TRIP ACTUATORS B1/B2 TRIPPED • Verify C1100-F010/F180, Scram Disch Vol Vent Vlv's, and C1100-F011/F181, Scram Disch Vol Drain Vlv's, are open.	*** 5**.	Cycle C7100-M605, Scram Reset Switch, to both positions (GP 1/4, GP 2/3), and release and: • Verifies Trip System A and B blue Pilot Scram Valve Solenoid lights are ON. • Verifies alarm is reset for RPS Channels A and B: - 3D73, TRIP ACTUATORS A1/A2 TRIPPED. - 3D74, TRIP ACTUATORS B1/B2 TRIPPED • Verifies C1100-F010/F180, Scram Disch Vol Vent Vlv's, and C1100-F011/F181, Scram Disch Vol Drain Vlv's, are open.
6.	Reset Rod Drift alarms.	6.	Resets Rod Drift alarms.
*** 7.**	Verify Annunciator 3D94, DISCH WATER VOL HI LEVE CHANNEL TRIP, clears.	*** 7.**	Verifies Annunciator 3D94, DISCH WATER VOL HI LEVE CHANNEL TRIP, clears.
NOTE:	**Inform examinee that time compression has been used and the Scram Discharge Volume will drain faster than normal.**		
8.	Verify Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, clears.	8.	Verifies Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, clears.

ELEMENT		STANDARD	
*** 9.**	Place C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in NORMAL: • Verify Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, clears.	*** 9**.	Places C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in NORMAL and verifies Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, clears.
10.	Close or verify closed the following valves (H11-P805): • N2100-F607, N RFP Disch Line Iso Valve. • N2100-F608, S RFP Disch Line Iso Valve.	10.	Verifies N2100-F607, N RFP Disch Line Iso Valve and N2100-F608, S RFP Disch Line Iso Valve are CLOSED.
11.	Place or verify both C32-R616A/B, North/South Reactor Feed Pump Controllers, in MANUAL.	11.	Places or verifies both C32-R616A/B, North/South Reactor Feed Pump Controllers, in MANUAL.
12.	Verify or place SULCV Mode Switch in START.	12.	Verifies / places SULCV Mode Switch in START.
13.	Reset Post Scram Feedwater Logic.	13.	Depresses Feedwater Logic RESET push button to Reset Post Scram Feedwater Logic.
14.	Reset Post Scram Reactor Water Level Setdown Logic.	14.	Depresses Reactor Water Level Set Down RESET push button to Reset Reactor Water Level Setdown Logic.
CUE:	**End JPM when Reactor Water Level Setdown Logic has been reset.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

None

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee that time compression may be used for activities performed outside of the Control Room. Notify Examinee if JPM is Time Critical (only if JPM is **NOT** Alternate Path.)

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any Power IC or IC set up specifically for this JPM.

Malfunctions:

Number	Title	Value	Delay	Ramp

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp

Special Instructions:

1. Place the Simulator in RUN.
2. Place the Mode Switch in Shutdown.
3. Insert the IRMs/SRMs
4. Allow RPV Water Level to restore back to 197”.
5. Acknowledge all alarms.
6. Allow examinee to enter the Simulator.

Cue Sheet: (JP-OP-315-0127-191)

Initial Conditions:

You are The P603 Operator.

The Mode Switch has just been taken to Shutdown for the start of the next Refueling Outage.

The scram report was as follows:

- The Mode Switch is in Shutdown.
- All Control Rods are fully inserted.
- Reactor Power is 0% and lowering.
- RPS has actuated.
- The Main Turbine is tripped.
- Transient annunciator response is in effect.

Also:

- The SRM/IRM detectors have been inserted.
- No fuel damage is suspected.
- D065 sump pumps have power.

Initiating Cue(s):

The CRS directs you to Reset the Reactor Scram IAW 23.610.

Cue Sheet: (JP-OP-315-0127-191)

Initial Conditions:

You are The P603 Operator.

The Mode Switch has just been taken to Shutdown for the start of the next Refueling Outage.

The scram report was as follows:

- The Mode Switch is in Shutdown.
- All Control Rods are fully inserted.
- Reactor Power is 0% and lowering.
- RPS has actuated.
- The Main Turbine is tripped.
- Transient annunciator response is in effect.

Also:

- The SRM/IRM detectors have been inserted.
- No fuel damage is suspected.
- D065 sump pumps have power.

Initiating Cue(s):

The CRS directs you to Reset the Reactor Scram IAW 23.610.

DO NOT give the following to examinee until specified in the CUE.

REACTOR PROTECTION SYSTEM (RPS)

Revision Summary

1) Updated ARMs Stamp per WG-001, no rev bar used.
2) Added Steps 4.1 and 6.1.2.4 to check scram solenoids per operator feedback.

Attachments

1 101614 Mode Switch / Manual Scram Defeat
2 101614 Mode Switch / Manual Scram Restoration

Enclosures - None

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR#**	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	JP-OP-315-0127-191	1			1703.02	I	N	

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operating the Reactor Protection System (RPS).

1.1 System Description

The RPS prevents the Reactor from operating under unsafe or potentially unsafe conditions by automatically initiating rapid insertion of the Control Rods (Reactor Scram) when trip setpoints are exceeded.

The RPS is a dual trip system consisting of two independent trip systems designated A and B. Both Trip System A and Trip System B are made up of two scram trip channels which include automatic and manual functions. These trip channels are designated A1, A2, B1, and B2. If a trip occurs in any trip channel of Trip System A and a trip occurs in any trip channel of Trip System B, a Reactor Scram will result. However, if trips occur in one or both trip channels of the same trip system, a Reactor Scram will not occur. This condition is called a half scram.

Each trip system is powered independently from the RPS Distribution Panels. Normal power is supplied to each distribution panel by an RPS Motor Generator (MG) Set. Alternate power is provided to the distribution panels from 480/120V AC single phase transformers primarily for maintenance purposes. Besides RPS, the distribution panels also supply power to the Power Range Neutron Monitoring System, the Offgas Monitoring System, the Nuclear Steam Supply Shutoff System (NSSSS), and the Process Radiation Monitoring System.

Each trip system has independent controls, indicating equipment, sensors, relays, actuating switches, and interlocks that meet electrical system separation criteria. Each trip system has two independent subchannels with their own set of sensors. There are normally four sensors monitoring each measured variable.

When a Reactor Scram is initiated, RPS Solenoid Valves vent air from an Instrument Air Header and 185 Control Rods are forced into the core by Control Rod Drive Hydraulic Pressure. Each Control Rod Drive Mechanism (CRDM) is hydraulically coupled to a Hydraulic Control Unit (HCU). The HCU consists of piping and valves that control the direction of Control Rod motion and a scram accumulator that rapidly forces the Control Rod into the core when required. This is accomplished by opening a Scram Inlet Valve to admit high pressure water below the piston, and a Scram Outlet Valve to allow the water above the piston to be displaced to the Scram Discharge Volume.

2.0 REFERENCES

2.1 Use References

2.1.1 23.309, 260/130V DC Electrical System (ESF and BOP)

2.1.2 23.316, RPS 120V AC and RPS MG Sets

2.2 Potential Use References

2.2.1 Drawings

I-2095-14	Schematic Diagram, Nuclear Stm. Supply Shut Off Sys. Trip Sys. A
I-2095-15	Schematic Diagram, Nuclear Stm. Supply Shut Off Sys. Trip Sys. B
I-2151-01	Schematic Diagram, Rx Protection System Motor-Generator Set A
I-2151-02	Schematic Diagram, Rx Protection System Motor-Generator Set B
I-2155-01	Schematic Diagram, Reac. Prot. Sys. Power Distribution
I-2155-11	Schematic Diagram, Reac. Prot. Sys. Scram Disch. Vol. Isol. VLV. Pos. Ind. Lights, Backup Scram Valves
I-2155-08, 8A, 09, 9A	Schematic Diagram, RPS Trip Sys. "A1" (A2, B1, B2) Scram Trip Logic
I-2156-01	Instrument Diagram, Reactor Protection System

2.2.2 Technical Specification, Section 3.3.8.2, Reactor Protection System (RPS) Electric Power Monitoring

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Operating instruction contained in this procedure can and will cause channel trips of the RPS and the NSSSS Isolation Systems.

3.2 Prior to placing a channel of RPS in a tripped condition, the scram solenoids power available lights on the opposite division shall be verified ON.

END OF SECTION

4.0 GENERAL PREREQUISITES

4.1 Thermal imaging equipment may be needed in support of this procedure.

END OF SECTION

6.2 Reset Following Reactor Scram

6.2.1 Prerequisites

1. RPS Channels A and B are in a tripped condition.
2. Trip System A and B blue Pilot Scram Valve Solenoid lights are OFF (H11-P603).

CM

3. Cause of Reactor scram is identified and corrected.
4. No fuel damage is suspected.
5. D065 sump pumps have power. (To limit possibility of overflowing sump)

6.2.2 Detailed Procedure

NOTE (1): Unless otherwise noted, all steps are performed at H11-P603.

NOTE (2): RPS Channel A and B cannot be reset for ten seconds (time delay relay) following a Reactor scram.

1. Verify or place Reactor Mode Switch in SHUTDOWN or REFUEL.
2. Verify Annunciator 3D6, SCRAM VALVE PILOT AIR HDR PRESS HIGH/LOW, is in alarm.
3. Verify Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, alarms.
4. Place C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in BYPASS:
   - Verify Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, alarms.

NOTE: When the scram is reset, the Scram Discharge Volume drains to the Torus Sump and may cause a TWMS Isolation due to the high sump level. This is an expected isolation and is therefore not reportable in accordance with 10CFR50.72.

5. Cycle C7100-M605, Scram Reset Switch, to both positions (GP 1/4, GP 2/3), and release:
   - Verify Trip System A and B blue Pilot Scram Valve Solenoid lights are ON.

- Verify alarm is reset for RPS Channels A and B:
  - 3D73, TRIP ACTUATORS A1/A2 TRIPPED.
  - 3D74, TRIP ACTUATORS B1/B2 TRIPPED
- Verify C1100-F010/F180, Scram Disch Vol Vent Vlv's, and C1100-F011/F181, Scram Disch Vol Drain Vlv's, are open.

6. Reset Rod Drift alarms.

7. Verify Annunciator 3D94, DISCH WATER VOL HI LEVE CHANNEL TRIP, clears.

8. Verify Annunciator 3D2, SCRAM DISCHARGE VOLUME LEVEL HIGH, clears.

9. Place C7100-M604, Scram Disch Vol Hi H2O Lvl Byp, switch in NORMAL:
   - Verify Annunciator 3D95, DISCH WATER VOL HI LEVEL CHANNEL TRIP BYPASSED, clears.

10. Close or verify closed the following valves (H11-P805):
    - N2100-F607, N RFP Disch Line Iso Valve
    - N2100-F608, S RFP Disch Line Iso Valve

11. Place or verify both C32-R616A/B, North/South Reactor Feed Pump Controllers, in MANUAL.

12. Verify or place SULCV Mode Switch in START.

13. Reset Post Scram Feedwater Logic.

14. Reset Post Scram Reactor Water Level Setdown Logic.

15. If Scram is locked in on IPCS, on IPCS cycle plant to Mode 3 or 4 and back to current Mode to clear locked in scram signal.

16. Verify closed or close C1100-F212, CST To CRD Pumps Secondary Supply Check Valve (ABB G-12).

END OF SECTION

JOB PERFORMANCE MEASURE

Job Position RO	No. JP-OP-315-0133-231	Revision 0
JPM Title Shut Down a Circulating Water Pump	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO / NO

Evaluator: _____

Validating Representatives Name: J. Walters / D. Roberts

JPM Type: **Normal** / Alternate Path **/** Time Critical — Start Time

Evaluation Method: **Perform** / Walkthrough / Discuss — Stop Time _____

Location: Plant / **Simulator** / Classroom — Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
*** 1.**											
*** 2.**											
*** 3.**											
4.											
5.											
6.											
7.											
8.											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Title Shut Down a Circulating Water Pump	No.: JP-OP-315-0133-231 Revision 0 Page 3

JPM Information

System:

W2400 – Circulating Water System

Task:

02N7100002 - Start a Circulating Water Pump
02N7100003 – Stopping a Circulating Water Pump

References: Required (R) / Available (A)

23.101, Circulating Water System (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are the CRLNO.
- Circulating Water (CW) Pump #5 is experiencing high motor vibrations.
- The motor for CW Pump #5 is going to be replaced.
- Plant conditions support operating with 4 CWPs per 23.101 Enclosure B.

Initiating Cue(s):

- The CRS directs you to shut down CW Pump #5 in accordance with 23.101..

Terminating Cue(s):

Circulating Water Pump #5 is shut down.

Task Standard:

The task is satisfactorily met when the examinee closes the Circ Water Pump Discharge Isolation Valve for Circ Water Pump #5, recognizes that Circ Water Pump #5 did not automatically trip when the valve close, manually trips Circ Water Pump #5, recognizes that the discharge valve starts stroking back open, and subsequently re-closes the Discharge Isolation Valve.

JPM Title Shut Down a Circulating Water Pump	No.: JP-OP-315-0133-231 Revision 0 Page 4

Licensed Operator Exam Information (required for NRC exams)

Safety Function:

8 – Plant Service Systems

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 510001 CSW Circulating Water System

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the Control room:

A4.01 Circulating Water Pumps …… 3.3

A4.02 Circulating Water Valves …… 3.1

Maintenance Rule Safety Classification:

W2400 -01

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

	ELEMENT		STANDARD
CUE:	**Provide examinee with Cue Sheet and a copy of (applicable sections of) 23.101.**		
*** 1.**	[6.2.1] Close N7100-F601 (F602, F603, F604, F605), CW Pump #1 (2, 3, 4, 5) Disch Iso Valve, for Circ Water Pump selected to be shutdown.	*** 1.**	Depresses closed pushbutton for N7100-F605, CW Pump #5 Disch Iso Valve.
NOTE:	**Circ Water Pump #5 will not trip when N7100-F605 is fully closed, which will cause N7100-F605 to re-open.**		
CUE:	**Step 6.2.2 is a Critical Step. IF the examinee asks for a peer check, state that you will act as the peer checker for this step. The examinee should utilize HU tools (self-check, peer check, flagging, etc.) to mitigate the occurrence of an error for this step.**		
*** 2.**	[6.2.2] Verify Circ Water Pump #1 (2, 3, 4, 5,) trips when CW Pump Disch Iso Valve is fully closed; if not, manually stop Circ Water Pump.	*** 2.**	Recognizes that Circ Water Pump #5 has not tripped and manually stops Circ Water Pump #5.
*** 3.**	[6.2.3] Close or verify closed N7100-F601 (F602, F603, F604, F605), CW Pump #1 (2, 3, 4, 5) Disch Iso Valve.	*** 3**.	Recognizes that N7100-F605 is re-opening and depresses close pushbutton for N7100-F605, CW Pump #5 Disch Iso Valve.
4.	[6.2.4] Place CMC switch, N7100-C001 (C002, C003, C004, C005) Circ Water Pump #1 (2, 3, 4, 5), for Circ Water Pump being shutdown in OFF/RESET.	4.	Verifies CMC Switch for N7100-C005 is in OFF/RESET.
5.	[6.2.5] Close N7100-F510A (B, C, D, E,), CWP #1 (2, 3, 4, 5) Lube & Clg Wtr Iso Vlv, for Circ Water Pump being shutdown.	5.	Depresses closed pushbutton for N7100-F510E, CWP #5 Lube & Clg Wtr Iso Vlv.
6.	[6.2.6] When CW System is required to be shutdown, perform Section 8.1, Circ Water System Shutdown.	6.	Marks this step as N/A.
7.	[6.2.7] If CW System is to be shutdown, shutdown Bromination System in accordance with 23.134, "Circulating Water Biocide Injection System."	7.	Marks this step as N/A.
8.	[6.2.8] If a Cooling Tower is to be isolated, place the Icing Prevention System for that tower in OFF in accordance with Section 7.7, Cooling Tower Icing Prevention.	8.	Marks this step as N/A. Informs CRS that CWP #5 is shut down.
CUE:	**As CRS, acknowledge report for CWP #5.**		
CUE:	**End the JPM when CWP #5 has been shut down and N7100-F605 is closed.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

JPM Title Shut Down a Circulating Water Pump	No.: JP-OP-315-0133-231 Revision 0 Page 6

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Controllers have an Auto light that is GREEN when selected and AMBER (YELLOW) when Manual is selected. When in Manual, the open and closed pushbuttons control the parameter to be changed by adjusting position or speed. When the deviation meter is nulled, then the process can be shifted to Auto to allow the desired setpoint to control the process.

System Specific Notes and Cues:

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. **Notify Examinee if time compression is used for activities performed outside of the Control Room.**

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any IC with CWP #5 in operation and can support shutdown of CWP #5.

Malfunctions:

Number	Title	Value	Delay	Ramp
N7BEINPUTL751090OUT	Contact for N7100-F605	TRUE	N/A	N/A

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp

Special Instructions:

N/A

Cue Sheet: (JP-OP-315-0133-231)

Initial Conditions:

- You are the CRLNO.
- Circulating Water (CW) Pump #5 is experiencing high motor vibrations.
- The motor for CW Pump #5 is going to be replaced.
- Plant conditions support operating with 4 CWPs per 23.101 Enclosure B.

Initiating Cue(s):

The CRS directs you to shut down CW Pump #5 in accordance with 23.101.

Cue Sheet: (JP-OP-315-0133-231)

Initial Conditions:

- You are the CRLNO.
- Circulating Water (CW) Pump #5 is experiencing high motor vibrations.
- The motor for CW Pump #5 is going to be replaced.
- Plant conditions support operating with 4 CWPs per 23.101 Enclosure B.

Initiating Cue(s):

The CRS directs you to shut down CW Pump #5 in accordance with 23.101.

CIRCULATING WATER SYSTEM

Revision Summary

1) Updated P&L 3.1.9 per CARD 21-26727.

Attachments

1	110618	Circulating Water System Valve Lineup
2	012822	Circulating Water System Electrical Lineup
3	122805	Circulating Water System Instrument Lineup

Enclosures

A	120596	Control Room Local Circ Wtr Reservoir Level Correlation and Setpoints
B	021303	Cooling Tower vs Circ Water Pump Operation Guidelines
C	031505	Alternate Cooling Water Supply for Circ Water Pumps
D	021914	Cooling Tower Deicing System Correlation

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #**	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	23.101	107		22-0445	1703.02	I	N	

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operation of the Circulating Water (CW) System including startup, normal, and shutdown operation.

1.1 System Description

The CW System provides an essentially closed loop cooling method for condensing Main Turbine exhaust steam to the Main Condenser. The five Circ Water Pumps draw screened water from the Circ Wtr Reservoir and discharge it to a manifold header. Water is discharged by means of two parallel 144 inch diameter pipes to the tube side of the Main Condenser. Heated water from the Main Condenser then goes to two Natural Draft Cooling Towers to be cooled. Cooled water from the Cooling Towers flows to the Circ Wtr Reservoir.

Major system components are five 20% Circ Water Pumps and Motors, three Circ Water Decant Pumps and Motors, one Cndr Wtr Box Low Vol Pump and Motor, two CW Pump House Sump Pumps and Motors, two Cndr Wtr Box High Vol Pumps and Motors, two Cooling Towers, and the Circ Wtr Reservoir and associated valves, piping, and controls.

General Service Water is supplied to each Circ Water Pump to lubricate and cool its glands and bearings.

W2400-F609, North Clg Twr 20” Bypass Vlv, and W2400-F610, South Clg Twr 20” Bypass Vlv, are not considered Cooling Tower Bypass Valves, but are used to promote circulation in Cooling Tower bases (when Cooling Towers are bypassed) and also allow GSW to "bypass" Cooling Towers (when CW System is out of service).

Cooling Towers have three modes of operation in which the following definitions apply:

- Isolated: Isolation Valves closed, Bypass Gates open
- Bypassed: Isolation Valves open, Bypass Gates open
- In Service: Isolation Valves open, Bypass Gates closed

An Icing Prevention control system is provided to control potential tower icing during cold weather operation. The system allows the operator to overflow one section of the outer hot water distribution basin perimeter at a time causing warm water to cascade down the tower inlet louver faces. A section on the Cooling Tower is one eighth of the tower. Each section contains either ten or eleven bays. Normal Icing Prevention is done on one section at a time. Each Icing Prevention System Pump controls valves for one section. Flow through Icing Prevention Valves in CLOSED position is normal due to valve design. This supplies the normal flow of the Outer Distribution Basin. When in automatic operation, valves open for Slow or Fast Flow Rates. Slow Rate Temperature is set at approximately 38°F. Fast Rate Temperature is set at approximately 30°F. Both North and South Cooling Towers are controlled by the same temperature switches.

2.0 REFERENCES

2.1 Use References

2.1.1 23.134, Circulating Water Biocide Injection System

2.1.2 23.626, Process Liquid Radiation Monitoring System

2.1.3 24.000.02, Shiftly, Daily, and Weekly Required Surveillances

2.1.4 Offsite Dose Calculation Manual, Section 3.11, Radioactive Effluent

2.2 Potential Use References

2.2.1 Drawings

I-2371-14	Schematic Diagram, Circ. Water Cond. Inlet NE and NW Valves Unit 2
I-2692-03	Schematic Diagram, North Cooling Tower East and West Isolation Valves Unit 2
I-2692-05	Schematic Diagram, North Cooling Tower East and West Bypass Valves Unit 2
M-2007	Diagram - Circulating Water System Unit 2
M-2812	Diagram, Emergency Use of Reservoir Water for General Service
M-5720	Circ. Water System Functional Operating Sketch
T3-340	Icing Prevention Valve Schematic

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Startup

3.1.1 Minimize time operating with two Circ Water Pumps running in Full Condenser operations to prevent silt buildup in Condenser Tubes.

3.1.2 Do not operate a Circ Water Decant Pump when Circ Wtr Reservoir Level is less than minus 2 feet (575 ft 9 in) as indicated on N61-R804, Circ Wtr Reservoir Lvl Cond Wtr Boxes Temp, Points 13 and 14 (H11-P807). Enclosure A provides a level cross reference. To facilitate Condenser Waterbox entry, the Shift Manager can authorize operation of the Circ Water Decant Pumps to a level no lower than -3.5 (574 ft. 3 in.) provided that the CW System is shutdown.

3.1.3 When Circ Wtr Reservoir Level is less than minus 5 feet (572 ft 9 in) as indicated on N61-R804, Circ Wtr Reservoir Lvl Cond Wtr Boxes Temp, Points 13 and 14 (H11-P807), reservoir level will require local verification. Enclosure A provides a level cross reference.

3.1.4 Circ Water Pumps shall not be operated when Circ Wtr Reservoir Level is less than 568 ft. 4 in. due to inadequate NPSH.

3.1.5 Observe the following criteria when multiple starts are performed on Circ Water Pumps or Circ Water Decant Pump:

1. First start can be made when motor is at ambient temperature.

2. Second start can be made if motor has run for a minimum of 10 minutes or if motor has been idle for 30 minutes since first start.

3. Third and all subsequent starts can be made if motor has run for a minimum of 20 minutes or if motor has been idle for 60 minutes since last start.

3.1.6 When more than one Circ Water Pump is to be started, observe the following precautions:

1. If Circ Water Pumps #4 and #5 are to be started, verify voltage on Bus 66H returns to normal after first pump is started before starting second pump.

2. If Bus 69J is being fed from System Service Transformer 66, (69J-J3), verify voltage on Bus 66H (R14-R812), returns to normal after each pump start before another pump is started.

3. If Bus 69J is being fed from System Service Transformer 66, (69J-J3), only 4 Circ Water Pumps can be operated due to capacity of System Service Transformer 66.

3.1.7 To prevent Circ Water Pump runout due to low discharge pressure, observe the following guidelines:

1. Do not run only one Circ Water Pump for extended periods (long enough to complete the start of the first pump and the start of the second pump).

2. If running two Circ Water Pumps, do not use the combination of Circ Water Pumps #1 and #5. Circ Water Pump #1 or #5 in conjunction with any other Circ Water Pump (#2 through #4) is acceptable.

3.1.8 To minimize pump vibration, the Circ Water Pumps should be operated in a balanced configuration. For example: (2, 4) (1, 3, 5) (2, 3, 4) (1, 2, 4, 5).

3.1.9 Prior to removing power from Programmable Logic Controllers (PLC) in the Deice logic, contact I&C to properly shutdown PLC per PST IC66. Once work has been completed and power is to be restored, contact I&C to restore power to the PLC units per PST IC66. Once power has been restored to the PLC, verify proper indications.

3.2 Normal Operation

3.2.1 Do not throttle the following valves. These valves are to be either fully open or fully closed.

- W2400-F605 (F607), North Clg Twr East (West) Byp Gate
- W2400-F608 (F606), South Clg Twr East (West) Byp Gate
- W2400-F601 (F602), North Clg Twr East (West) Iso Vlv
- W2400-F603 (F604), South Clg Twr East (West) Iso Vlv

3.2.2 Refer to the following guidelines to adjust the oil level of an operating circulating water pump. Improper oil level adjustments may causing the bearing oil to overflow onto the pumps motor upon shutdown.

1. If the oil level is below the operating range:

- No observed leakage-Monitor pump bearing and winding temperature until operating oil levels have been verified to be acceptable or the pump can be shutdown to check the oil level.

- If prefilters are in place, have prefilters removed, check oil level in operating range and reinstall new prefilters.

- If oil level cannot be verified to be in operating range, shutdown the pump and observe the oil level.

    a. If the oil level is within the standstill range, the Inlet Air Screens on the motor must be cleaned.

    b. If the oil level remains low (below the standstill range), add oil.

2. Oil removed during routine oil sampling can be replaced using a measuring container to ensure the amount removed is replaced.

3. If oil loss can be quantified (from a leak), the same amount of oil can be added to an operating pump with Shift Manager's permission.

3.2.3 Notify Chemistry when placing Cooling Tower in or out of service to allow startup/shutdown of monitoring equipment.

CM

3.2.4 This system or its components contain organics (untreated lake water) that could adversely affect operation of the plant if drained to the plant floor/equipment drains. Before draining or venting any system to the floor/equipment drains, refer to MMA17,"Foreign Material Exclusion (FME)."

CM

3.2.5 Anytime the system is opened for maintenance or inspection, the potential exists for internal flooding. While in this condition and during recovery, special attention shall be given to minimize the risk of internal plant flooding.

3.2.6 CWP #1(2,3,4,5) Lube and Cooling Water Supply Strainers should be swapped to clean strainer between 5 to 10 psid, but shall not be allowed to exceed 10 psid.

3.2.7 If N7100-F601 thru F605, CW Pump #1 (2, 3, 4, 5) Disch Iso Valve, is manually operated, initiate a CARD for Maintenance to inspect/replace the MOV shear pin prior to operating the valve electrically.

3.2.8 When restoring from condenser isolation, Waterbox CW Inlet Iso Vlvs should be manually opened (~50 turns) to unseat valves if torqued into seat for isolation prior to electrically stroking valves open.

3.3 Cold Weather Operation (Ambient Air Less than 40°F)

3.3.1 When ambient air temperature is less than 35°F, a visual observation of the North and South Cooling Towers should be performed at least every twelve hours to check for excessive ice buildup, and the Icing Prevention Trouble alarm.

3.3.2 When checking for damaging ice formations on the North and South Cooling Towers:

1. Do not allow ice formation to progress beyond the second support grid of the outer perimeter fill.

2. Do not allow ice formation to bridge between the air louvers and fill.

3. Do not allow excessive (hanging) ice on the face of the air louvers.

CM

3.3.3 Maximum Circ Wtr Reservoir level is 2.5 ft. (top of the clay liner). Exceeding this level may cause overflow of the Circ Wtr Reservoir to the environment.

3.3.4 Hotwell Condensate Water Temperature should be maintained at or above 40°F at normal operating levels. CW System should be shutdown if unable to maintain this parameter to prevent load stresses on the Condenser.

3.3.5 Cooling Tower Deicing that changes the period between pump run to less than 2 minutes may cause Glycol Reservoir Low Level Alarms. The controller is normally set to 10 minutes ON and 10 minutes OFF in SLOW, and 10 minutes ON and 2 minutes OFF in FAST. If the OFF time is set to less than 2 minutes, the glycol may not have enough time to flow back to the reservoir before the next pump start and may generate a Low Level Alarm.

3.3.6 In alternate icing prevention line-up, additional ON time may be necessary on those segments which contain the overlap section in order to prevent icing.

3.3.7 An indication of a failed solenoid may be the Icing Prvention pump is operating and no de-ice valves are opening. The operator will have to take appropriate actions to determine which solenoid (if any) is stuck open as it may not be obvious.

END OF SECTION

4.0 GENERAL PREREQUISITES

NOTE: Unless otherwise noted, all controls and indications for CW System are located on COP H11-P807.

4.0.1 Circulating Water System Valve Lineup has been completed in accordance with Attachment 1.

4.0.2 Circulating Water System Electrical Lineup has been completed in accordance with Attachment 2.

4.0.3 Circulating Water System Instrument Lineup has been completed in accordance with Attachment 3.

4.0.4 The following systems are in operation in accordance with applicable System Operating Procedures to support Circulating Water System Operation:

1. 23.131, "General Service Water System"

2. 23.417, "Circulating Water Pump House Heating and Ventilating System"

4.0.5 If work occurred on top of cooling towers, verify de-ice valves are in proper position.

END OF SECTION

6.2 STOPPING CIRC WATER PUMPS

NOTE: To minimize pump vibration, the Circ Water Pumps should be operated in a balanced configuration.

CAUTION

To prevent Circ Water Pump runout due to low discharge pressure, when running two Circ Water Pumps, DO NOT use the combination Circ Water Pumps #1 and #5. Circ Water Pumps #1 or #5 in conjunction with any other pump is acceptable.

6.2.1 Specific Prerequisites

1. Enclosure B has been referred to prior to stopping a Circ Water Pump.

6.2.2 Detailed Procedure

NOTE (1): Circ Water Pump shutdown is initiated by closing associated CW Pump Disch Iso Valve to prevent interruption of system flow.

NOTE (2): N7100-F601 (F602, F603, F604, F605), CW Pump #1 (2, 3, 4, 5) Disch Iso Valve, may start to reopen following pump trip.

1. Close N7100-F601 (F602, F603, F604, F605), CW Pump #1 (2, 3, 4, 5) Disch Iso Valve, for Circ Water Pump selected to be shutdown.

CRITICAL STEP

2. Verify Circ Water Pump #1 (2, 3, 4, 5,) trips when CW Pump Disch Iso Valve is fully closed; **if not,** manually stop Circ Water Pump.

3. Close or verify closed N7100-F601 (F602, F603, F604, F605), CW Pump #1 (2, 3, 4, 5) Disch Iso Valve.

4. Place CMC switch, N7100-C001 (C002, C003, C004, C005) Circ Water Pump #1 (2, 3, 4, 5), for Circ Water Pump being shutdown in OFF/RESET.

5. Close N7100-F510A (B, C, D, E,), CWP #1 (2, 3, 4, 5) Lube & Clg Wtr Iso Vlv, for Circ Water Pump being shutdown.

6. When CW System is required to be shutdown, perform Section 8.1, Circ Water System Shutdown.

7. If CW System is to be shutdown, shutdown Bromination System in accordance with 23.134, "Circulating Water Biocide Injection System."

8. If a Cooling Tower is to be isolated, place the Icing Prevention System for that tower in OFF in accordance with Section 7.7, Cooling Tower Icing Prevention.

END OF SECTION

COOLING TOWER VS CIRC WATER PUMP OPERATION GUIDELINES

Normal Sequence of Cooling Tower Operation for Startup

Seq #	*North Tower*	*South Tower*	*# CW Pumps*	*Condenser Alignment*	*Remarks*
1	Bypass	Bypass	1	Half	Initial Ops Start second CW Pump
2	Bypass	Bypass	2	Half	Incr Pwr when CW > 65°F Towers in serv
3	In Serv	In Serv	2	Half	Incr Pwr Condenser dT ~ 18, start 3rd CW pmp
4	In Serv	In Serv	3	Half	Incr Pwr Shift to full condenser
5	In Serv	In Serv	3	Full	Interim Ops Cond dT ~ 18, start 4th CW pmp
6	In Serv	In Serv	4	Full	Normal Ops 55°F < CW Temp < 88°F
7	In Serv	In Serv	5	Full	Hot weather CW Temp > 88°F see guidelines
8	In Serv	Bypass	5	Full	Cold weather CW Temp < 55°F see guidelines
8	Bypass	In Serv	5	Full	Cold weather CW Temp < 55°F see guidelines

Normal Sequence of Cooling Tower Operation for Shutdown

Seq #	*North Tower*	*South Tower*	*# CW Pumps*	*Condenser Alignment*	*Remarks*
1	Bypass	In Serv	5	Full	Cold weather CW Temp < 55°F see guidelines
1	In Serv	Bypass	5	Full	Cold weather CW Temp < 55°F see guidelines
2	In Serv	In Serv	5	Full	Hot weather CW Temp > 88°F see guidelines
3	In Serv	In Serv	4	Full	Normal Ops 55°F < CW Temp < 88°F
4	In Serv	In Serv	3	Full	Interim Ops Condenser dT ~ 18, S/D 4th CW pmp
5	In Serv	In Serv	3	Half	Decr Pwr Shift to half condenser
6	In Serv	In Serv	2	Half	Decr Pwr Cond dT ~ 18, S/D 3rd CW pmp
7	Bypass	Bypass	2	Half	Decr Pwr when CW < 55°F Bypass Towers
8	Bypass	Bypass	1	Half	S/D Ops S/D 2nd CW Pump

The above table sequences are based on stable ambient temperature. If ambient temperature is fluctuating, the following guidelines are given:

Hot weather (ref. Startup Seq #7):

1. If the Circ Water inlet temperature is increasing and approaching 88°F, and is expected to remain above 85°F based on extended weather forecast, start the 5th CW pump.

COOLING TOWER VS CIRC WATER PUMP OPERATION GUIDELINES

2. If the Circ Water inlet temperature is less than 85°F, and is expected to remain below 88°F based on extended weather forecast, stop the 5th CW pump.

Cold weather (ref. Startup Seq #8):

1. If the Circ Water inlet temperature is decreasing and approaching 55°F, and is expected to remain below 58°F based on extended weather forecast, start the 5th pump. Bypass either the South Tower or the North Tower.

2. If the Circ Water inlet temperature is greater than 58°F, and is expected to remain above 55°F based on extended weather forecast, stop the 5th CW pump. Put the bypassed Tower back in-service.

COOLING TOWER VS CIRC WATER PUMP OPERATION GUIDELINES

Unusual Operation

Acceptable Tower/Pump Configurations with Only 4 CW Pumps Available

Conf #	*North Tower*	*South Tower*	*# CW Pumps*	*Condenser Alignment*	*Remarks*
1	In Serv	In Serv	4	Full	Preferred lineup when CW inlet temp > 55ºF. If CW inlet temp < 55ºF, configuration 2 or 3 may be used for short duration (less than 12 hrs) to warm the pond.
2	In Serv	Bypass	4	Full	Use this configuration for short duration only (less than 12 hrs) to warm the pond and monitor cooling towers every 2 hours for ice and manually deice as necessary.
3	Bypass	In Serv	4	Full	Use this configuration for short duration only (less than 12 hrs) to warm the pond and monitor cooling towers every 2 hours for ice and manually deice as necessary.

Acceptable Tower/Pump Configurations with Only 3 CW Pumps Available

Conf #	*North Tower*	*South Tower*	*# CW Pumps*	*Condenser Alignment*	*Remarks*
1	In Serv	In Serv	3	Full	Preferred lineup when CW inlet temp > 55ºF. If CW inlet temp < 55ºF, configuration 2 or 3 may be used for short duration (less than 12 hrs) to warm the pond. For longer periods with CW inlet temp < 55ºF go to 2 pump operation.
2	In Serv	Bypass	3	Full	Use this configuration for short duration only (less than 12 hrs) to warm the pond and monitor cooling towers every 2 hours for ice and manually deice as necessary. Open 20” bypass valve (W2400-F610) on South Tower. Intended for short down powers where CW inlet temp < 55°F to avoid condenser/pump changes.
3	Bypass	In Serv	3	Full	Use this configuration for short duration only (less than 12 hrs) to warm the pond and monitor cooling towers every 2 hours for ice and manually deice as necessary. Open 20” bypass valve (W2400-F609) on North Tower. Intended for short down powers where CW inlet temp < 55ºF to avoid condenser/pump changes.

COOLING TOWER VS CIRC WATER PUMP OPERATION GUIDELINES

Acceptable Tower/Pump Configurations with Only 2 CW Pumps Available

Conf #	*North Tower*	*South Tower*	*# CW Pumps*	*Condenser Alignment*	*Remarks*
1	Isolated	In Serv	2	Half	Preferred lineup when ambient temp is < 40°F and CW inlet temp > 55ºF
2	Bypass	In Serv	2	Half	Preferred lineup when ambient temp is < 40°F and CW inlet temp < 55ºF
3	In Serv	Isolated	2	Half	Preferred lineup when ambient temp is < 40°F and CW inlet temp > 55ºF
4	In Serv	Bypass	2	Half	Preferred lineup when ambient temp is < 40°F and CW inlet temp < 55°F
5	In Serv	In Serv	2	Half	Preferred lineup when ambient temp is > 40°F

JOB PERFORMANCE MEASURE

Job Position SRO / RO	No. JP-OP-315-0173-231	Revision 0
JPM Title Respond to CCHVAC Shift to Recirculation Mode (Alt Path)	Duration 14 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name: D. Roberts / J. Walters _____

JPM Type: Normal / **Alternate Path /** Time Critical Start Time _____

Evaluation Method: **Perform** / Walkthrough / Discuss Stop Time _____

Location: Plant / **Simulator** / Classroom Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.				*** 7.**							
2.				*** 8.**							
3.				*** 9.**							
4.				10.							
5.				*** 11.**							
6.				12.							

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS:

_____

_____

_____

REMEDIAL CONTENT: _____

_____ **PASS** _____ **FAIL**

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

T4100 – Control Center HVAC System

Task:

02T4102004 – Manually shift the Control Center HVAC to the RECIRCULATION Mode

References: Required (R) / Available (A)

3D36, “Div I/II RB Vent Exh Rad Monitor Upscale Trip” (R)
Applicable sections of 23.413, CCHVAC System SOP (R)

Tools and Equipment Required:

None

Initial Conditions:

You are the Control Room LNO.

- A spent fuel cask was dropped from the Reactor Building overhead crane onto RB-1.
- All personnel have evacuated the Reactor Building
- 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip was subsequently received.

Initiating Cue(s):

The CRS directs you to respond to 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip.

Terminating Cue(s):

End JPM when CCHVAC has been manually shifted to the Recirculation Mode and the Emergency Makeup Fan in the non-operating division (Division 2) has been stopped.

Task Standard:

The task is satisfactorily met when the examinee recognizes that CCHVAC failed to automatically shift to the recirculation mode, manually shifts Division 1 and Division 2 CCHVAC to the recirculation mode, and then shuts down the Division 2 Emergency Makeup Fan.

Licensed Operator Exam Information (required for NRC exams)

Safety Function:

9 - Radioactivity Release

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 290003 - SF9 CRV Control Room Ventilation

K/A STATEMENT:

A2. Ability to (a) predict the impacts of the following on the Control Room Ventilation and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal operations:

A2.03 Initiation/reconfiguration failure ..... 3.5 / 3.8

Maintenance Rule Safety Classification:

T4100 - 00

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT	STANDARD
NOTE: Due to the nature of this event, the expected sequence of response may differ from that listed below.	
CUE: Provide Examinee with CUE SHEET and a copy of ARP 3D36, DIV I/II RB VENT EXH RADN MONITOR UPSCALE TRIP.	
NOTE: The examinee may recognize CCHVAC failure immediately due to it being listed in the Auto Actions section of ARP 3D36. This may lead the examinee to respond to that failure (automatic action failed to occur, so manual action is warranted) prior to responding to the rest of the ARP.	
1. [3D36 IR 1.] Direct an operator to verify D11-K808 (K810), Div 1 (2) RB Vent Exhaust Radiation Monitor, is greater than 16,000 cpm at RR H11-P883 (P884).	1. Direct an operator to obtain D11-K808 (K810), Div 1 (2) RB Vent Exhaust Radiation Monitor readings.
CUE: If dispatched, report D11K808 (810), Div 1 (2) RB Vent Exhaust Radiation Monitors indicate 17,000 (17,500) cpm and are lowering.	
2. [3D36 IR 2.] IF RB Vent Exhaust Radiation is verified greater than 16,000 cpm, PERFORM the following concurrently with this procedure: • 20.000.02, "Abnormal Release of Radioactive Material." • 29.100.01 SH 5, "Secondary Containment and Rad Release."	2. Informs CRS of the need to enter 20.000.02, Abnormal Release AOP and 29.100.01 Sheet 5, Secondary Containment Control and Rad Release EOP..
CUE: As CRS, acknowledge AOP and EOP entry conditions. Direct CRLNO to continue with ARP response.	
3. [3D36 SA 1.] Comply with the following ODCM requirements: • Section 3.3.7.12, Monitoring Instrumentation - Radioactive Gaseous Effluent Monitoring Instrumentation. • Section 3.11.2, Radioactive Effluents – Gaseous. • Section 3.11.2.8, Venting or Purging of Primary Containment	3. Informs the CRS of ODCM requirements from the ARP 3D36.
CUE: As CRS, acknowledge ODCM information from ARP 3D36. Direct CRLNO to continue with ARP response.	

4. [3D36 SA.2] Verify Control Center HVAC automatic shift to Recirc in accordance with 23.413, "Control Center HVAC System.	4. Obtains copy of 23.413 and recognizes that CCHVAC has failed to shift to the Recirculation Mode.
CUE: When the examinee locates 23.413, CCHVAC System SOP, provide the copy attached to this JPM (yellow paper).	
5. [23.413 7.6.2.1] If CCHVAC is anticipated to operate in Recirculation Mode for approximately 4 hours or more, consider placing the following in Off (AB4 G11): • T4100-C051, CCHVAC CR Kitchen Exhaust Fan. • T4100-C052, CCHVAC CR Toilet Exhaust Fan.	5. May direct an NO to place the CR Kitchen and CR Toilet Exhaust Fans in Off.
CUE: IF asked, inform examinee CCHVAC will be in the Recirc Mode for greater than 4 hours. **IF directed as NO, acknowledge direction given for CR Kitchen and Toilet Exhaust Fans (no follow up report or simulator actions are necessary).**	
6. [23.413 7.6.2.2] Verify or place Div 1 (2) switches for the following equipment in AUTO: **Div 1 CCHVAC** • T4100-B007, Div 1 CCHVAC Supply Fan. • T4100-C031, Div 1 CCHVAC Return Air Fan. • T4100-C041, Div 1 CCHVAC Chilled Wtr Pump. • T4100-B009, Div 1 CCHVAC Chiller. • T4100-C047, Div 1 CCHVAC Emerg Makeup Fan. • T4100-B028, Div 1 CCHVAC Equip Room Cooler. **Div 2 CCHVAC** • T4100-B006, Div 2 CCHVAC Supply Fan. • T4100-C030, Div 2 CCHVAC Return Air Fan. • T4100-C040, Div 2 CCHVAC Chilled Wtr Pump. • T4100-B008, Div 2 CCHVAC Chiller. • T4100-C048, Div 2 CCHVAC Emerg Makeup Fan. • T4100-B027, Div 2 CCHVAC Equip Room Cooler.	6. Verifies each of the following switches are in AUTO: **Div 1 CCHVAC** • T4100-B007, Div 1 CCHVAC Supply Fan. • T4100-C031, Div 1 CCHVAC Return Air Fan. • T4100-C041, Div 1 CCHVAC Chilled Wtr Pump. • T4100-B009, Div 1 CCHVAC Chiller. • T4100-C047, Div 1 CCHVAC Emerg Makeup Fan. • T4100-B028, Div 1 CCHVAC Equip Room Cooler. **Div 2 CCHVAC** • T4100-B006, Div 2 CCHVAC Supply Fan. • T4100-C030, Div 2 CCHVAC Return Air Fan. • T4100-C040, Div 2 CCHVAC Chilled Wtr Pump. • T4100-B008, Div 2 CCHVAC Chiller. • T4100-C048, Div 2 CCHVAC Emerg Makeup Fan. • T4100-B027, Div 2 CCHVAC Equip Room Cooler.

*** 7.** [23.413 7.6.2.3] Place CCHVAC Div 1 Mode Select switch in RECIRC.	*** 7.** Rotates the CCHVAC Div 1 Mode Select switch to RECIRC.
*** 8.** [23.413 7.6.2.4] Place CCHVAC Div 2 Mode Select switch in RECIRC.	*** 8.** Rotates the CCHVAC Div 2 Mode Select switch to RECIRC.
*** 9.** [23.413 7.6.2.5] Depress CCHVAC Ventilation Mode Reset pushbutton momentarily for each division.	*** 9.** Depresses and releases CCHVAC Ventilation Mode Reset pushbutton for Div 1 CCHVAC. Depresses and releases CCHVAC Ventilation Mode Reset pushbutton for Div 2 CCHVAC.
10. [23.413 7.6.2.6] Verify following equipment is running on the operating division: • T4100-B007 (B006), Div 1 (2) CCHVAC Supply Fan. • T4100-C041 (C040), Div 1 (2) CCHVAC Chilled Wtr Pump. NOTE: T4100-B028 (B027) are controlled by room temperature and may not start. • T4100-B028 (B027), Div 1 (2) CCHVAC Equip Room Cooler. • T4100-C031 (C030), Div 1 (2) CCHVAC Return Air Fan. • T4100-B009 (B008), Div 1 (2) CCHVAC Chiller. • T4100-C047 (C048), Div 1 (2) CCHVAC Emerg Makeup Fan.	10. Verifies the following equipment is running for Div 1 CCHVAC: • T4100-B007, Div 1 CCHVAC Supply Fan. • T4100-C041, Div 1 CCHVAC Chilled Wtr Pump. • T4100-B028, Div 1 CCHVAC Equip Room Cooler. • T4100-C031, Div 1 CCHVAC Return Air Fan. • T4100-B009, Div 1 CCHVAC Chiller. • T4100-C047, Div 1 CCHVAC Emerg Makeup Fan.
*** 11.** [23.413 7.6.2.7] Determine status of T4100-C047 and C048, Div 1 and 2 CCHVAC Emerg Makeup Fans. **NOTE**: Taking the Emergency Makeup Fan in the non-operating division to OFF maintains its availability for future use and does not render the fan inoperable. a. If both Div 1 and 2 CCHVAC Emerg Makeup Fans are running: • Stop the fan in the non-operating CCHVAC division. b. If only one CCHVAC Emerg Makeup Fan is running, leave it running even if in the non-operating division:	*** 11.** Determines that both T4100-C047 and C048 are in operation. Determines that Division 1 CCHVAC is the operating division. Places the CMC Switch for T4100-C048, Div 2 CCHVAC Emerg Makeup Fan, in OFF-RESET.

12. [23.413 7.6.2.8] If **no** radiation release has occurred, maintain Emergency Air Intake Selector switches in AUTO.	12. Asks CRS if an offsite radiation release has occurred.
CUE: IF asked, as CRS inform examinee that no offsite release is in progress. Inform examinee that another operator will complete the remainder of the procedure. **CUE: End JPM when CCHVAC has been manually shifted to the Recirculation Mode and the Emergency Makeup Fan in the non-operating division (Division 2) has been stopped.**	

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

Controllers have an Auto light that is GREEN when selected and AMBER (YELLOW) when Manual is selected. When in Manual, the open and closed pushbuttons control the parameter to be changed by adjusting position or speed. When the deviation meter is nulled, then the process can be shifted to Auto to allow the desired setpoint to control the process.

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee.

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

Any Power IC with CCHVAC in Service

Malfunctions:

Number	Title	Value	Delay	Ramp
D11MF0030	Div 1 RB Vent Exh Rad Monitor	10000000.0	0	0
D11MF0032	Div 2 RB Vent Exh Rad Monitor	10000000.0	0	0

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp
TAAWT41M95A_B_CTVSP	Fails D1 CCHVAC Shift to Recirc (**Note 1**)	0	0	0
TAAYT41M115A_B_CTVSP	Fails D2 CCHVAC Shift to Recirc (**Note 1**)	0	0	0

Note 1: Relay malfunctions for Div 1 (Div 2) CCHVAC will automatically clear when two conditions are met:

(1) The respective Mode Select Switch is taken to Recirc.
AND
(2) The respective Ventilation Mode Reset Pushbutton is depressed.

Special Instructions:

1. Initialize simulator to the desired IC.
2. Open and execute Lesson JP0173-231.lsn.
3. When cued by examiner, trigger the lesson step.

Cue Sheet (JP-OP-315-0173-231)

Initial Conditions:

You are the Control Room LNO.

- A spent fuel cask was dropped from the Reactor Building overhead crane onto RB-1.
- All personnel have evacuated the Reactor Building
- 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip was subsequently received.

Initiating Cue(s):

The CRS directs you to respond to 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip.

Cue Sheet (JP-OP-315-0173-231)

Initial Conditions:

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- 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip was subsequently received.

Initiating Cue(s):

The CRS directs you to respond to 3D36, Div 1/II RB Vent Exhaust Radiation Monitor Upscale Trip.

DIV I/II RB VENT EXH RADN MONITOR UPSCALE TRIP

AUTO ACTIONS

- System initiations or trips:
  - SBGT initiates.
  - Reactor Building HVAC fans trip and isolate.
  - Control Center HVAC shifts to Recirculation Mode.
- Isolations
  - Group 14, Drywell and Suppression Pool Ventilation System
  - Group 16, Nitrogen Inerting System

INITIAL RESPONSE

1. Direct an operator to verify D11-K808 (K810), Div 1 (2) RB Vent Exhaust Radiation Monitor, is greater than 16,000 cpm at RR H11-P883 (P884).
2. **IF** RB Vent Exhaust Radiation is verified greater than 16,000 cpm, **PERFORM** the following concurrently with this procedure:
   - 20.000.02, "Abnormal Release of Radioactive Material."
   - 29.100.01 SH 5, "Secondary Containment and Rad Release."

SUBSEQUENT ACTIONS

1. Comply with the following ODCM requirements:
   - Section 3.3.7.12, Monitoring Instrumentation - Radioactive Gaseous Effluent Monitoring Instrumentation.
   - Section 3.11.2, Radioactive Effluents – Gaseous.
   - Section 3.11.2.8, Venting or Purging of Primary Containment.
2. Verify Control Center HVAC automatic shift to Recirc in accordance with 23.413, "Control Center HVAC System."

3. When RB Vent Exhaust Radiation is below the setpoint, direct an operator to perform the following:

   a. Verify D11-K808, Div 1 RB Vent Exhaust Radiation Monitor, and/or D11-K810, Div 2 RB Vent Exhaust Radiation Monitor, are/is less than 16,000 cpm.

      • Depress CLR on keypad.

         - Verify Red HIGH (2) light is OFF.

4. Return the following systems to normal, in accordance with the applicable System Operating Procedure:

   • 23.404, "Standby Gas Treatment System."

   • 23.413, "Control Center Heating, Ventilation and Air Conditioning."

   • 23.426, "Reactor Building Heating, Ventilation and Air Conditioning."

   • 23.427, "Primary Containment Isolation System."

INITIATING DEVICE/SETPOINTS

D11-K808 Div 1 RB Vent Exhaust Radiation Monitor	16,000 cpm increasing
D11-K810 Div 2 RB Vent Exhaust Radiation Monitor	16,000 cpm increasing

REFERENCES

I-2080-19

I-2183-09

END

Section Divider

Do NOT provide the following until directed to do so by the CUE.

CONTROL CENTER HVAC

Revision Summary

1) Added bullet to P&L 3.2 to include "Manual Isolation of Division 1 or Division 2 RBHVAC" per CARD 20-28217.
2) Revised steps 5.2.2.4, 7.3.2.1.e, 7.5.2.2, 7.6.2.3, 7.7.2.3, 7.8.2.5 to separate into different steps per CARDs 20-28513, 20-28588.
3) Corrected use reference from MMA10 to MOP21 per CARD 20-33073.
4) Added step 5.1.2.3.g per CARD 21-25133.
5) Made administrative typo correction in step 6.1.2.7 (ACR # 22-0618, revision 103A).
6) Made administrative format correction so that 5.2 and 7.8 "End of Section" is now located on page 19 and 49 respectively, Table of Contents updated per correction (ACR # 22-0618, revision 103A).

Attachments - See Page 2

Enclosures - See Page 2

Information and Procedures								
DTC	**DSN**	**Revision**	**Date Issued**	**DCR #** 20-1375 **ACR #** 22-0618	**File #**	**IP**	**ISFSI**	**Recipient**
TPNPP	23.413	103A	08/02/2022		1703.02	I	N	

Attachments

1	032818	Control Center HVAC System Valve Lineup
2	102506	Control Center HVAC System Electrical Lineup
3	071719	Control Center HVAC System Instrument Lineup
4A	011110	Div 1 CCHVAC Standby Verification Checklist
4B	011110	Div 2 CCHVAC Standby Verification Checklist
5A	011110	Verification Checklist For Section 5.1, Chiller Water System Initial Fill And Vent
5B	011110	Verification Checklist For Section 5.1, Chiller Water System Initial Fill And Vent

Enclosures

A	022813	Damper Lineup Normal Mode
B	040505	Damper Lineup Recirculation Mode
C	022500	Damper Lineup Chlorine Mode
D	052709	Chiller Purge Unit Diagnostic Alarms
E	050508	Control Center Common Ducting
F	102103	Control Center HVAC Pressure Conversions
G	022813	Shutdown a CCHVAC Makeup Fan (EOPs) (H11-P808 and H11-P817)

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operating the Control Center HVAC System.

1.1 System Description

The Control Center Heating, Ventilating and Air Conditioning (HVAC) System maintains the Control Center envelope (Relay Room, Cable Spreading Room, Control Room, Computer Room and air conditioning equipment room) within design temperature and humidity limits during all modes of operation and following a design basis loss of coolant accident or fire. The system detects and removes airborne radioactivity. All active system components are redundant. The system is designed to maintain a slight positive pressure (approximately +1/8" water) in the Normal and Purge modes and a greater positive pressure in the Recirculation mode (approximately +1/4" water) with respect to the outside.

The Control Center is heated, ventilated, and air conditioned independently from the remainder of the Reactor/Auxiliary Building. This fresh air intake for the control center air conditioning system is located approximately fifty feet above the site grade elevation at the south wall of the Reactor/Auxiliary Building. Normal air supply to the Main Control Room is filtered through roll filters. Emergency Air Supply is filtered through HEPA and charcoal filters. The ventilation exhaust air from the control center air conditioning system is discharged to the auxiliary building roof.

The Control Center HVAC system consists of two 100% capacity multizone air handling units each attached to a roll and electrostatic filter. Each multizone unit contains a supply air fan, chilled water cooling coil and electric heating coil. Two 100 percent capacity compressor-condenser units are equipped with individual chilled water circuits and circulating pumps to supply chilled water to the air handling units. Two 100 percent return air fans exhaust and recirculate the air supplied to the various zones of the control center. Two complete and separate HVAC systems have been provided and share a common distribution and return ductwork system. The makeup and recirculation charcoal filter train has redundancy of active components only (fans, heaters, dampers and controls). The control center HVAC system is an engineered safety feature system.

Control Center HVAC System normal mode recirculates air in Control Room with a limited makeup of outside air. Control Center Makeup-Air Supply Fan and A/C Equipment Room Fan Coil Unit will not operate while in the normal mode. However, they will start automatically should Recirc Mode be initiated by an emergency signal.

The Purge Mode, used for smoke removal, is the same as the normal operating mode except there is no recirculation of exhaust air. If there is a fire, the Purge Mode may be initiated manually or automatically by a Halon System initiation in the Relay Room or Cable Spreading Room. Control Center Makeup Air Supply Fan and A/C Equipment Room Fan Coil Unit will not operate while in the Purge Mode. However, they will start automatically should Recirc Mode be initiated by an emergency signal.

Control Center HVAC System Chlorine mode is used following an accidental chlorine release. In this mode, the Control Center may be manually isolated and there is no makeup provided. The charcoal recirculation filter cleans the air recirculated through the Control Center. The Chlorine Mode may be initiated manually. The A/C Equipment Room Fan Coil Unit will operate if the chlorine mode was initiated manually or if the Recirc mode is initiated by an emergency signal.

1.2 Purge Purifier Unit

The purpose of the Purge Purifier Unit is to remove air and non-condensable gases that accumulate in the chiller condenser due to normal leakage.

The unit consists of a tank, inlet and outlet valves, and a refrigeration unit. The refrigeration system has an evaporator located inside the tank that provides a cold condensing surface for refrigerant. As the refrigerant is condensed a partial vacuum is left behind drawing additional refrigerant and non-condensables into the tank. The liquid refrigerant is returned to the chiller condenser via the liquid return line. The non-condensables are left in the tank and as they accumulate they reduce the heat transfer capability of the purge evaporator coil, which in turn reduces purge compressor suction temperature. When temperature decreases to the predetermined setpoint the pumpout compressor starts and removes the accumulated air. As air is removed suction temperature increases and when the predetermined setpoint is reached the pumpout compressor will stop.

The Purge Purifier Unit has four modes of operation that are controlled by a microprocessor. The microprocessor stores the last 30 days of purge history for determining the average as well as determining abnormal operating conditions for the unit.

THE MODES OF OPERATION ARE AS FOLLOWS:

- STOP - The Unit will not run.
- ON - The unit will run continuously regardless of chiller status. This is the preferred mode of operation.
- AUTO - The unit will run only when the chiller is running.
- ADAPTIVE - The unit will cycle as determined by the average pumpout time of the unit in both operating and shutdown conditions.

2.0 REFERENCES

2.1 Use References

2.1.1 23.501.03, Halon Fire Suppression System

2.1.2 23.625, Process Gaseous Radiation Monitoring System

2.2 Potential Use References

2.2.1 Procedures

- 23.127, Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System
- 23.129, Station and Control Air System
- 23.601, Instrument Trip Sheets
- 3D37, CCHVAC MAKEUP AIR RAD MONITOR TROUBLE
- 3D38, RAD CONT CENTER EMERG AIR DIV I MON TROUBLE
- 3D39, RAD CONT CENTER EMERG AIR DIV II MON TROUBLE
- 43.413.001, Control Room Emergency Filter Performance Test
- MOP21, Housekeeping

2.2.2 Technical Specifications/TRM

- Technical Specifications, Section 3.7.3, Control Room Emergency Filtration (CREF) System
- Technical Specifications, Section 3.7.4, Control Center Air Conditioning (AC) System
- TRM Section TR 3.7.2, Control Room Emergency Filtration (CREF) System

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Prior to taking a component or components out of service from either or both Control Room HVAC divisions, comply with the following:

- Technical Specifications, Section 3.7.3, Control Room Emergency Filtration (CREF) System.
- Technical Specifications, Section 3.7.4, Control Center Air Conditioning (AC) System.
- TRM Section TR 3.7.2, Control Room Emergency Filtration (CREF) System.

3.2 If a Reactor accident occurs, the Control Center HVAC System Recirc Mode is used to reduce radiological exposure to Control Room personnel. In this mode, normal air intake and exhaust ducts are closed and a limited quantity of outside air is supplied to the Control Center for pressurization (+1/4" wc). Outside air for makeup to the Control Room is supplied by the Makeup and Recirculation Filter Train. The Recirculation Mode may be initiated manually or automatically with any one of the following signals from either the operating or non-operating division.

- Main Control Room Normal Intake Radiation High
- Low Reactor Water Level or High Drywell Pressure
- Reactor Building Ventilation Exhaust Radiation High
- East Fuel Pool Exhaust Radiation High
- West Fuel Pool Exhaust Radiation High
- A momentary loss of power of the essential bus
- East Fuel Pool Exhaust Radiation Monitor Failure
- West Fuel Pool Exhaust Radiation Monitor Failure
- Manual Isolation of Division 1 or Division 2 RBHVAC

CM

3.3 This system and its components contain organics (refrigerants) which, if drained to the floor/equipment drains, could have adverse consequences on plant operation. Before draining or venting this system to the floor/equipment drain system, refer to MOP21, " Housekeeping," for disposal of organics.

3.4 Recirculation Mode

3.4.1 When in the Recirc Mode with the Emergency Air Intake Selector switch in AUTO, the Control Center Emergency Air Inlet Radiation Monitor system logic will auto-isolate one air inlet path (N/S) which has a Hi-Hi trip following a five minute sampling period (in effect for selecting the air inlet with the lowest radiation level). Dampers on the tripped side will be closed for one hour. Both sides will then reopen for five minutes while inlet air is resampled. Inlet selection based on trip/no-trip will then be repeated. If no Hi-Hi trip is present, both inlets will remain open since there is no need (or signal present) to isolate one side or the other.

3.4.2 Although the auto-select logic provides a five minute resampling period for the radiation monitors, the piping configuration, by design, ensures that the monitors will access a representative sample of outside air for the isolated intake path. Therefore, when manually selecting a preferred air intake path, the resampling period is not mandatory for obtaining an accurate reading of outside radiation levels from the intake radiation monitors.

3.4.3 It is possible that significant levels of radiation at both inlets could be a consequence of unusual meteorological conditions. Both inlets could be automatically selected to open due to an inability of the logic system to resolve the lower of the two levels.

3.5 Operation of the Control Room Emergency Filtration System while in the Recirc or Chlorine Mode during any activity involving an unauthorized chemical release such as paint vapors or cleaning solvents within the Control Room should only be performed during an emergency. This will affect the performance of the charcoal filters. Should this occur, contact the Tech Group to verify acceptable performance of the filtration unit in accordance with 43.413.001, "Control Room Emergency Filter Performance Test."

3.6 Maximum differential pressure across the Recirculation Air Filter train is 9" wc.

3.7 Maximum differential pressure across the Makeup Air Filter train is 8" wc.

3.8 Control Center HVAC System operation is limited to one division at a time.

CM

3.9 Closure of Smoke/Halon Dampers for the Relay Room, Cable Spreading Room or Computer Room causes loss of both divisions of CCHVAC to their respective room. If the dampers cannot be reopened from H11-P816, manual actions are required to open them. 23.501.03, "Halon Fire Suppression System," contains instructions for opening these dampers.

3.10 During seismic testing the Div 1 Purge Purifier Unit tripped on high liquid level and will be required to be reset if a seismic event occurs.

3.11 If both of the Computer Room A/C Compressor Units [T4100-B047 (B045) and T4100-B048 (B046)] are shutdown, there is a potential for fire alarms and actuation of the Computer Room Halon System due to the increased humidity in the Computer Room. In order to eliminate the potential of a Halon dump, the Halon System should be isolated in accordance with 23.501.03, Section 9.1.2, Halon Protection Circuit Isolation, until one of the Computer Room A/C compressor units is returned to service.

3.12 Operating the chill water pump with the chiller shutdown for an extended period, approximately 40 minutes or more, will cause the Freon to boil in the evaporator and condense in the compressor which may result in compressor damage when starting the chiller.

3.13 The preferred mode is Normal while any breaches are in place. The Normal Mode has the most capacity to maintain a positive pressure in the Main Control Room with breaches in the pressure boundary. Refer to Tech Spec 3.7.3 for required actions.

3.14 The CCHVAC Kitchen and Toilet Exhaust Fans will continue to run in Recirculation and Chlorine Modes with their associated isolation dampers closed, allowing them to operate in a stall condition. If CCHVAC is anticipated to operate in Recirculation or Chlorine Mode for approximately 4 hours or more for planned maintenance, consider shutting off these fans to extend the life of the fans.

3.15 EECW TCV not in AUTO will require declaring the associated CCHVAC chiller inoperable, if operating, due to no temperature control of EECW to ensure chiller remains functional (chiller requires greater than 68°F supply cooling water). Therefore, when the EECW TCV is bypassed the associated Division of CCHVAC must be declared INOPERABLE, while in MODEs 1, 2, or 3, or during movement of recently irradiated fuel in Secondary Containment.

3.16 During non-emergency operations such as CCHVAC Startup or Mode Shifts, consider stationing personnel inside/outside MCR access doors to perform duties of a Safety Monitor. Access to the MCR should be avoided during times where large differential pressures can cause rapid door movement and/or revolving door collapse.

3.17 The Chill Water loops for CCHVAC have chemistry controls to inhibit corrosion. The amount of chemicals and the volume of CCHVAC Chilled Water inventory does not place any restrictions on draining the water to floor or equipment drains.

END OF SECTION

4.0 GENERAL PREREQUISITES

4.1 The following systems are in service to support Control Center HVAC System:

- Station and Control Air System in accordance with 23.129, "Station and Control Air System."
- Process Gaseous Radiation Monitoring System is operating in accordance with 23.625, "Process Gaseous Radiation Monitoring System," to support the operation of the Control Center HVAC System.
- RBCCW/EECW System in accordance with 23.127, “Reactor Building Closed Cooling Water/Emergency Equipment Cooling Water System.”

4.2 The following Attachments have been completed:

- Attachment 1, Control Center HVAC System Valve Lineup.
- Attachment 2, Control Center HVAC System Electrical Lineup.
- Attachment 3, Control Center HVAC System Instrument Lineup.

END OF SECTION

7.3 Control Center HVAC Automatic Mode Shift To Recirculation

7.3.1 Specific Prerequisites - None

7.3.2 Detailed Procedure

NOTE (1): Unless otherwise noted, all controls and indicators are on COP H11-P808 (P817).

NOTE (2): When CCHVAC is shifted to RECIRC, 3D38 (3D39), CONT CENTER EMERG AIR DIV I (II) RADN MON TROUBLE, will alarm momentarily until the sample pump is running.

CAUTION

Any unauthorized activity involving a chemical release such as paint vapors or cleaning solvents may adversely affect the filtration system when in the Recirc mode.

1. If Control Center HVAC system has shifted automatically to Recirc Mode:

   a. If **no** offsite radiation release has occurred, maintain Emergency Air Intake Selector switches in AUTO.

   b. If an offsite radiation release has occurred within 30 minutes:

      1) Place Emergency Air Intake Selector switch for both divisions to NORTH or SOUTH, selecting intake with lowest indicated radiation level.

      2) Periodically monitor wind speed and intake radiation levels during this mode **and** shift intake as necessary to minimize radiation levels of intake air.

   c. Determine status of T4100-C047 and C048, Div 1 and 2 CCHVAC Emerg Makeup Fans.

NOTE: Taking the Emergency Makeup Fan in the non-operating division to OFF maintains its availability for future use and does not render the fan inoperable.

      1) If both Div 1 and 2 CCHVAC Emerg Makeup Fans are running:

         • Stop the fan in the non-operating CCHVAC Division.

2) If only one CCHVAC Emerg Makeup Fan is running, leave it running even if in the non-operating Division.

NOTE: When CCHVAC shifts to RECIRC, Emergency Makeup Air Rad Monitor receives a start signal.

d. Verify the following radiation monitors are functional by ensuring OPERATE green lights are ON:

- D11-K836A, Div 1 S CCHVAC Emerg Air Inlet Rad Monitor (H11-P914)
- D11-K837A, Div 1 N CCHVAC Emerg Air Inlet Rad Monitor (H11-P914)
- D11-K836B, Div 2 S CCHVAC Emerg Air Inlet Rad Monitor (H11-P915)
- D11-K837B, Div 2 N CCHVAC Emerg Air Inlet Rad Monitor (H11-P915)

e. Place CCHVAC Div 1 Mode Select switch in RECIRC.

f. Place CCHVAC Div 2 Mode Select switch in RECIRC.

g. Verify damper position in accordance with Enclosure B.

h. If CCHVAC shifted to Recirc due to MPU 1 or 2 swap, restore heaters to on by depressing Heater ON pushbutton.

2. If CCHVAC is anticipated to operate in Recirculation Mode for approximately 4 hours or more, consider placing the following in Off (AB4-G11):

- T4100-C051, CCHVAC CR Kitchen Exhaust Fan.
- T4100-C052, CCHVAC CR Toilet Exhaust Fan.

3. When Recirc Mode is no longer required, restore CCHVAC to Normal Mode per Section 7.4, Control Center HVAC Manual Mode Shift To Normal.

END OF SECTION

7.6 Control Center HVAC Manual Mode Shift To Recirculation

NOTE: Unless otherwise noted all controls and indications are on COP H11-P808 (P817).

7.6.1 Specific Prerequisites - None

7.6.2 Detailed Procedure

CAUTION

Any unauthorized activity involving a chemical release such as paint vapors or cleaning solvents may adversely affect the filtration system when in the Recirc mode.

CAUTION

It is possible that significant levels of radiation at both inlets could be a consequence of unusual meteorological conditions. Both inlets could be automatically selected to open due to an inability of the logic system to resolve the lower of the two levels.

1. If CCHVAC is anticipated to operate in Recirculation Mode for approximately 4 hours or more, consider placing the following in Off (AB4-G11):
   - T4100-C051, CCHVAC CR Kitchen Exhaust Fan.
   - T4100-C052, CCHVAC CR Toilet Exhaust Fan.
2. Verify or place Div 1 (2) switches for the following equipment in AUTO:
   - **Div 1 CCHVAC**
     - T4100-B007, Div 1 CCHVAC Supply Fan.
     - T4100-C031, Div 1 CCHVAC Return Air Fan.
     - T4100-C041, Div 1 CCHVAC Chilled Wtr Pump.
     - T4100-B009, Div 1 CCHVAC Chiller.
     - T4100-C047, Div 1 CCHVAC Emerg Makeup Fan.
     - T4100-B028, Div 1 CCHVAC Equip Room Cooler.

- **Div 2 CCHVAC**
    - T4100-B006, Div 2 CCHVAC Supply Fan.
    - T4100-C030, Div 2 CCHVAC Return Air Fan.
    - T4100-C040, Div 2 CCHVAC Chilled Wtr Pump.
    - T4100-B008, Div 2 CCHVAC Chiller.
    - T4100-C048, Div 2 CCHVAC Emerg Makeup Fan.
    - T4100-B027, Div 2 CCHVAC Equip Room Cooler.

3. Place CCHVAC Div 1 Mode Select switch in RECIRC.

4. Place CCHVAC Div 2 Mode Select switch in RECIRC.

5. Depress CCHVAC Ventilation Mode Reset pushbutton momentarily for each division.

NOTE: When CCHVAC is shifted to RECIRC, 3D38 (3D39), CONT CENTER EMERG AIR DIV I (II) RADN MON TROUBLE, will alarm momentarily until the sample pump is up to speed.

6. Verify following equipment is running on the operating division:
    - T4100-B007 (B006), Div 1 (2) CCHVAC Supply Fan.
    - T4100-C041 (C040), Div 1 (2) CCHVAC Chilled Wtr Pump.

NOTE: T4100-B028 (B027) are controlled by room temperature and may not start.

- T4100-B028 (B027), Div 1 (2) CCHVAC Equip Room Cooler.
- T4100-C031 (C030), Div 1 (2) CCHVAC Return Air Fan.
- T4100-B009 (B008), Div 1 (2) CCHVAC Chiller.
- T4100-C047 (C048), Div 1 (2) CCHVAC Emerg Makeup Fan.

7. Determine status of T4100-C047 and C048, Div 1 and 2 CCHVAC Emerg Makeup Fans:

NOTE: Taking the Emergency Makeup Fan in the non-operating division to OFF maintains its availability for future use and does not render the fan inoperable.

   a. If both Div 1 and 2 CCHVAC Emerg Makeup Fans are running:

      • Stop the fan in the non-operating CCHVAC division.

   b. If only one CCHVAC Emerg Makeup Fan is running, leave it running even if in the non-operating division.

8. If **no** radiation release has occurred, maintain Emergency Air Intake Selector switches in AUTO.

9. If an offsite radiation release has occurred:

   a. Place Emergency Air Intake Selector switch for both divisions to NORTH or SOUTH, selecting intake with lowest indicated radiation level.

   b. Periodically monitor wind speed and intake radiation levels during this mode and shift intake as necessary to minimize radiation levels of intake air.

10. Verify damper position in accordance with Enclosure B.

NOTE: When CCHVAC shifts to RECIRC, Emergency Makeup Air Rad Monitor receives a start signal.

11. Verify the following radiation monitors are functional by ensuring OPERATE green lights are ON:

    • D11-K836A, Div 1 S CCHVAC Emerg Air Inlet Rad Monitor (H11-P914)

    • D11-K837A, Div 1 N CCHVAC Emerg Air Inlet Rad Monitor (H11-P914)

    • D11-K836B, Div 2 S CCHVAC Emerg Air Inlet Rad Monitor (H11-P915)

    • D11-K837B, Div 2 N CCHVAC Emerg Air Inlet Rad Monitor (H11-P915)

12. When Recirc Mode is no longer required, restore CCHVAC to Normal Mode per Section 7.4, Control Center HVAC Manual Mode Shift To Normal.

END OF SECTION

JOB PERFORMANCE MEASURE

Job Position RO	No. JP-OP-315-0172-207	Revision 2
JPM Title Restore/Protect RCIC as the Preferred HP Feed Source Due to a Fire in Zone 9	Duration 10 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO / NO

Evaluator: _____

Validating Representatives Name: K. Griffin / B. Skandalaris / S. Schmus

JPM Type: **Normal** / Alternate Path **/** Time Critical Start Time _____

Evaluation Method: Perform / **Walkthrough** / Discuss Stop Time _____

Location: **Plant** / Simulator / Classroom Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.											
*** 2.**											
*** 3.**											
*** 4.**											
5.											

OPERATOR FUNDAMENTALS OBSERVATION

Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.

Operator Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations	Comment Number
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS: _____

_____

_____

REMEDIAL CONTENT: _____

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

E5150 RCIC

Task:

04A0001012 Assist the Licensed Operator in responding to Plant Fires

References: Required (R) / Available (A)

Applicable pages (pp 29-32) of 20.000.22, “Plant Fires” (R)

Note: These need to be printed double-sided to match plant conditions for AOP usage.

Tools and Equipment Required:

None

Initial Conditions:

- You are an extra operator on shift.
- The plant is operating steady state at 100% rated thermal power.
- A Fire alarm (Zone 9) has been received in the West Cable Tunnel (Fire Zone 05 ABW) and a fire has been confirmed.
- The fire threatens cable trays in the cable tunnel.
- Spurious RCIC Valve isolations have occurred.
- All other operators are involved with fighting the fire.

Initiating Cue(s):

- The Control Room LNO has directed you to perform AOP 20.000.22, Subsequent Action AB.1 through AB.4.

Terminating Cue(s):

Examinee notifies the control room that AOP 20.000.22 actions AB.1 through AB.4 are complete.

Task Standard:

The task is satisfactorily met if the examinee opens, or directs to be opened, the following:

- 72F Position 4A.
- 2PB2-6 Circuit 11.
- 2PB2-5 Circuit 1.
- 2PB2-5 Circuit 10

Licensed Operator Exam Information (Required for NRC Exams Only)

Safety Function:

4 – Heat Removal from Reactor Core

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 217000 – Reactor Core Isolation Cooling System (RCIC)

K/A STATEMENT:

A2. Ability to (a) predict the impacts of the following on the REACTOR CORE ISOLATION COOLING SYSTEM (RCIC); and (b) based on those predictions, use procedures to correct, control, or mitigate the consequences of those abnormal conditions or operations:

A2.03 Valve closures due to malfunction(s)..... 3.8 / 3.7

Maintenance Rule Safety Classification:

From MMR Appendix E

Maintenance Rule Risk Significant? (Yes or No)

From MMR Appendix E

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	Provide examinee with Cue Sheet and a copy of the applicable pages from 20.000.22, Plant Fires AOP.		
PREREQUSITES: None			
NOTE: Fire may damage the circuitry to H11-P810 requiring the action to be taken at Bus 72F.			
1.	At H11-P810 Bus 72F, Open Position 4A (CR) or Open Position 4A at Bus 72F in D2 Switchgear Room (AB3 G-10).	1.	Contacts CR to OPEN 72F Position 4A. or Depresses OPEN pushbutton at Bus 72F Position 4A.
CUE:	**IF contacted to open 72F Position 4A from the CR, report that 72F Position 4A is OPEN.** **CUE: IF examinee explains that he/she will depress the trip pushbutton locally, inform examinee the following when 72F Position 4A pushbutton is depressed:** • Pushbutton inserted when depressed. • Flag status changed from red CLOSED to green OPEN. • Light status changed to red ON and green OFF.		
*** 2.**	At Dist Cab 2PB2-6, open Circuit 11 (RR West Wall South).	*** 2.**	Opens 2PB2-6 Circuit 11
CUE:	**2PB2-6 Circuit 11 is open.**		
*** 3.**	At Dist Cab 2PB2-5, open Circuit 1 (RR West Wall South).	*** 3.**	Opens 2PB2-5 Circuit 1
CUE:	**2PB2-5 Circuit 1 is open.**		
*** 4.**	At Dist Cab 2PB2-5, open Circuit 10 (RR West Wall South).	*** 4.**	Opens 2PB2-5 Circuit 10
CUE:	**2PB2-5 Circuit 10 is open.**		
5.	Notify the control room that 20.000.22 actions AB.1 through AB.4 are complete.	5.	The control room is notified that 20.000.22 actions AB.1 through AB.4 are complete.
CUE:	The control room acknowledges that 20.000.22 actions AB.1 through AB.4 are complete		
CUE:	**End JPM when examinee notifies the control room that 20.000.22 actions AB.1 through AB.4 are complete.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating 25 amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

Manual valves are checked in the closed direction (MOP02 and MOP05). Valve stem position may aid in valve position determination, but cannot be used as Independent Verification (MOP02).

Ex.: Verify valve closed: "Valve handwheel indicates no valve movement in the clockwise direction."

Verify valve open: "Valve handwheel has been rotated slightly in the clockwise direction and returned to the original positions."

Closing a valve: "Valve handwheel has been rotated in the fully clockwise direction until no additional valve movement. Valve stem is down."

Opening a valve: "Valve handwheel has been rotated in the fully counterclockwise direction until no additional valve movement, valve stem is out."

System Specific Notes and Cues:

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee if time compression will be used for activities performed outside of the Control Room. Notify Examinee if JPM is Time Critical (only if JPM is **NOT** Alternate Path).

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Cue Sheet: (JP-OP-315-0172-207)

Initial Conditions:

- You are an extra operator on shift.
- The plant is operating steady state at 100% rated thermal power.
- A Fire alarm (Zone 9) has been received in the West Cable Tunnel (Fire Zone 05 ABW) and a fire has been confirmed.
- The fire threatens cable trays in the cable tunnel.
- Spurious RCIC Valve isolations have occurred
- All other operators are involved with fighting the fire.

Initiating Cue(s):

- The Control Room LNO has directed you to perform AOP 20.000.22, Subsequent Action AB.1 through AB.4.

Cue Sheet: (JP-OP-315-0172-207)

Initial Conditions:

- You are an extra operator on shift.
- The plant is operating steady state at 100% rated thermal power.
- A Fire alarm (Zone 9) has been received in the West Cable Tunnel (Fire Zone 05 ABW) and a fire has been confirmed.
- The fire threatens cable trays in the cable tunnel.
- Spurious RCIC Valve isolations have occurred
- All other operators are involved with fighting the fire.

Initiating Cue(s):

- The Control Room LNO has directed you to perform AOP 20.000.22, Subsequent Action AB.1 through AB.4.

SUBSEQUENT ACTIONS (continued)

CONDITION	ACTION
	- - - - - - - - - - IMPACT 1 - - - - - - - - - - -
	- - - - - - - - - - STRATEGY 1 - - - - - - - - - -
AA. Fire Detection Zone 9/ Fire Zone 05ABE: E Cable Tunnel with Cable Trays threatened OR indication of HPCI Valve isolation of E4150-F075, RCIC System Actuation or Div 1 SRVs not warranted for current conditions ❑	❑ AA.1 At 2PA2-5 open Ckt 1 (RR NW Corner). ❑ AA.2 At 2PA2-6 open Ckt 1 (RR West Wall North). ❑ AA.3 At 2PA-1 open Pos 5C (AB3 G-11). ❑ AA.4 At H11-P601 unlock and close E5150-F007. ❑ AA.5 If above actions or plant conditions are unsuccessful in restoring a source of High pressure feed, then use the EOP flowcharts to establish a low pressure feed source. This is the action that meets 10CFR50 Appendix R Section III.G.2 requirements {Credited action}. All other actions outside the control room are to prevent having to rely on Low Pressure ECCS and depressurization.

IF	**Personnel feel effects of smoke inhalation.**	**THEN**	**All necessary personnel don respirators.**

IF	**HP Feed sources are insufficient to maintain RPV Level 3 AND two (2) or more SRVs are lifting.**	**THEN**	**Enter the EOPs for RPV Level Control.**

CAUTIONS - None

NOTES

7. Fire may damage the circuitry to H11-P810 requiring the action to be taken at Bus 72F.

IMPACTS

1. Damage caused by the fire has or could impact SBFW, HPCI, and RCIC. Should a loss of Offsite power or High Pressure Feed occur then actions should be taken per the EOP flowcharts.

STRATEGIES

1. Safe Shutdown strategy is to use available High Pressure Feed or depressurize to use low pressure ECCS systems per EOP flow charts if no High Pressure Feed is available. HPCI, RCIC, and SBFW may all be unavailable. HPCI is the preferred HP feed source and steps are to restore/protect HPCI. Depressurization should be using MT Bypass Valves or Div 2 SRVs. Div 2 SRVs may spuriously open during fires.

3. Safe Shutdown strategy is to use available High Pressure Feed or depressurize to use low pressure ECCS systems per EOP flow charts if no High Pressure Feed is available. HPCI, RCIC, and SBFW may all be unavailable. RCIC is the preferred HP feed source and steps are to restore/protect RCIC. Depressurization should be using MT Bypass Valves or Div 1 SRVs. Div 1 SRVs may spuriously open during fires.

COMPONENT DESCRIPTION

2PA-1, Pos 5C, E5150-F075
2PA2-5 Ckt 1, Div 1 SRVS & ADS Relays
2PA2-6 Ckt 1, Div 1 SRVS & ADS Relays
2PB2-5 Ckt 1, Div 2 SRV's B21-F013L, M, & N Ctrl Power
2PB2-5 Ckt 10, RCIC Vlv's E5150-F005, E5150-F026 & RCIC Ctrl Logic
2PB2-6 Ckt 11, B21-F013C, D, F, G, & K Div 2 SRV'S & Low-Low Set Logic
Bus 72F, Pos 4A, MCC 72F-4A Feed
E4150-F075, HPCI Exh Vac Bkr Otbd Iso Vlv
H11-P810, System Services 480V & 4160V Div 2 - Control Room
H11-P601, ECCS Div 1 Combination Operating Panel, Div 2 ADS inhibit/reset switches.

SUBSEQUENT ACTIONS (continued)

CONDITION	ACTION
AB. Fire Detection Zone 9/ Fire Zone 05ABW: W Cable Tunnel with Cable Trays threatened OR indication of RCIC Valve isolations and Div 2 SRV operation not warranted for current conditions ❑	- - - - - - - - - - **IMPACT 1** - **STRATEGY 3** - **NOTE 7** - - - - - - - - - - - - ❑ AB.1 At H11-P810 Bus 72F, open Pos 4A (CR) **or** Open Pos 4A at Bus 72F in Div 2 Switchgear Room (AB3 G-10). ❑ AB.2 At 2PB2-6, open Ckt 11 (RR W Wall South). ❑ AB.3 At 2PB2-5, open Ckt 1 (RR W Wall South). ❑ AB.4 At 2PB2-5 open Ckt 10 (RR West Wall South). ❑ AB.5 At H11-P601 reset and inhibit Div 2 ADS. (CR) ❑ AB.6 If above actions or plant conditions are unsuccessful in restoring a source of High pressure feed, then use the EOP flowcharts to establish a low pressure feed source. This is the action that meets 10CFR50 Appendix R Section III.G.2 requirements {Credited action}. All other actions outside the control room are to prevent having to rely on Low Pressure ECCS and depressurization.
AC. Fire Detection Zone 9/ Fire Zone 06AB: change Out area with Cable Trays threatened OR indication of HPCI Valve isolation of E4150-F075, RCIC System Actuation or Div 1 SRVs not warranted for current conditions ❑	- - - - - - - - - - **IMPACT 1** - **STRATEGY 1** - - - - - - - - - - - - ❑ AC.1 At 2PA2-5 open Ckt 1 (RR NW Corner). ❑ AC.2 At 2PA2-6 open Ckt 1 (RR West Wall North). ❑ AC.3 At 2PA-1 open Pos 5C (AB3 G-11).

(continued)

IF	**Personnel feel effects of smoke inhalation.**	**THEN**	**All necessary personnel don respirators.**

IF	**HP Feed sources are insufficient to maintain RPV Level 3 AND two (2) or more SRVs are lifting.**	**THEN**	**Enter the EOPs for RPV Level Control.**

CAUTIONS - None

NOTES

6. Fire may damage the circuitry to H11-P809 requiring the action to be taken at Bus 72C.

IMPACTS

1. Damage caused by the fire has or could impact SBFW, HPCI, and RCIC. Should a loss of Offsite power or High Pressure Feed occur then actions should be taken per the EOP flowcharts.

STRATEGIES

1. Safe Shutdown strategy is to use available High Pressure Feed or depressurize to use low pressure ECCS systems per EOP flow charts if no High Pressure Feed is available. HPCI, RCIC, and SBFW may all be unavailable. HPCI is the preferred HP feed source and steps are to restore/protect HPCI. Depressurization should be using MT Bypass Valves or Div 2 SRVs. Div 1 SRVs may spuriously open during fires.

COMPONENT DESCRIPTION

2PA-1, Pos 5C, E4150-F075
2PA2-5 Ckt 1, Div 1 SRVS & ADS Relays
2PA2-6 Ckt 1, Div 1 SRVS & ADS Relays
2PA2-6 Ckt 10, HPCI Valve Logic
Bus 72C Pos 3A, MCC 72C-3A Feed
E4150-F002, HPCI Stm Sply Inbd Iso Vlv
E4150-F075, HPCI Exh Vac Bkr Otbd Iso Vlv
E5150-F007, RCIC Pump Disch Otbd Iso Vlv
H11-P601, ECCS Div 1 Combination Operating Panel
H11-P809, System Services 480V & 4160V Div 1 - Control Room
E1150-F010, RHR Crosstie Vlv

JOB PERFORMANCE MEASURE

Job Position SRO / RO / NO	No. JP-OP-315-0262-004	Revision 0
JPM Title Transfer of UPS from the Voltage Regulator to the Rectifier Charger / Inverter	Duration 15 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO / NO

Evaluator: _____

Validating Representatives Name: _K. Griffin / B. Skandalaris / S. Schmus_____

JPM Type: **Normal** / Alternate Path **/** Time Critical

Evaluation Method: Perform / **Walkthrough** / Discuss

Location: **Plant** / Simulator / Classroom

Start Time _____

Stop Time _____

Total Time: _____

PERFORMANCE EVALUATION SUMMARY											
Element	S	U	Comment	Element	S	U	Comment	Element	S	U	Comment
1.											
2.											
*** 3.**											
4.											
5.											
*** 6.**											
*** 7.**											

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS:

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ / _____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Title Transfer of UPS from the Voltage Regulator to the Rectifier Charger / Inverter	No.: JP-OP-315-0262-004 Revision: 0 Page 3

JPM Information

System:

R3100 - Uninterruptible Power Supply

Task:

04R3100005 - Manually transfer Uninterruptible Power Supply from Alternate to Normal Power

References: Required (R) / Available (A)

23.308.01, Uninterruptible Power Supply (UPS) System (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are an extra operator on shift.
- UPS A Loads are being fed from UPS Bus A Voltage Regulator.
- Work has been completed on the UPS A Static Transfer Switch.
- On Panel R3100-S010, UPS A MANUAL BYPASS SWITCH is in ISOLATED BYPASS.
- On Panel R3100-S011, UPS Bus A Inverter, on the Display Panel:
    - AC INPUT AVAILABLE green LED, is ON.
    - OUT OF SYNC, red LED is extinguished.

Initiating Cue(s):

The Control Room LNO directs you to transfer UPS A Loads from the Voltage Regulator to the Rectifier Charger / Inverter in accordance with 23.308.01, UPS System SOP.

Terminating Cue(s):

UPS A Loads have been transferred from the Voltage Regulator to the Rectifier Charger / Inverter.

Task Standard:

The task is satisfactorily met when the examinee rotates the Manual Bypass Switch to the Bypass To Load position, then subsequently rotates the Manual Bypass Switch to Normal Operation position, and then cycles the Static Transfer Switch by depressing the Inverter to Load pushbutton.

JPM Title	No.: JP-OP-315-0262-004
Transfer of UPS from the Voltage Regulator to the Rectifier Charger / Inverter	Revision: 0 Page 4

Licensed Operator Exam Information (Required for NRC Exams Only)

Safety Function:

Safety Function 6 - Electrical

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 262002 - Uninterruptable Power Supply (A.C./D.C.)

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the control room: *

A4.01 Transfer of power sources..... 3.1

* **Note**: At Fermi 2, the UPS is operated locally in the field to transfer power supplies.

Maintenance Rule Safety Classification:

R3100-05

Maintenance Rule Risk Significant? (Yes or No)

No

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide Examinee with Cue Sheet and copy of applicable portions of 23.308.01**		
1.	[6.2.1] Pre-requisites.	1.	Verifies prerequisites are met (from CUE).
CUE:	**IF asked, direct examinee to the cue sheet for indications required by the prerequisites.**		
2.	[6.2.2.1] On Panel R3100-S010, UPS Bus A Voltage Regulator, determine position of UPS A MANUAL BYPASS SWITCH.	2.	Determines position of UPS A MANUAL BYPASS SWITCH.
CUE:	**Inform examinee that the UPS A MANUAL BYPASS SWITCH is in ISOLATED BYPASS.**		
*** 3.**	[6.2.2.1.a] If in ISOLATED BYPASS, transfer the MANUAL BYPASS SWITCH to BYPASS TO LOAD.	*** 3.**	Rotates the MANUAL BYPASS SWITCH to BYPASS TO LOAD position.
CUE:	**When the examinee simulates rotating the switch in the correct direction, inform the examinee that the MANAUAL BYPASS SWITCH is in the BYPASS TO LOAD position.**		
4.	[6.2.2.1.b] If in BYPASS TO LOAD, perform the following: 1) On panel R3100-S011, UPS Bus A Inverter, on the Display Panel, verify BYPASS TO LOAD pushbutton amber LED is illuminated.	4.	Checks status of BYPASS TO LOAD pushbutton amber LED.
CUE:	**Inform examinee that the BYPASS TO LOAD pushbutton amber LED is illuminated.** **IF asked, inform examinee that the INVERTER TO LOAD pushbutton green LED is OFF.**		
5.	[6.2.2.1.b] If in BYPASS TO LOAD, perform the following: 2) On Panel R3100-S010, UPS Bus A Voltage Regulator, verify In Sync green light is illuminated.	5.	Checks status of In Sync green light.
CUE:	**IF examinee asks, inform examinee that the green In Sync light is lit.**		
*** 6.**	[6.2.2.1.b.2)a)] Transfer MANUAL BYPASS SWITCH, to NORMAL OPERATION.	*** 6.**	Rotates the MANUAL BYPASS SWITCH to the NORMAL OPERATION position.
CUE:	**When the examinee simulates rotating the switch in the correct direction, inform the examinee that the MANAUAL BYPASS SWITCH is in the NORMAL OPERATION position.**		
*** 7.**	[6.2.2.2] At Panel R3100-S011, UPS Bus A Inverter, on the Display Panel, perform the following: a. Depress INVERTER TO LOAD pushbutton. b. Verify the green LED on the INVERTER TO LOAD pushbutton illuminates.	*** 7.**	Presses and releases INVERTER TO LOAD pushbutton. Checks status of the green LED on the Inverter to Load Pushbutton.

ELEMENT	STANDARD
NOTE: IF the examinee failed to place the Manual Bypass Switch to NORMAL OPERATION, WHEN the examinee depresses the INVERTER TO LOAD pushbutton, NOTHING will happen. IF this occurs, provide the following cues: **CUE: IF the examinee checks the status of the INVERTER TO LOAD green LED, inform the examinee that the green LED on the INVERTER TO LOAD pushbutton is NOT lit.** **IF the examinee checks the status of the BYPASS TO LOAD amber LED, inform the examinee that the amber LED on the BYPASS TO LOAD pushbutton is lit.**	
NOTE: IF the examinee (properly) placed the Manual Bypass Switch to NORMAL OPERATION, provide the following cues: **CUE: When the examinee simulates pressing the INVERTER TO LOAD pushbutton, inform the examinee that the green LED on the pushbutton is LIT.** **IF examinee checks, inform examinee that the amber LED on the BYPASS TO LOAD pushbutton is OFF.**	
CUE: End JPM when UPS A has been transferred from the Voltage Regulator to the Rectifier Charger / Inverter.	

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

JPM Title Transfer of UPS from the Voltage Regulator to the Rectifier Charger / Inverter	No.: JP-OP-315-0262-004 Revision: 0 Page 7

Evaluator Notes:

Start this JPM at the UPS.

This JPM can be performed on either UPS.

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

FAILURE TO WEAR ALL PPE REQUIRED FOR TASK PERFORMANCE WILL RESULT IN FAILURE OF THIS JPM.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating 25 amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

Manual valves are checked in the closed direction (MOP02 and MOP05). Valve stem position may aid in valve position determination, but cannot be used as Independent Verification (MOP02).

Ex.: Verify valve closed: "Valve handwheel indicates no valve movement in the clockwise direction."

Verify valve open: "Valve handwheel has been rotated slightly in the clockwise direction and returned to the original positions."

Closing a valve: "Valve handwheel has been rotated in the fully clockwise direction until no additional valve movement. Valve stem is down."

Opening a valve: "Valve handwheel has been rotated in the fully counterclockwise direction until no additional valve movement, valve stem is out."

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee.

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

N/A

Malfunctions:

Number	Title	Value	Delay	Ramp
N/A				

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp
N/A				

Special Instructions:

N/A

Cue Sheet: (JP-OP-315-0262-004)

Initial Conditions:

- You are an extra operator on shift.
- UPS A Loads are being fed from UPS Bus A Voltage Regulator.
- Work has been completed on the UPS A Static Transfer Switch.
- On Panel R3100-S010, UPS A MANUAL BYPASS SWITCH is in ISOLATED BYPASS.
- On Panel R3100-S011, UPS Bus A Inverter, on the Display Panel:
    - AC INPUT AVAILABLE green LED, is ON.
    - OUT OF SYNC, red LED is extinguished.

Initiating Cue(s):

The Control Room LNO directs you to transfer UPS A Loads from the Voltage Regulator to the Rectifier Charger / Inverter in accordance with 23.308.01, UPS System SOP.

Cue Sheet: (JP-OP-315-0262-004)

Initial Conditions:

- You are an extra operator on shift.
- UPS A Loads are being fed from UPS Bus A Voltage Regulator.
- Work has been completed on the UPS A Static Transfer Switch.
- On Panel R3100-S010, UPS A MANUAL BYPASS SWITCH is in ISOLATED BYPASS.
- On Panel R3100-S011, UPS Bus A Inverter, on the Display Panel:
  - AC INPUT AVAILABLE green LED, is ON.
  - OUT OF SYNC, red LED is extinguished.

Initiating Cue(s):

The Control Room LNO directs you to transfer UPS A Loads from the Voltage Regulator to the Rectifier Charger / Inverter in accordance with 23.308.01, UPS System SOP.

Revision Summary

1) Corrected Attachment 4 heading per CARD 22-22130, no rev bars used on attachment.

Attachments

1	101818	UPS A Electrical Lineup - Standby
2	101818	UPS B Electrical Lineup – Standby
3	101818	UPS A System Electrical Lineup – Operating
4	030122	UPS B System Electrical Lineup – Operating

Enclosures

A	081618	UPS Panel Diagram
B	081618	UPS Manual Bypass Switch Diagram
C	100119	UPS System Single Line Diagram
D	012220	UPS Essential Loads
E	100119	Expected Alarms on UPS Shutdown

TABLE OF CONTENTS

1.0 PURPOSE

To prescribe the method for operating the Uninterruptible Power Supply (UPS) System.

1.1 UPS System Description

The UPS System is designed to supply regulated, transient-free, uninterruptible 120 VAC power to essential plant instruments. The UPS System consists of Units A and B, disconnect switches, and a battery rack with fused disconnect switches. Units A and B each consist of a Regulator (line voltage regulator), Static switch, Inverter (static inverter), Rectifier-Charger (regulated rectifier), and Distribution Panel. All UPS equipment is located at RW2-M16, adjacent to BOP Battery Room (see Enclosure C).

The normal power supply to UPS Bus A and the alternate supply to UPS Bus B is from Bus 72M position 3D. The normal supply to UPS Bus B and the alternate supply to UPS Bus A is from Bus 72R position 2B.

During normal operation, each Rectifier/Charger provides regulated DC voltage to the Inverters and maintains the common battery at full charge voltage. In turn, the Inverter supplies its associated distribution panel with AC voltage. If a normal power supply is lost or a Rectifier/Charger fails, the other UPS unit's Rectifier/Charger will supply both Inverters and maintain the battery charged. If an inverter failure occurs or the DC power is lost (both Rectifier/Chargers and the battery), a static switch will automatically supply the distribution cabinet on that side from the Bypass power supply. A low voltage DC disconnect occurs at 210 VDC. Supplied loads include the Integrated Plant Computer System (IPCS), Turbine Control, Rod Position Information System, and Feedwater Control.

The following is a list of the major components and their functions:

480 VAC Disconnect Switches: Two three-phase disconnect switches, one for each unit, are supplied to isolate the normal power supply to each Rectifier/Charger. Two three-phase disconnect switches, one for each unit, are supplied to isolate the alternate power supply to each Regulator.

Rectifier/Charger: Each unit provides a regulated DC voltage to its associated Inverter and maintains the 240 VDC battery at full charge. Each Rectifier/Charger has the capacity to supply the Inverter, operating at full load, and to recharge a fully discharged battery to 95% of rated voltage within 12 hours. The Rectifier/Chargers operate in parallel in either the Float Mode or the Equalize Mode. A timer is provided to allow placing the Rectifier/Chargers into the Equalize Mode for up to 20 hours. DC voltage is nominally 270 VDC in the float mode and 280 VDC in the equalize mode.

Voltage Regulator: Provides regulated 120 VAC from the alternate power supply for each unit to the Bypass side of each unit's Static switch, and the MANUAL BYPASS SWITCH.

Inverters: Convert 210 to 280 VDC to a regulated 120 VAC for the normal input to each unit's Static switch.

Static Transfer Switch: The Static Switch is an electronic switch comprised of two pairs of silicon-controlled rectifiers (SCR) with each pair connected in inverse parallel (back-to-back). One set of SCRs is connected to the Inverter while the other set of SCRs is connected to the bypass power source. The outputs of the two sets of SCRs are connected and furnish power to the critical loads. Reed relays are integrated into the SCR gating logic to provide a fail-safe transfer to the bypass source in the event of a system failure.

- **Static Switch Transfer Criteria**

  Inverter Failure (Fast): When the half cycle Inverter voltage drops below its envelope set point for a period greater than 4ms. Under this condition the load is transferred to the bypass source no matter the sync condition between the Inverter and the bypass source.

  Overload: When the output R.M.S. current exceeds the time versus capacity limits of the Inverter Bridge components. For a constant 125% load the time will be 10 minutes, and at 150% load the time will be 1 minute. The bypass and Inverter must be in-sync for this transfer to take place. If a sync condition does not exist, then a transfer will not occur.

  Inverter Low Voltage: When the Inverter R.M.S. voltage value goes below the Inverter Low Voltage set point. This set point is nominally set at -10% and is adjustable. The bypass and Inverter must be in sync for this transfer to take place. If a sync condition does not exist, then a transfer will not occur.

  Inverter High Voltage: When the Inverter R.M.S. voltage value goes above the Inverter High Voltage set point. This set point is nominally set at +10% and is adjustable. The bypass and Inverter must be in sync for this transfer to take place. If a sync condition does not exist, then a transfer will not occur.

- **Static Switch Retransfer Criteria**

  The Static Switch will automatically retransfer the load to the Inverter following an automatic Static Switch transfer assuming all the following conditions are true:

  - Auto Retransfer is enabled.
  - Bypass and Inverter are in sync.
  - Conditions outlined in the Static Switch Transfer Criteria above do not exist.
  - AC output current is less than or equal to 100% of the system rating.
  - Auto Retransfer time delay has expired.

  If any of these conditions are not true, then the load will not automatically retransfer back to the Inverter.

  The failure of the bypass line, while the Static Switch is in Bypass to Load position, will result in the loss of power to the load, i.e. the Static Switch will not retransfer the load back to the Inverter automatically. Manual transfers are allowed during a bypass source failure assuming the Inverter output is within specifications and an overload does not exist.

  On initial power-up the Static Switch will be in the Bypass to Load position, i.e. starting the load on the bypass power source. The Static Switch will then retransfer (assuming the Auto Retransfer feature has been enabled), the load to the Inverter. If any of the conditions outlined above are not met the Static Switch will remain on bypass until the failure conditions are remedied.

Manual Bypass Switch: This is a manually operated switch on each unit allows transferring of the power supply to the Bypass Power, bypassing the Static switch and all control logic. The Manual Bypass Switch is used when either maintenance or testing needs to be performed on the Static switch, the unit is to be totally shutdown, or an Inverter or Static switch fails.

Sync Monitor: The MBS Sync Monitor Board monitors the synchronization between the Normal AC Input and the bypass source. When the board recognizes that these two sources are in sync it will cause the In-Sync LED to illuminate and the solenoid lockout to de-energize.

Auto Retransfer Capability: The RETRANSFER ENABLE SCREEN allows the user to either enable or disable the Auto Retransfer capability of the Static Transfer Switch. When enabled, the Static Switch will automatically retransfer the load back to the Inverter, assuming Inverter conditions are normal, after an automatic transfer to the bypass source. When disabled, the Static Switch will not transfer the load back to the Inverter after an automatic transfer to the bypass source.

Alarm Lamps, Test, and Reset Pushbuttons: Various alarm lamps are provided to provide local indication of system malfunctions. Alarm lights will latch in. Depressing the Alarm Latch Reset pushbutton will clear the lamp if the initiating condition has cleared.

Battery: The UPS Battery is designed to supply the 30kVA Inverters, operating at full rated output, for a period of 30 minutes. A two-pole fused disconnect switch is provided to allow maintenance. RID 86667 increased the battery amp-hour rating from 253 Amp-hours to 508 Amp-hours.

The clock time on the Main Display Screen is updated every six minutes.

END OF SECTION

2.0 REFERENCES

2.1 Use References

23.118, "Main Generator And Generator Excitation"

23.308.02, "Integrated Plant Computer System (IPCS) Power Supply"

23.608, "Rod Worth Minimizer"

23.615, "Integrated Plant Computer System (IPCS)"

2.2 Potential Use References

2.2.1 Drawings

SD-2510-02	Schematic Diagram - 480V BOP Buses #72L, R, A and M, Radwaste Bldg
SD-2511-33	Wiring Diagram - 480V Bus 72R Pos A, B, C and D
SD-2530-18	UPS One Line Diagram - Units A and B

END OF SECTION

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Battery voltage must be between 210 to 280 VDC for proper UPS system operation.

3.2 If UPS Battery voltage is less than 210 VDC as indicated on Battery Voltage on the Metering Screen, then the battery must be charged before placing UPS Bus A (B) Inverter in service.

3.4 Unless Inverter is in sync with Voltage Regulator output, depressing the BYPASS TO LOAD pushbutton will not operate the Static Transfer Switch.

3.5 Do not reposition SW800, MANUAL BYPASS SWITCH, unless transfer unit is in synch.

3.6 120Kv/SBO DCS is fed from UPS A/B, de-energizing both UPS A and B will result in no control of 120Kv mat, CTGs from EF2 control room or H21-P623 unless temporary power is provided to DCS.

3.7 A DC Disconnect condition will cause the Battery Input Breaker, to trip open. Upon restoration of AC input to the Battery Charger, the Battery Charger will resume normal operation and the Inverter will auto-restart. For the Battery Charger to begin supplying power to the Batteries the Battery Input Breaker must be reset to the ‘off’ position and then closed to the ‘on’ position.

3.8 The failure of the Voltage Regulator, while the Static Switch is in BYPASS TO LOAD position, will result in the loss of power to the load, i.e. the Static Switch will not retransfer the load back to the Inverter automatically. Manual transfers are allowed during a Voltage Regulator failure assuming the Inverter output is within specifications and an overload does not exist.

3.9 The preferred method to place UPS Bus A (B) on alternate power supply is with the Static Transfer switch.

END OF SECTION

4.0 GENERAL PREREQUISITES

4.1 The following systems are available to support UPS System operation:

- 72M is energized

OR

- 72R is energized

END OF SECTION

6.2 UPS A Load Transfer to Rectifier Charger / Inverter

6.2.1 Prerequisites

1. UPS A Loads are being fed from UPS Bus A Voltage Regulator.

2. On Panel R3100-S011, UPS Bus A Inverter, on the Display Panel, Normal Power Supply is available as indicated by:

   - AC INPUT AVAILABLE green LED, is ON.

   - OUT OF SYNC, red LED is extinguished.

6.2.2 Detailed Procedure

1. On Panel R3100-S010, UPS Bus A Voltage Regulator, determine position of UPS A MANUAL BYPASS SWITCH.

   a. If in ISOLATED BYPASS, transfer the MANUAL BYPASS SWITCH to BYPASS TO LOAD.

   b. If in BYPASS TO LOAD, perform the following:

      1) On panel R3100-S011, UPS Bus A Inverter, on the Display Panel, verify BYPASS TO LOAD pushbutton amber LED is illuminated.

      2) On Panel R3100-S010, UPS Bus A Voltage Regulator, verify In Sync green light is illuminated.

         a) Transfer MANUAL BYPASS SWITCH, to NORMAL OPERATION.

NOTE: Static switch will only transfer load if all transfer criteria are met.

2. At Panel R3100-S011, UPS Bus A Inverter, on the Display Panel, perform the following:

   a. Depress INVERTER TO LOAD pushbutton.

   b. Verify the green LED on the INVERTER TO LOAD pushbutton illuminates.

END OF SECTION

JOB PERFORMANCE MEASURE

Job Position SRO / RO	No. JP-OP-315-0150-001	Revision 6
JPM Title Startup Fuel Pool Ventilation Exhaust Radiation Monitor D11-K609A	Duration 15 minutes*	Page 1

*2 times Duration for ILO Exams

Examinee: _____ SRO / RO

Evaluator: _____

Validating Representatives Name: _K. Griffin / B. Skandalaris / S. Schmus_____

JPM Type: **Normal** / Alternate Path **/** Time Critical

Evaluation Method: Perform / **Walkthrough** / Discuss

(Circle method used) **Plant** / Simulator / Classroom

Start Time _____

Stop Time _____

Total Time: _____

PERFORMANCE EVALUATION SUMMARY							
Element	S	U	Comments	Element	S	U	Comments
1.							
*** 2.**							
*** 3.**							
4.							
5.							
6.							

OPERATOR FUNDAMENTALS OBSERVATION				
Monitor operator fundamentals during the JPM set. Rate each area based on the criteria by placing a checkmark in the appropriate column. Indicate the comment number associated with the observation.				
Operator Fundamental	**Meets all Expectations**	**Opportunity for Improvement**	**Does not meet Expectations**	**Comment Number**
Monitoring				
Control				
Conservatism				
Teamwork				
Knowledge				

OVERALL EVALUATOR COMMENTS:

_____ PASS _____ FAIL

Evaluator Signature / Date: _____ /_____

JPM Observation Criteria

Fundamental	Meets all Expectations	Opportunity for Improvement	Does not meet Expectations
Monitoring	Equipment status monitored at proper frequency, using multiple means if available. Understood which indications were critical.	Some monitoring was performed but undue focus on task or lack of system knowledge prevented ideal monitoring.	Did not recognize key equipment status indicators, too much focus on single indications and ignored total system status.
Control	Task preview used to prepare for job. Aware of control bands and maintained them. Configuration control maintained.	Adequate control of system maintained throughout task but some improvements could be made such as better manual control or greater depth of knowledge for anticipating system response.	No anticipation of results of actions. Unaware or control bands or not able to maintain them. Lack of knowledge of how to control system parameters.
Conservatism	Low threshold for identification of problems. Questioning attitude. Uses “stop when unsure” if needed. Sensitive to nuclear safety.	Some opportunities existed to question before proceeding, High focus on task completion without consideration for other system affects.	Proceeds even when unsure with unanswered questions. High threshold for problem conditions.
Teamwork	Routinely communicates system status changes to the team. Communicates actions before taking them.	Communicated most status and actions. Some improvement would be warranted.	Routinely takes action without informing the team.
Knowledge	Able to anticipate system response based on solid system knowledge. Good working knowledge of generic fundamentals to predict and monitor system response.	Plant, system, or generic fundamental knowledge has some gaps.	Unable to predict system response, unsure of generic fundamentals concepts related to plant operation. Only relied on procedure for operating knowledge.

JPM Information

System:

D1100 – Radiation Monitoring

Task:

02D1100007 - Operate the Division I/II Fuel Pool Ventilation Exhaust Radiation Monitors

References: Required (R) / Available (A)

23.625, Process Gaseous Radiation Monitoring (R)

Tools and Equipment Required:

None

Initial Conditions:

- You are the Patrol LNO.
- Troubleshooting was performed on Div I Fuel Pool E Vent Exh Rad Monitor D11-K609A.
- Troubleshooting is complete.

Initiating Cue(s):

- The CRS directs you to place Div I Fuel Pool East Ventilation Exhaust Radiation Monitor D11-K609A in service in accordance with 23.625.
- All procedure prerequisites are complete to place this radiation monitor in service.

Terminating Cue(s):

Div I Fuel Pool E Vent Exh Rad Monitor D11-K609A is in service per 23.625.

Task Standard:

The task is satisfactorily met if the examinee recognizes that the mode selector switch for the D11-K609A is not in the correct position, places the mode selector switch in Operate, and then presses and releases the Reset pushbutton.

Licensed Operator Exam Information (required for NRC exams)

Safety Function:

9 – Radioactivity Release

K/A Reference: (from NUREG 1123)

K/A SYSTEM: 272000 - Radiation Monitoring System

K/A STATEMENT:

A4. Ability to manually operate and/or monitor in the control room: (CFR: 41.7 / 45.5 to 45.8)

A4.05 Process radiation monitor 3.3

Maintenance Rule Safety Classification:

D1100-03

Maintenance Rule Risk Significant? (Yes or No)

Yes

PERFORMANCE EVALUATION

Start Time _____

ELEMENT		STANDARD	
CUE:	**Provide examinee with Cue Sheet and copy of (applicable sections of) 23.625.**		
1.	[8.2.1.1] At D11-K609A, Div 1 Fuel Pool E Vent Exh Rad Monitor, verify Mode Selector Switch (S1) is in OPERATE.	1.	Recognizes that the Mode Selector Switch (S1) is in TRIP TEST.
CUE:	**IF examinee asks position, The Mode Selector Switch (S1) is in TRIP TEST.** **IF examinee checks light status, the LOW light is off and the HIGH light is LIT.**		
CUE:	**IF examinee calls the Main Control Room, grant permission to place the Mode Selector Switch (S1) in OPERATE.**		
*** 2.**	[8.2.1.1] Place Mode Selector Switch (S1) in OPERATE.	*** 2.**	Rotates Mode Selector Switch (S1) from TRIP TEST to OPERATE.
CUE:	**IF examinee simulates turning the Mode Selector Switch (S1), inform the examinee that the Mode Selector Switch (S1) is in the position demonstrated by the examinee.** **IF examinee checks light status, the LOW light is off and the HIGH light is LIT.**		
*** 3.**	[8.2.1.2] At D11-K609A, Div 1 Fuel Pool E Vent Exh Rad Monitor, depress RESET Pushbutton (S2).	*** 3.**	Presses and releases RESET Pushbutton (S2).
CUE:	**When examinee simulates pressing the RESET Pushbutton (S2), inform examinee that the RESET Pushbutton (S2) has been pressed and released.**		
4.	[8.2.1.3.a] At D11-K609A, Div 1 Fuel Pool E Vent Exh Rad Monitor, verify white LOW light (DS-1) is OFF.	4.	Verifies white LOW light (DS-1) is OFF.
CUE:	**IF examinee checks status of the White LOW light (DS-1), inform examinee that the White LOW light (DS-1) is OFF.**		
5.	[8.2.1.3.b] At D11-K609A, Div 1 Fuel Pool E Vent Exh Rad Monitor, verify amber HIGH light (DS-2) is OFF.	5.	Verifies amber HIGH light (DS-2) is OFF.
CUE:	**If examinee checks status of the Amber HIGH light (DS-2), inform examinee the Amber HIGH light (DS-2) is OFF.**		
6.	[8.2.2] Verify the following alarms are clear: • 3D27, DIV I/II FP VENT EXH RADN MONITOR DNSCL/INOP • 3D31, DIV I/II FP VENT EXH RADN MONITOR UPSCALE • 3D35, DIV I/II FP VENT EXH RADN MONITOR UPSCALE TRIP	6.	Contacts the Control Room to verify alarms 3D27, 3D31, and 3D35 are clear.
CUE:	**If the examinee contacts the Main Control Room, inform the examinee that alarms 3D27, 3D31, and 3D35 are all clear.**		
CUE:	**End JPM when Fuel Pool Vent Exhaust Radiation Monitor D11-K609A is in service.**		

_____ SATISFACTORY _____ UNSATISFACTORY

Stop Time _____

*** Critical Step**

Evaluator Notes:

Do not permit the examinee to operate any plant equipment. Placing the Mode Selector Switch in any position other than OPERATE will trip RBHVAC.

ENSURE ALL INDUSTRIAL AND PERSONNEL SAFETY PRACTICES ARE USED AND ENFORCED AT ALL TIMES.

Generic Notes and Cues:

CMC switches will turn RED and amperage will increase when the switch is rotated to the start position started. The current should initially be five to seven times the normal running amps with the ammeter flashing. As counter EMF is developed, the amperage will lower to the normal running amperage and the ammeter will no longer flash. CMC switches will turn GREEN when the pumps are stopped and amperage will decrease to zero.

Ex.: Pump start: "Switch has been rotated to the start position, red light is lit, green light is out, amperage initially pegs out high, and is now indicating __X__ amps."

Pump stop: "Switch has been rotated to the stop position, green light is lit, red light is out, amperage indicates 0 amps."

Remotely operated valve position is determined with open and close indicating lights. A RED light only would indicate that the valve is open. A GREEN light only would indicate that the valve is closed. Dual indication would indicate that the valve is in some intermediate position.

Manual valves are checked in the closed direction (MOP02 and MOP05). Valve stem position may aid in valve position determination, but cannot be used as Independent Verification (MOP02).

Ex.: Verify valve closed: "Valve handwheel indicates no valve movement in the clockwise direction."

Verify valve open: "Valve handwheel has been rotated slightly in the clockwise direction and returned to the original positions."

Closing a valve: "Valve handwheel has been rotated in the fully clockwise direction until no additional valve movement. Valve stem is down."

Opening a valve: "Valve handwheel has been rotated in the fully counterclockwise direction until no additional valve movement, valve stem is out."

Controllers have an Auto light that is GREEN when selected and AMBER (YELLOW) when Manual is selected. When in Manual, the open and closed pushbuttons control the parameter to be changed by adjusting position or speed. When the deviation meter is nulled, then the process can be shifted to Auto to allow the desired setpoint to control the process.

System Specific Notes and Cues:

None

Task Performance and Cues:

The Elements of this JPM are step by step in accordance with the procedure. The Standard is that the procedure is performed as written. The Cues are as listed above for indication or as each step is completed the appropriate information is reported to the examinee. Notify Examinee that time compression may be used for activities performed outside of the Control Room. Notify Examinee if JPM is Time Critical (only if JPM is **NOT** Alternate Path.)

Critical Steps:

Critical Tasks are identified by asterisk (*) and **bolded** steps on the cover sheet. Verify that the latest revision of the procedure is used and critical tasks are correctly identified.

FOLLOW-UP DOCUMENTATION QUESTIONS

Reason for follow-up question(s):

Question:

Reference:

Response:

Question:

Reference

Response:

Simulator Setup

IC#:

N/A

Malfunctions:

Number	Title	Value	Delay	Ramp
N/A				

Remote Functions:

Number	Title	Value	Delay	Ramp
N/A				

Override Functions:

Number	Title	Value	Delay	Ramp
N/A				

Special Instructions:

N/A

Cue Sheet: (JP-OP-315-0150-001)

Initial Conditions:

- You are the Patrol LNO.
- Troubleshooting was performed on Div I Fuel Pool East Vent Exh Rad Monitor D11-K609A.
- The troubleshooting is complete.

Initiating Cue(s):

- The CRS directs you to place the Div I Fuel Pool East Ventilation Exhaust Radiation Monitor D11-K609A in service in accordance with 23.625.
- All procedure prerequisites are complete to place this radiation monitor in service.

Cue Sheet: (JP-OP-315-0150-001)

Initial Conditions:

- You are the Patrol LNO.
- Troubleshooting was performed on Div I Fuel Pool East Vent Exh Rad Monitor D11-K609A.
- The troubleshooting is complete.

Initiating Cue(s):

- The CRS directs you to place the Div I Fuel Pool East Ventilation Exhaust Radiation Monitor D11-K609A in service in accordance with 23.625.
- All procedure prerequisites are complete to place this radiation monitor in service.

PROCESS GASEOUS RADIATION MONITORING

Revision Summary

1) Changed D11-K816A, 817A, 836A and 837A to RM-1000 per EDP 70198.

Attachments – See pages 2 and 3

Enclosures

A	030920	Process Gaseous Radiation Monitors
B	061407	Eberline System SS-1 Unit and Channel Number Assignments
C	121202	SS-1 Status Conditions
D	121202	SS-1 System Status Annunciator
E	112895	Communication Error Messages
F	061099	Process Gaseous Radiation Monitors Assignments
G	061099	Process Gaseous Radiation Monitor Trips
H	071099	Table of Required Attachments

Attachments

1	050306	Off Gas Monitoring Valve Lineup
2	061407	OSSF Vent Exhaust Valve Lineup
3	061407	RB Exhaust Plenum Valve Lineup
4	031201	TB Vent Exhaust Valve Lineup
5	061407	RWB Vent Exhaust Valve Lineup
6	061407	Div 1 SGTS Exhaust Valve Lineup
7	061407	Div 2 SGTS Exhaust Valve Lineup
8	031201	Div 1 SGTS Exhaust ARM AXM-1 Valve Lineup
9	031201	Div 2 SGTS Exhaust ARM AXM-1 Valve Lineup
10	031201	Div 1 RB Vent Exhaust Valve Lineup
11	031201	Div 2 RB Vent Exhaust Valve Lineup
12	111209	Div 1 CCHVAC Emerg Air S Inlet Valve Lineup
13	111209	Div 2 CCHVAC Emerg Air S Inlet Valve Lineup
14	111209	Div 1 CCHVAC Emerg Air N Inlet Valve Lineup
15	111209	Div 2 CCHVAC Emerg Air N Inlet Valve Lineup
16	031201	Div 1 CCHVAC Makeup Air Valve Lineup
17	031201	Div 2 CCHVAC Makeup Air Valve Lineup
18	041922	Fuel Pool Vent Exhaust Electrical Lineup
19	032912	Main Steam Line Electrical Lineup
20	032912	Off Gas Monitoring Electrical Lineup
21	032912	Div 1 Containment Area Hi Range Electrical Lineup
22	032912	RWB Vent Exhaust Electrical Lineup
23	032912	OSSF Vent Exhaust Electrical Lineup
24	032912	RB Exhaust Plenum Electrical Lineup
25	032912	TB Vent Exhaust Electrical Lineup
26	032912	Div 2 Containment Area Hi Range Electrical Lineup
27	032912	Div 1 and Div 2 SGTS Exhaust Electrical Lineup
28	032912	Balance of Plant Monitoring Electrical Lineup
29	022203	Deleted
30	032912	Div 1 Two Minute Holdup Pipe Electrical Lineup
31	032912	Div 2 Two Minute Holdup Pipe Electrical Lineup
32	032912	Div 1 RB Vent Exhaust Electrical Lineup
33	032912	Div 2 RB Vent Exhaust Electrical Lineup
34	032912	Div 1 CCHVAC Makeup Air Electrical Lineup
35	032912	Div 2 CCHVAC Makeup Air Electrical Lineup
36	032912	Div 1 CCHVAC Emerg Air S Inlet Electrical Lineup
37	032912	Div 2 CCHVAC Emerg Air S Inlet Electrical Lineup
38	032912	Div 1 CCHVAC Emerg Air N Inlet Electrical Lineup
39	032912	Div 2 CCHVAC Emerg Air N Inlet Electrical Lineup
40	032912	SS-1 Electrical Lineup
41	041117	Torus Hard Vent Electrical Lineup

Attachments

42	031201	Off Gas Monitoring Instrument Lineup
43	031201	Fuel Pool Vent Exhaust Instrument Lineup
44	031201	Deleted
45	031201	Div 1 Containment Area Hi Range Instrument Lineup
46	031201	Div 2 Containment Area Hi Range Instrument Lineup
47	031201	Div 1 RB Vent Exhaust Instrument Lineup
48	031201	Div 2 RB Vent Exhaust Instrument Lineup
49	061407	Div 1 CCHVAC Emerg Air S Inlet Instrument Lineup
50	061407	Div 2 CCHVAC Emerg Air S Inlet Instrument Lineup
51	061407	Div 1 CCHVAC Emerg Air N Inlet Instrument Lineup
52	061407	Div 2 CCHVAC Emerg Air N Inlet Instrument Lineup
53	031201	Div 1 CCHVAC Makeup Air Instrument Lineup
54	031201	Div 2 CCHVAC Makeup Air Instrument Lineup
55	031201	Torus Hard Vent Instrument Lineup
56	031201	Div 1 Two Minute Holdup Pipe Instrument Lineup
57	031201	Div 2 Two Minute Holdup Pipe Instrument Lineup
58	031201	Main Steam Line Instrument Lineup

TABLE OF CONTENTS

Section/Title **Page**

1.0 PURPOSE

To prescribe the method for operating the Process Gaseous Radiation Monitoring System.

1.1 System Description

Each monitoring unit consists of the following components: a detector, a monitor or analyzer, an auxiliary trip unit (when a monitor is used), and a recorder located in the Control Room. Some of the process monitors use sampling devices to draw a sample from the process for examination.

The Process Gaseous Radiation Monitoring System consists of the following monitors:

1.1.1 General Electric

1. *Off-Gas Radiation Monitor System

   This monitor subsystem continuously measures the radioactivity in the condenser off-gas at the discharge of the 2.2-minute delay pipe after it has passed through the steam-jet air-ejector and the recombiner. The monitor detects the radiation level which is attributable to the radioactive gases produced in the reactor and transported in the steam through the turbine to the condenser.

2. *Main Steam Line Radiation Monitor System

   This monitor subsystem continuously measures the radioactive gases coming from the reactor through the main steam lines. These are activation gases which come mainly from activation of oxygen, and fission gases which come from small fuel leaks and "tramp" uranium impurities. If the reactor fuel fails and a gross release of fission products occurs, the monitoring subsystem provides a trip signal to the GSE & MVP.

*Denotes Technical Specification/Offsite Dose Calculation Manual (ODCM) Item.

3. *Fuel Pool Ventilation Exhaust Radiation Monitor Systems

This monitor subsystem measures the activity from the fuel pool area ventilation exhaust ducts which discharge into the Reactor Building ventilation exhaust system. The fuel pool contains gaseous activity due to mixing with the reactor coolant system during each refueling. Diffusion of this activity from the pool generates airborne activity which is swept into the spent fuel pool area ventilation system. During refueling operation (including criticality tests) the monitors act to detect a high radiation level in the duct work which could be due to fission gases from a refueling accident or a rod drop accident. Two independent redundant monitors are provided on each of the east and west exhaust duct legs. The detectors are located as far upstream of the building isolation valve as possible to allow for reaction time to close the valve and prevent the release of activity.

1.1.2 Eberline

1. *Reactor Building Exhaust Plenum Radiation Monitor System

This monitor subsystem measures the activity in the Reactor Building exhaust plenum prior to its discharge to the environment. The activity this monitor is designed to detect is due to corrosion and fission products from the Reactor/Auxiliary Building ventilation system and from the off-gas system. The gaseous activity in the exhaust is mainly due to the condenser off-gas. The particulate and iodine activity is accumulated on filters viewed by solid-state beta scintillation, and gamma scintillation detectors. The filters are counted in the chemistry laboratory count room to aid in determining the quantities of specific radionuclides released. The gaseous activity is monitored by a beta scintillator and energy-compensated Geiger-Mueller (G-M) tube viewing the same gas sample volume and a high-range noble gas monitor utilizing another energy-compensated G-M Tube.

*Denotes Technical Specification/ODCM Item.

2. *Standby Gas Treatment System (SGTS) Post-Accident Radiation Monitor System

   This monitor subsystem measures the radioactivity in the exhaust vent lines from the SGTS after an accident has occurred and prior to discharge to the environment. The activities these monitors are designed to detect are fission products (following an accident) from the Reactor Building which have been treated by the SGTS (there is a monitor on each SBGT system). The activity in the exhaust is expected to be high levels of noble gases resulting from a breach of primary integrity. The gaseous activity of the SGTS unit exhaust is monitored by two energy-compensated Geiger-Mueller (G-M) tubes. In addition, a grab sample pallet contains an energy compensated G-M tube, and a particulate filter and charcoal cartridge in a removable, shielded holder to allow count room analysis of particulates and iodine in the exhaust.

   This SGTS Accident Range Radiation Monitoring System is normally maintained in standby condition and changes to a normal operate condition upon receipt of an external "on" signal from its associated System Particulate Iodine Noble Gas (SPING) radiation monitor.

3. *Standby Gas Treatment (SGTS) Radiation Monitor System

   This monitor subsystem measures the radioactivity in the exhaust vent lines from the SGTS prior to its discharge to the environment. There is a monitor on both SGTS systems. The activity these monitors are designed to detect is fission products from the Reactor Building which have been treated by the SGTS. If the monitor alarms on one SGTS, the main control room operator can shutdown the faulty SGTS system and use the second SGTS system to clean up the air being discharged. The gaseous activity in the exhaust is expected to normally be below detectable levels. Particulate and iodine activity is accumulated on filters viewed by solid-state beta scintillation, and gamma scintillation detectors. These filters are counted in the chemistry laboratory count room to aid in determining the quantities of specific radionuclides released. The gaseous activity is monitored by a beta scintillator and energy-compensated Geiger-Mueller (G-M) tube viewing the same gas sample volume.

   A High Radiation Alarm from the mid-range noble gas detector initiates an external "on" signal to its associated AXM-1 SGTS Post Accident Radiation Monitor system. This monitor then goes into an automatic flush cycle to isolate itself.

   Additionally, both the Normal SPING and the AXM have their sample lines heat traced.

*Denotes Technical Specification/ODCM Item.

4. *Turbine Building Ventilation Exhaust Radiation Monitor System

   This monitor subsystem measures the radioactivity in the Turbine Building exhaust prior to its discharge to the environment. The activity this monitor detects is from fission products in the steam which may leak from the turbine or other components in the building. The gaseous activity is expected to be normally below detectable levels. The particulate and iodine activity is accumulated on filters viewed by solid-state beta scintillation, and gamma scintillation detectors. The filters are counted in the chemistry laboratory count room to aid in determining the quantities of specific radionuclides released. The gaseous activity is monitored by a beta scintillator and energy-compensated Geiger-Mueller (G-M) tube viewing the same gas sample volume.

5. *Radwaste Building Ventilation Exhaust Radiation Monitor System

   This monitor subsystem measures the radioactivity in the Radwaste Building exhaust prior to its discharge to the environment. The activity this monitor detects is from samples in the laboratory fume hoods, tank vents, the extruder fill station, and ventilation exhaust from contaminated cubicles. The gaseous activity is expected to normally be below detectable levels. The particulate and iodine activity is accumulated on filters viewed by solid-state beta scintillation, and gamma scintillation detectors. The filters are counted in the chemistry laboratory count room to aid in determining the quantities of specific radionuclides released. The gaseous activity is monitored by a beta scintillator and energy-compensated Geiger-Mueller (G-M) tube viewing the same gas sample volume.

6. *Onsite Storage Facility Ventilation Exhaust Radiation Monitor System.

   This monitor subsystem measures the radioactivity in the Radwaste Onsite Storage Facility exhaust prior to its discharge to the environment. The activity this monitor detects is a result of the storage and handling of radwaste and equipment in the building. Any type of activity is normally expected to be below detectable levels. The particulate and iodine activity is accumulated on filters viewed by solid-state beta scintillation, and gamma scintillation detectors. The filters are counted in the chemistry laboratory count room to aid in determining the quantities of specific radionuclides released. The gaseous activity is monitored by a beta scintillator and energy-compensated Geiger-Mueller (G-M) tube viewing the same gas sample volume.

*Denotes Technical Specification/ODCM Item.

1.1.3 Gulf

1. *Control Center Makeup Air Radiation Monitor System

   This monitor system measures the activity in the makeup air to the main Control Room. No measurable activity is expected to be present in the makeup air. However, in the event of a design basis accident, fission gases could escape from the main coolant system and be drawn into the makeup air intake. There are redundant monitors at the makeup air intake.

   A representative sample for each monitor is extracted from the ventilation duct which passes through the gas monitor, a low-flow alarm switch, and finally through a sample pump before being returned to the ventilation duct.

2. Two-Minute Holdup Pipe Exhaust Radiation Monitor System

   This monitor system measures the activity from the mechanical vacuum pumps after the discharge from the two-minute delay pipe. In addition, it also monitors the turbine gland sealing system exhaust which enters the off-gas system at the discharge of the mechanical vacuum pumps. The mechanical vacuum pumps are normally used only during startup to remove large quantities of air from the system at high flow rates. After the off-gas flow-rate is reduced to normal levels, the flow is rerouted through the off-gas treatment system and the mechanical vacuum pumps are shut off. The monitors initially detect the activity due to fission gases produced in the reactor and transported in the steam through the turbine to the condenser. Later, the monitors detect the same gases which come through the turbine gland sealing system. Two redundant monitors are provided with the detectors mounted adjacent to the discharge line.

   Each shielded monitor has a gamma-sensitive scintillation detector which is mounted adjacent to the off-gas pipe.

*Denotes Technical Specification/ODCM Item.

3. Control Center Emergency Air Inlets Radiation Monitor System

   This monitor system measures the activity in the emergency air supply ducts to the main Control Room. No measurable activity is expected in the emergency air supply. A secondary emergency air makeup intake is added to the north side of the auxiliary building, along with radiation detectors in both the existing air makeup intake and the second air intake. Therefore, either inlet for makeup air to the control center can be selected from either side of the potential release points, depending on the relative activity.

   A representative sample for each of the four monitors is extracted from the emergency ventilation duct through a stainless steel sample tube, which passes through the gas monitor, a low-flow alarm switch, and a sample pump before being returned to the duct.

4. Station Air to RWCU Filter Demin

NOTE: Station Air to RWCU Filter Demin is not installed at this time.

5. *Reactor Building Ventilation Exhaust Radiation Monitor System

   This monitor subsystem measures the radioactivity in the Reactor Building ventilation system exhaust duct prior to its discharge from the building. During normal operation and during refueling operation (including criticality tests), the monitors act to detect a high activity level in the ductwork. Two redundant monitors are located on the common line upstream of the isolation dampers.

   A continuous representative sample is extracted from the common duct through a low flow alarm switch, the gas monitor, and then through a sample pump prior to being returned to the ventilation duct.

6. *Containment Area High Range Radiation Monitor System

   This monitor subsystem measures the radioactivity in the containment area for detection of intense gamma radiation. The gamma radiation detector, a gamma ionization chamber, detects radiation from 100 to 108 R/hr. The detector is encased in stainless steel to protect it from containment sprays and high temperature. Two independent monitors are located in the containment and input to monitors in the Relay Room to give alarms to aid the operator in assessing conditions during accident conditions.

*Denotes Technical Specification/ODCM Item.

2.0 REFERENCES

2.1 Use References - None

2.2 Potential Use References

2.2.1 Procedures

- 23.413, Control Center HVAC
- 3D4, DIV I/II OFF GAS RADN MONITOR TROUBLE
- 3D8, DIV I/II OFF GAS RADN MONITOR UPSCALE
- 3D12, DIV I/II OFF GAS RADN MONITOR HIGH-HIGH
- 3D16, 2 MINUTE HOLDUP PIPE RADN MONITOR TROUBLE
- 3D20, 2 MINUTE HOLDUP PIPE RADN MONITOR UPSCALE HI
- 3D24, 2 MINUTE HOLDUP PIPE RADN MONITOR UPSCALE HI-HI
- 3D27, DIV I/II FP VENT EXH RADN MONITOR DNSCL/INOP
- 3D28, DIV I/II RB VENT EXH RADN MONITOR TROUBLE
- 3D31, DIV I/II FP VENT EXH RADN MONITOR UPSCALE
- 3D32, DIV I/II RB VENT EXH RADN MONITOR UPSCALE
- 3D33, OFF GAS RADN MONITOR END OF TIMER PERIOD
- 3D35, DIV I/II FP VENT EXH RADN MONITOR UPSCALE TRIP
- 3D36, DIV I/II RB VENT EXH RADN MONITOR UPSCALE TRIP
- 3D37, CONT CENTER MAKEUP AIR RADN MONITOR TROUBLE
- 3D38, CONT CENTER EMERG AIR DIV I RADN MON TROUBLE
- 3D39, CONT CENTER EMERG AIR DIV II RADN MON TROUBLE
- 3D41, CONT CENTER MAKEUP AIR RADN MONITOR UPSCALE
- 3D42, CONT CENTER/RB VENT RADN MON FLOW LOW

- 3D43, DIV I/II CONTM AREA RADN MONITOR TROUBLE
- 3D44, EFFLUENT PROCESS RADN MONITOR TROUBLE
- 3D45, CONT CENTER MAKEUP AIR RADN MONITOR UPSCALE TRIP
- 3D46, RW BLDG VENT EXHAUST RADN MONITOR UPSCALE/INOP
- 3D48, TURBINE BLDG VENT EXHAUST RADN MONITOR UPSCALE/INOP
- 3D73, TRIP ACTUATORS A1/A2 TRIPPED
- 3D74, TRIP ACTUATORS B1/B2 TRIPPED
- 3D82, MN STM LINE CH A/B/C/D RADN MONITOR HI-HI
- 3D83, MN STM LINE CH A/B/C/D RADN MONITOR UPSCALE
- 3D84, MN STM LINE CH A/B/C/D RADN MONITOR DOWNSCALE
- 3D10-RWC, RW BLDG VENT EXHAUST RADIATION UPSCALE
- 3D12-RWC, RW BLDG VENT EXHAUST RADIATION UPSCALE TRIP

2.2.2 Technical Specifications/TRM/ODCM

- Technical Specifications, Section 3.3.1.1, Reactor Protection System (RPS) Instrumentation
- Technical Specifications, Section 3.3.3.1, Post Accident Monitoring (PAM) Instrumentation
- Technical Specifications, Section 3.3.6.1, Primary Containment Isolation Instrumentation
- Technical Specifications, Section 3.3.6.2, Secondary Containment Isolation Instrumentation
- Technical Specifications, Section 3.3.7.1, Control Room Emergency Filtration (CREF) System Instrumentation.

- TRM Section TR 3.3.1.1, Reactor Protection System (RPS) Instrumentation
- TRM Section TR 3.3.3, Accident Monitoring Instrumentation
- TRM Section TR 3.3.6.1, Primary Containment Isolation Instrumentation
- TRM Section TR 3.3.6.2, Secondary Containment Isolation Instrumentation
- TRM Section TR 3.3.7.1, Control Room Emergency Filtration (CREF) System Instrumentation
- ODCM Section 3.3.7.12, Radioactive Gaseous Effluent Monitoring Instrumentation

2.2.3 Drawings

I-2181-01	System Diagram – Process Radiation Monitor Subsystems
I-2185-01	Schematic Diagram – Process Radiation Monitoring System Powering Distribution
I-2185-02	Schematic Diagram – Process Radiation Monitoring System Annunciator Inputs
I-2185-03	Schematic Diagram – Process Radiation Monitoring System Main Steam Line Rad Mon Subsystem D1103
I-2185-04	Schematic Diagram – Process Radiation Monitoring System Off Gas Rad Mon Subsystem D1102
I-2185-05	Schematic Diagram – Process Radiation Monitoring System Off Gas Vent Pipe Rad Mon Subsystem
I-2185-07	Schematic Diagram – Process Radiation Monitoring System Fuel Pool Ventilation Rad Mon Subsystem Part 1
I-2185-08	Schematic Diagram – Process Radiation Monitoring System Fuel Pool Ventilation Rad Mon Subsystem Part 2

3.0 PRECAUTIONS AND LIMITATIONS

3.1 Trips initiated on the Gulf RP-30(1000) modules (during a test or otherwise) will actuate its associated control function unless trip contacts have been jumpered.

3.2 Placing the Mode Selector switch of the Fuel Pool Monitoring Sub System INDICATOR and TRIP UNIT to any position other than "OPERATE" will produce the equivalent of a "HIGH RADIATION TRIP" of this Subsystem.

3.3 Eberline monitor flush sequence shall be initiated only as directed by Radiation Protection.

3.4 Notify Radiation Protection whenever any Process Radiation Monitor's status is changed (placed in service, removed from service, flushed, placed in standby, etc).

3.5 Trips initiated on the following Eberline Sping Monitors during a functional test will actuate its associated control function:

- D11-P279, TB Vent Exhaust Sping
- D11-P281, RWB Vent Exhaust Sping

3.6 SS-1 provides the alarm function required by ODCM 3.3.7.12 for each low range noble gas activity monitor, as well as providing required functions for SGTS AXMs required by TR 3.3.3. Ensure compliance when the SS-1 is out of service.

3.7 If SS-1 locks-up and a reset restores function, a CARD needs to be written to trigger Maintenance Rule Functional Failure review.

3.8 During the initial minutes of an accident transient, spurious signals may occur in the reading from the Containment Area High Range Radiation Monitors.

END OF SECTION

8.0 D11-K609A, B, C, D, DIV 1 AND DIV 2 FUEL POOL E AND W VENT EXH DUCT RAD MONITORS

NOTE: All controls and indications for D11-K609A, B, C, D, Div 1 and 2 Fuel Pool E and W Vent Exh Rad Monitors, are located on RR H11-P606.

8.1 Prerequisites

8.1.1 Applicable Process Gaseous Radiation Monitoring Lineups have been completed.

8.1.2 D11-K609A, B, C, D, Div 1 and 2 Fuel Pool E and W Vent Exh Rad Monitors, have been calibrated and functionally tested in accordance with applicable I&C procedure.

8.2 Detailed Procedure

NOTE: D11-R605, Fuel Pool Vent Exh East Duct PRMS Recorder (COP H11-P601), has two inputs: D11-K609A and B, Div 1 and Div 2 Fuel Pool E Vent Exh Rad Monitor (blue pen and red pen). D11-R606, Fuel Pool Vent Exh West Duct PRMS Recorder (COP H11-P812), has two inputs: D11-K609C and D, Div 1 and Div 2 Fuel Pool W Vent Exh Rad Monitor (blue pen and red pen).

CAUTION

Placing the Mode Selector Switch (S1) in any position other than OPERATE will trip Reactor Bldg HVAC.

8.2.1 Perform the following steps at each Fuel Pool Vent Exh Duct Rad Monitor:

- D11-K609A, Div 1 Fuel Pool E Vent Exh Rad Monitor
- D11-K609B, Div 2 Fuel Pool E Vent Exh Rad Monitor
- D11-K609C, Div 1 Fuel Pool W Vent Exh Rad Monitor
- D11-K609D, Div 2 Fuel Pool W Vent Exh Rad Monitor

1. Verify Mode Selector Switch (S1) is in OPERATE.
2. Depress RESET Pushbutton (S2).

3. Verify following conditions on monitor module:

   a. White LOW Light (DS-1) is OFF.

   b. Amber HIGH Light (DS-2) is OFF.

8.2.2 Verify the following alarms are clear:

1. Annunciator 3D27, DIV I/II FP VENT EXH RADN MONITOR DNSCL/INOP.

2. Annunciator 3D31, DIV I/II FP VENT EXH RADN MONITOR UPSCALE.

3. Annunciator 3D35, DIV I/II FP VENT EXH RADN MONITOR UPSCALE TRIP.

END OF SECTION