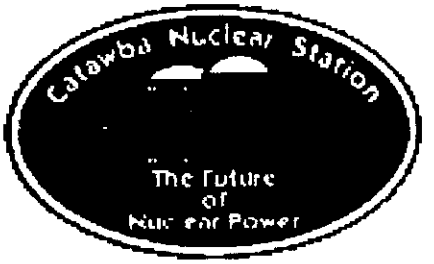
Duke Power SM

A Duke Energy Company



2001 NRC EXAM
JPM SET

2001 NRC EXAM JPM SET	
JPM #	Title
I-2/SIM	Loss of ND (Leak) at Mid-loop
I-3/SIM	Verify Proper VX System Operation
I-4/SIM	Borate the Reactor Coolant System to Satisfy Rod Insertion Limits
I-5/SIM	Ensure Proper Feedwater Isolation Following a Reactor Trip
I-6/C/R	Take Power Range Drawer Out of Service
I-7/SIM	Transfer the Emergency Core Coolant System to Cold Leg Recirculation
I-8/PLANT	Transfer HVAC Control to "LOCAL" Following Control Room Evacuation
I-9/PLANT	Shutdown Battery Charger 1ECA
**II-4/C/R	Re-energize 2ETA From Unit 1
**II-8/PLANT	Start the Hydrogen Recombiner

**Unit 2 Reference attached.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-2/SIM

Loss of ND (Leak) at Mid-loop

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Establish makeup to the NCS following an ND system leak at mid-loop per AP/1/A/5500/19 (Loss of Residual Heat Removal System).

Alternate Path:

NO

Facility JPM #:

NEW

K/A Rating(s):

005 A4.01 (3.6/3.6)

Task Standard:

Operator establishes makeup to the NCS in accordance with Enclosure 7 of AP/1/A/5500/19.

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

Simulator ___X___ In-Plant _____ Perform ___X___ Simulate _____

References:

AP/1/A/5500/19 (Loss of Residual Heat Removal System), Rev. 35

Validation Time: 10 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

_____

_____

_____

SIMULATOR SET-UP SHEET

1. Recall IC # 30
2. NR NCLT 6810/6820 at 6.9%.
3. LOA-NI004 (NI pump 1B Rack-out), RACKED IN insert.
4. Go to RUN until NCS level increases to 7%.
5. Have valves 1NI-147B, 1NV-135, 1NV-252A, 1NV253B, 1ND-24A, and 1ND-58B closed from the control board.
6. 1NI-147B in "DISC".
7. MAL NV006B (Charging pump 1B Failure), both, insert.
8. Stop 1B NV Pump
9, Insert MAL-ND004A Severity Value =100.
9. Acknowledge alarms.
10. Freeze simulator when NC level is at 6.5% and write to a SNAP.
11. SNAP No.: 159
12. Place simulator in run when directed by the examiner.

SIMULATOR OPERATOR INSTRUCTIONS:

Install appropriate covers/flags for Pumps NV-1A and NI-1A.

Tools/Equipment/Procedures Needed:

Have enough copies of AP/1/A/5500/19 available for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

You are the Unit 1 OATC.

Unit 1 ~~was~~ is in Mode 5 following core reloading.

The NCS was drained to mid-loop (7.25 %) in preparation for vacuum refill operations.

ND train "A" ~~was~~ is in service for decay heat removal. NCS temperature is 130°F.

The NCS is vented through the 3" NCS head vent.

NI Pump 1A is being overhauled, and is unavailable.

A leak has occurred in the ND piping in the auxiliary building, and AP/1/A/5500/19 has been implemented.

The operating NV Pump 1B has failed.

NCS level is 6.5 % and decreasing.

The ND pumps are OFF.

NCS temperature is rising.

Move to below

What about NV 1A?

INITIATING CUES:

The SRO desires you to makeup to the NCS using NI ~~pump 1B~~ and injecting into the cold legs using AP/1/A/5500/19, Enclosure 7, ~~steps 1 through 3~~.

START TIME: _____

`TEP 1: Obtain a copy of the appropriate procedure. STANDARD: Operator locates AP1/A/5500/19, Enclosure 7. **EXAMINER'S CUE: When the candidate locates AP/1/A/5500/19, hand him/her a clean copy of Enclosure 7 and tell him/her that it is current and complete.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: Dispatch operator to restore available NV and NI pumps to an operating condition. (Enclosure 7, STEP 1.) STANDARD: Operator determines the NI pump 1B is RACKED IN and this is the pump the SRO desires to be used per Initial Conditions. COMMENTS:	___ SAT ___ UNSAT
CAUTION: Use of NV pump(s) or NI pump requires careful control to prevent overpressurizing the NC System.	
STEP 3: If using available NV pump(s), then align S/I flowpath to the cold legs as follows: (Enclosure 7, STEP 2). STANDARD: Candidate should determine from the Initial Conditions that no NV pump is available. Step does not apply. COMMENTS: Why can't start a different NV pump?	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 4: **Note:** • If NC level is off scale low, then use of a hot leg flowpath is preferred if readily available. • If NC System is intact and level is on scale, then cold leg flowpath may be preferable for purposes of removing decay heat. STANDARD: Operator determines that NC level indication on the Narrow Range and/or Mid Range level transmitters are on scale, and the NCS is not intact (vented thru 3" vent). Therefore, either path may be used, but Initial Conditions specify cold leg injection path. ***CUE: The Narrow Range and Mid Range NC level transmitters read 6.5 %.*** COMMENTS:	___ SAT ___ UNSAT
STEP 5: If using available NI pumps, then establish S/I flow path from one NI pump as follows: (Step 3.b) STANDARD: Operator determines from initial conditions that NI pump 1B ~~will be used~~ is unavailable. Concludes that NI pump 1B must be used. COMMENTS:	___ SAT ___ UNSAT
STEP 6: Ensure 1NI-100B - OPEN. (Step 3.b.1) STANDARD: Operator locates and verifies NI pump suction from FWST (1NI-100B) has RED "OPEN" light LIT. ***CUE: The RED "OPEN" light for 1NI-100B is LIT, and the GREEN "CLOSED" light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 7: Ensure the following valves - OPEN • 1NI-144A • 1NI-147B (Step 3.b.2) STANDARD: Operator locates the NI pump mini-flow recirc valves, determines that the RED "OPEN" light for 1NI-144A is LIT, and the GREEN "CLOSED" light for 1NI-147B is LIT. Operator must enable 1NI-147B by switching the enable/disable switch to enable, and then opening 1NI-147B, noting the RED "OPEN" light is LIT. ***CUE: The RED "OPEN" light for 1NI-144A is LIT, and the GREEN "CLOSED" light is DARK. The GREEN "CLOSED" light for 1NI-147B is LIT and the RED "OPEN" light is DARK. After the operator enables 1NI-147B and depresses the RED pushbutton for 1NI-147B, the RED "OPEN" light for 1NI-147B is LIT and the GREEN "CLOSED" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 8: Start NI pump 1B. (Step 3.a.3) STANDARD: Operator depresses the red pushbutton for NI Pump 1B and determines that the RED "ON" light is LIT. ***CUE: The RED "ON" light for NI Pump 1B is LIT and the GREEN "OFF" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 9:	Align the S/I flowpath to either the hot legs or the cold legs as follows: The operator decides to align the cold leg flowpath, per the Initial Conditions, and open valves 1NI-150B and 1NI-162A. (Step 3.b.4 cold legs)	**CRITICAL STEP** ___ SAT
STANDARD:	Operator locates and depresses the RED pushbuttons on the B train NI cold leg injection valves (1NI-150B and 1NI-162A), determines that the RED "OPEN" lights for 1NI-150B and 1NI-162A are LIT, the GREEN "CLOSED" lights are DARK.	___ UNSAT
	***CUE: The RED "OPEN" lights for valves 1NI-150B and 1NI-162A are LIT, the GREEN "CLOSED" lights are DARK.**	
COMMENTS:		
	This JPM is complete.	

TIME STOP: _____

Add Examiner cues re: desirability of aligning the FWST for gravity per either steps 4 or 5.

"It is not desired to align the FWST for gravity feed".

Add step for applicant to report to SRO that End. 7 of AP/1/A/5500/19 has been completed. (Not critical)

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

You are the Unit 1 OATC.

Unit 1 was in Mode 5 following core reloading.

The NCS was drained to mid-loop (7.25 %) in preparation for vacuum refill operations.

ND train "A" was in service for decay heat removal. NCS temperature is 130°F.

The NCS is vented through the 3" NCS head vent.

NI Pump 1A is being overhauled, and is unavailable.

A leak has occurred in the ND piping in the auxiliary building, and AP/1/A/5500/19 has been implemented.

The operating NV Pump 1B has failed.

NCS level is 6.5 % and decreasing.

The ND pumps are OFF.

NCS temperature is rising.

INITIATING CUES:

The SRO desires you to makeup to the NCS using NI pump 1B and injecting into the cold legs using AP/1/A/5500/19, Enclosure 7 steps 1 through 3.

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-3/SIM

Verify Proper VX System Operation

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Verify Proper VX System Operation per EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure)

Alternate Path:

Yes: H_2 Skimmer Fan 1A does not start automatically.

Facility JPM #:

OP-CN-EP-CSF-002

K/A Rating(s):

028 A2.02 (3.4/3.4)

Task Standard:

HSF 1A started manually and all other VX fans and dampers are left in the proper alignment for greater than 3 psig in containment.

Preferred Evaluation Location:

Simulator ___X___ In-Plant _____

Preferred Evaluation Method:

Perform ___X___ Simulate _____

References:

EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure) Rev. 8

Validation Time: 6 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1. Select EOL 100% IC snap.
2. Insert **MAL-NC013A**, (RCS Cold Leg A Leak), Severity Value = **20**.
3. Insert **MAL-VV003A**, (Hydrogen Skimmer Fan A Auto Failure)
4. RUN simulator and perform the required actions of EP/E-0 and EP/E-1. The minimum run time will be that which allows 9 minutes to elapse after actuation of the Phase B isolation on containment pressure greater than 3 psig.
5. After CSF Containment Integrity alarms orange perform steps 1-5 of EP/FR-Z.1, (Response to High Containment Pressure).
6. Ensure that the key for VX fan 1A is NOT left in the switch after each JPM.
7. Place the simulator in FREEZE.
8. Write to an AVAILABLE SNAP.

   IC SELECTED 154

SIMULATOR OPERATOR INSTRUCTIONS:

None.

Tools/Equipment/Procedures Needed:

Ensure enough copies of EP/1/A/5000/FR-Z.1 are available in the Simulator for each candidate. Be sure a key is available to examiner for H_2 Skimmer Fan 1A.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

A LOCA has occurred on Unit 1 resulting in containment pressure exceeding 3 psig.

INITIATING CUES:

You have been directed to verify proper VX System operation per step 6 of EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure).

Does ϕB occur @ 3 psig? If so, give in I.C. when pressure exceeded 3 psig (e.g. 11 mins. ago). Better still use times: ϕB occurred at 1015 and it is currently 1026.

Init. Conditions: A LOCA has occurred on Unit 1. Containment pressure exceeded 3 psig @ 1015.

Initiating Cue: You have been .... The time is now 1026

START TIME: _____ What is significance of 9 minutes?

STEP 1: Verify proper VX System operation as follows: Elapsed time since Phase B actuation – GREATER THAN 9 MINUTES. STANDARD: ~~None~~ Checks time at which ϕB actuation occurred and ~~confirms that~~ determines that 6 min have passed since ϕB actuation. Continues to Step 6.b. ~~**EXAMINER CUE: 11 minutes have elapsed since Phase B actuation**~~ COMMENTS: Waits 3 minutes then, Examiner Cue: After examinee identifies need to wait 3 min; use time compression and tell examinee that time is now 1024.	CRITICAL STEP ____SAT ____UNSAT
STEP 2: Verify the following Containment Air Return Fan dampers –OPEN:. • ARF-D-2 • ARF-D-4 STANDARD: ARF-D-2: • At 1MC-14 Monitor light 1MD-4, I/5 LIT OR • At rear of 1MC-4 RED "OPEN" light LIT and GREEN "CLSD" light DARK for ARF-D-2 switch ***** CUE: Monitor light 1MD-4, I/5 LIT*** ***OR*** ***RED "OPEN" light LIT and GREEN "CLSD" light DARK for ARF-D-2 switch*** STANDARD: ARF-D-4: • At 1MC-14 Monitor light 1MD-4, I/8 lit OR • At rear of 1MC-4 RED, "OPEN" light lit and GREEN "CLSD" light dark for ARF-D-4 switch ***** CUE: Monitor light 1MD-4, I/8 LIT*** ***OR*** ***RED "OPEN" light LIT and GREEN "CLSD" light DARK for ARF-D-4 switch*** COMMENTS:	___ SAT ___ UNSAT Where should an RO be actually doing these steps?

*****Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.***

STEP 3: Verify the following equipment alignment:
- 1VX-1A open
- 1VX-2B open

___ SAT

___ UNSAT

STANDARD: 1VX-1A:
- At 1MC-14 Monitor light 1MD-4, I/6 LIT
  OR
- At rear of 1MC-4 RED, "OPEN" light LIT and GREEN "CLSD" light DARK for 1VX-1A switch

CUE: Monitor light 1MD-4 I/6 LIT
OR
RED "OPEN" light LIT and GREEN "CLSD" light DARK for 1VX-1A

1VX-2B:
- At 1MC-14 Monitor light 1MD-4, I/7 LIT
  OR
- At rear of 1MC-4 RED, "OPEN" light LIT and GREEN "CLSD" light DARK for 1VX-2B switch

CUE: Monitor light 1MD-4 I/7 LIT
OR
RED "OPEN" light LIT and GREEN "CLSD" light DARK for 1VX-2B

COMMENTS:

SAT
See comment for Step 2.

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 4: Verify Containment Air Return Fans on
- Containment Air Return Fan 1A
- Containment Air Return Fan 1B

STANDARD: Containment Air Return Fan 1A :
- At 1MC-14 Monitor light 1MD-4, I/3 LIT
  OR
- At rear of 1MC-4 RED indicating light LIT for ARF-1A switch.

****CUE: Monitor light 1MD-4 I/3 LIT***
OR
RED "ON" light LIT and GREEN "OFF" light DARK for Containment Air Return Fan 1A

STANDARD: Containment Air Return Fan 1B:
- At 1MC-14 Monitor light 1MD-4, I/10 LIT
  OR
- At rear of 1MC-4 RED indicating light LIT for ARF-1B switch.

*****CUE: Monitor light 1MD-4 I/10 LIT.***
OR
RED "ON" light LIT and GREEN "OFF" light DARK for Containment Air Return Fan 1B

COMMENTS:

___ SAT

___ UNSAT

Same as before

STEP 5 Verify H2 Skimmer Fans on
- H2 Skimmer Fan 1A
- H2 Skimmer Fan 1B

____SAT

STANDARD: H2 Skimmer Fan 1A:
- At 1MC-14 Monitor light 1MD-4, I/4 DARK.

OR
- At rear of 1MC-4 GREEN "OFF" light LIT for HSF-1A switch.

___UNSAT

Determines H2 Skimmer Fan 1A is not ~~operating~~ ~~inoperable~~ as required and needs to be manually started per RNO (See next step). Same as before except need to add above sentence.

CUE: Monitor light 1MD-4 I/4 DARK
OR
RED "ON" light DARK and GREEN "OFF" light LIT for Hydrogen Skimmer Fan 1A

H2 Skimmer Fan 1B
- At 1MC-14 Monitor light 1MD-4, I/9 LIT.

OR
- At rear of 1MC-4 RED "ON" light LIT for HSF-1B switch

CUE: Monitor light 1MD-4 I/9 LIT.
OR
RED "ON" light LIT and GREEN "OFF" light DARK for Hydrogen Skimmer Fan 1B

COMMENTS:

STEP 6: Manually start H2 Skimmer Fan 1A.

CRITICAL STEP

STANDARD: At rear of 1MC-4, place key in key switch for HSF-1A and rotate to the "ON" position. Verify RED indicating light LIT.

CUE: Key placed in key switch for HSF 1A and rotated to the "ON" position. RED "ON" light is LIT, the GREEN "OFF" light is DARK.

___ SAT

EXAMINER NOTE: Examiner will supply key to candidate.

___ UNSAT

COMMENTS: Should obtain key as would normally be done. Standard should say something like "Obtains key from SRO. At rear of ..."

CUE: Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 7: Verify containment air returns fans operate as containment pressure changes as follows:

- If at anytime containment pressure is greater than 0.4 psig, then ensure containment air returns fans are on.
- If at anytime containment pressure is less than 0.3 psig, then ensure containment air return fans are off.

___ SAT

___ UNSAT

Note: Plant conditions and this step only require the operator to monitor. He is not required to do anything else for this JPM.

STANDARD: Examinee states that greater than .4 psig he would verify monitor lights 1MD-4, 1/3 and 1/10 LIT (1MC-14) or RED lights on 1MC4 for containment air return fans LIT.

Examinee states that less than .3 psig he would verify monitor lights 1MD-4, 1/3 and 1/10 DARK (1MC-14) or GREEN lights on 1MC4 for containment air return fans LIT.

CUE: Containment pressure is 2.5 psig.

COMMENTS: Standard should reflect actions as per initial conditions :. ~~Examinee should state that~~ rechecks Since containment pressure is above 3.0 psig, ~~he would~~ ~~verify~~ ~~operate~~ containment air return fans are on by checking monitor lights 1MD-4, 1/3 and 1/10 LIT (1MC-14) or RED lights on 1MC-4 for both cont. air ret. fans are LIT.

This JPM is complete.

TIME STOP: _____

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A LOCA has occurred on Unit 1 resulting in containment pressure exceeding 3 psig.

INITIATING CUES:

You have been directed to verify proper VX System operation per step 6 of EP/1/A/5000/FR-Z.1 (Response to High Containment Pressure).

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-4/SIM

Borate the Reactor Coolant System to Satisfy Rod Insertion Limits

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Borate the Reactor Coolant System per Enclosure 3 of AP/1/A/5500/03 (Load Rejection) and determine allowable Rod Insertion Limits.

Alternate Path:

NO

Facility JPM #:

New JPM

K/A Rating(s):

004 A4.01 (3.8/3.9)

Task Standard:

Boration has been initiated per Enclosure 3 of AP/1/A/5500/03 and required rod height has been determined to be approximately 70-80 steps on Bank D Per Section 2.4, Page 7 of the Core Operating Limits Report (COLR).

Preferred Evaluation Simulator:

Simulator ___X___ In-Plant _____

Preferred Evaluation Perform

Perform ___X___ Simulate _____

References:

AP/1/A/5500/03 (Load Rejection) Enclosure 3 Rev. 25
Cycle 12 Core Operating Limits Report Rev. 17

Validation Time: 10 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1. Pick any 100% power IC set.
2. Place simulator in RUN.
3. Trip 1A CF Pump.
4. Perform actions of AP/03.
5. Allow simulator to run until the plant is stable.
6. Freeze, and write to a snap.

   SNAP No.: 158

7. Place simulator in run when directed by the examiner.

SIMULATOR OPERATOR INSTRUCTIONS:

None.

Tools/Equipment/Procedures Needed:

Ensure enough copies of Enclosure 3 to AP/1/A/5500/03 are available in the Simulator for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

You are the Unit 1 OATC.

Unit 1 has experienced a Load Rejection due to the loss of 1A Feedwater Pump. AP/1/A/5500/03 (Load Rejection) is in progress.

Current power level is 63%.

The OAC is out of service.

INITIATING CUES:

The SRO instructs you to determine the rod insertion limit for the present power level and perform Enclosure 3 of AP/1/A/5500/03 (Load Rejection) to initiate boration.

START TIME: _____

STEP 1: Obtain a copy of the appropriate procedure. STANDARD: Operator obtains a copy of AP/1/A/5500/03. **EXAMINER'S CUE: When the candidate locates the appropriate procedure, give him/her a copy of Enclosure 3 and tell him/her that it is current and complete.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: If the control rods cannot be maintained above the rod insertion limits then: IF OAC is available, THEN verify OAC point C1L4409 is in alarm STANDARD: No action required. Initial conditions state that the OAC is out of service COMMENTS:	___ SAT ___ UNSAT
STEP 3: Determine Rod Insertion Limit for current power level. STANDARD: Operator determines from the Unit 1 Core Operating Limits Report (COLR) that the Rod Insertion Limit is 70-80 steps withdrawn on Control Bank "D". COMMENTS: get copy of appropriate part of COLR to confirm RIL	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 4: Ensure one NV Pump - ON STANDARD: Operator determines that one NV Pump is in service ***CUE: The RED "ON" light for 1B NV Pump is LIT and the GREEN "OFF" light is DARK*** COMMENTS:	___ SAT ___ UNSAT
NOTE: A boration rate significantly higher than 30 gpm may have an undesired effect on power reduction.	
STEP 5: Establish boric acid flow of greater than or equal to 30 GPM from the BAT as follows: Ensure at least one Boric Acid Transfer Pump ON STANDARD: Operator locates controls for Boric Acid Transfer Pumps and starts at least one pump by turning B/A XFR pump 1A or 1B switch to the on position and verifies RED "ON" light LIT. ***CUE: The RED "ON" light is LIT for Boric Acid Pump 1A and the GREEN "OFF" light is DARK. The RED "ON" light is LIT for Boric Acid Pump 1B and the GREEN "OFF" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 6: Open the following valves • 1NV-238A • 1NV-186A STANDARD: Operator rotates the switches for 1NV-238A and 1NV-186A to the open position on 1MC-11 and verifies that boration flow is greater than or equal to 30 gpm as indicated on 1NVCR5450. ***CUE: The switch for 1NV-238A has been rotated to the open position. The RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK. The switch for 1NV-186A has been rotated to the open position. The RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 7: When OAC point C1L4409 (Ctrl Bank Tech Spec Insertion Lmt Reached) alarm clears OR control rods are above insertion limits, Then close the following valves: • 1NV-238A • 1NV-186A STANDARD: Operator determines that boration must continue until Control Bank D is above 70 - 80 steps withdrawn. ****EXAMINER NOTE: The JPM is complete once boration is established and Rod Insertion Limit is determined** COMMENTS: Set up IPM such that examinee must borate until RIL is cleared and then stops boration. How long? Will check on prep week. Probably too long to be worth while.	**CRITICAL STEP** ___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

You are the Unit 1 OATC.

Unit 1 has experienced a Load Rejection due to the loss of 1A Feedwater Pump. AP/1/A/5500/03 (Load Rejection) is in progress.

Current power level is 63%.

The OAC is out of service.

INITIATING CUES:

The SRO instructs you to determine the rod insertion limit for the present power level and perform Enclosure 3 of AP/1/A/5500/03 (Load Rejection) to restore the control banks above the initiate boration

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

Catawba Unit 1 Cycle 13

Core Operating Limits Report
Revision 19

February 2001

Duke Power Company

		Date
Prepared By:	Sandra D Davis	Feb. 01, 2001
Checked By:	Scott B. Thomas	2/1/01
Checked By:	Raj Al-Ifft	2/1/01
Approved By:	P. M. Abraham	2/1/01

QA Condition 1

The information presented in this report has been prepared and issued in accordance with Catawba Technical Specification 5.6.5.

Catawba 1 Cycle 13 Core Operating Limits Report

IMPLEMENTATION INSTRUCTIONS FOR REVISION 19

Revision 19 of the Catawba Unit 1 COLR should be implemented immediately.

Catawba 1 Cycle 13 Core Operating Limits Report

REVISION LOG

Revision	EI Date	Pages Affected	COLR
0 – 1	Superceded	N/A	C1C07
2 – 5	Superceded	N/A	C1C08
6 – 8	Superceded	N/A	C1C09
9 – 11	Superceded	N/A	C1C10
12 - 14	Superceded	N/A	C1C11
15 – 17	Superceded	N/A	C1C12
18	October 2000	1 – 26 Appendix A	C1C13 (orig. issue)
19	February 2001	1-4, 25, 26	C1C13 (revision)

Catawba 1 Cycle 13 Core Operating Limits Report

INSERTION SHEET FOR REVISION 19

Remove pages	Insert Rev. 19 pages
Pages 1-4, 25 and 26	Pages 1-4, 25 and 26

Catawba 1 Cycle 13 Core Operating Limits Report

1.0 Core Operating Limits Report

This Core Operating Limits Report (COLR) has been prepared in accordance with the requirements of Technical Specification 5.6.5.

The Technical Specifications that reference this report are listed below:

TS Section	Technical Specifications	COLR Parameter	COLR Section	COLR Page
3.1.1	Shutdown Margin	Shutdown Margin	2.1	6
3.1.3	Moderator Temperature Coefficient	MTC	2.2	6
3.1.4	Rod Group Alignment Limits	Shutdown Margin	2.1	6
3.1.5	Shutdown Bank Insertion Limit	Shutdown Margin	2.1	6
		Rod Insertion Limits	2.3	7
3.1.6	Control Bank Insertion Limit	Shutdown Margin	2.1	6
		Rod Insertion Limits	2.4	7
3.1.8	Physics Tests Exceptions	Shutdown Margin	2.1	6
3.2.1	Heat Flux Hot Channel Factor	F_Q	2.5	11
		AFD	2.7	18
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3.2.3	Axial Flux Difference	AFD	2.7	18
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3.3.9	Boron Dilution Mitigation System	Reactor Makeup Water Flow Rate	2.9	23
3.5.1	Accumulators	Max and Min Boron Conc.	2.10	23
3.5.4	Refueling Water Storage Tank	Max and Min Boron Conc..	2.11	23
3.7.15	Spent Fuel Pool Boron Concentration	Min Boron Concentration	2.12	24
3.9.1	Refueling Operations - Boron Concentration	Min Boron Concentration	2.13	24
3.9.2	Refueling Operations – Nuclear Instrumentation	Reactor Makeup Water Flow Rate	2.14	24

The Selected License Commitments that reference this report are listed below:

SLC Section	Selected Licensing Commitment	COLR Parameter	COLR Section	COLR Page
16.7-9.3	Standby Shutdown System	Standby Makeup Pump Water Supply	2.15	25
16.9-11	Boration Systems – Borated Water Source – Shutdown	Borated Water Volume and Conc. for BAT/RWST	2.16	25
16.9-12	Boration Systems – Borated Water Source – Operating	Borated Water Volume and Conc. for BAT/RWST	2.17	26

Catawba 1 Cycle 13 Core Operating Limits Report

2.0 Operating Limits

The cycle-specific parameter limits for the specifications listed in Section 1.0 are presented in the following subsections. These limits have been developed using NRC approved methodologies specified in Technical Specification 5.6.5.

2.1 Shutdown Margin - SDM (TS 3.1.1, TS 3.1.4, TS 3.1.5, TS 3.1.6, TS 3.1.8)

2.1.1 For TS 3.1.1, shutdown margin shall be greater than or equal to 1.3% ΔK/K in mode 2 with Keff < 1.0 and in modes 3 and 4.

2.1.2 For TS 3.1.1, shutdown margin shall be greater than or equal to 1.0% ΔK/K in mode 5.

2.1.3 For TS 3.1.4, shutdown margin shall be greater than or equal to 1.3% ΔK/K in mode 1 and mode 2.

2.1.4 For TS 3.1.5, shutdown margin shall be greater than or equal to 1.3% ΔK/K in mode 1 and mode 2 with any control bank not fully inserted.

2.1.5 For TS 3.1.6, shutdown margin shall be greater than or equal to 1.3% ΔK/K in mode 1 and mode 2 with Keff ≥ 1.0.

2.1.6 For TS 3.1.8, shutdown margin shall be greater than or equal to 1.3% ΔK/K in mode 2 during Physics Testing.

2.2 Moderator Temperature Coefficient - MTC (TS 3.1.3)

2.2.1 The Moderator Temperature Coefficient (MTC) Limits are:

The MTC shall be less positive than the upper limits shown in Figure 1. The BOC, ARO, HZP MTC shall be less positive than 0.7E-04 ΔK/K/°F.

The EOC, ARO, RTP MTC shall be less negative than the -4.1E-04 ΔK/K/°F lower MTC limit.

2.2.2 The 300 ppm MTC Surveillance Limit is:

The measured 300 PPM ARO, equilibrium RTP MTC shall be less negative than or equal to -3.2E-04 ΔK/K/°F.

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2.2.3 The 60 PPM MTC Surveillance Limit is:

The 60 PPM ARO, equilibrium RTP MTC shall be less negative than or equal to -3.85E-04 ΔK/K/°F.

Where: BOC = Beginning of Cycle (burnup corresponding to most positive MTC)
EOC = End of Cycle
ARO = All Rods Out
HZP = Hot Zero Thermal Power
RTP = Rated Thermal Power
PPM = Parts per million (Boron)

2.3 Shutdown Bank Insertion Limit (TS 3.1.5)

2.3.1 Each shutdown bank shall be withdrawn to at least 226 steps. Shutdown banks are withdrawn in sequence and with no overlap.

2.4 Control Bank Insertion Limits (TS 3.1.6)

2.4.1 Control banks shall be within the insertion, sequence, and overlap limits shown in Figure 2. Specific control bank withdrawal and overlap limits as a function of the fully withdrawn position are shown in Table 1.

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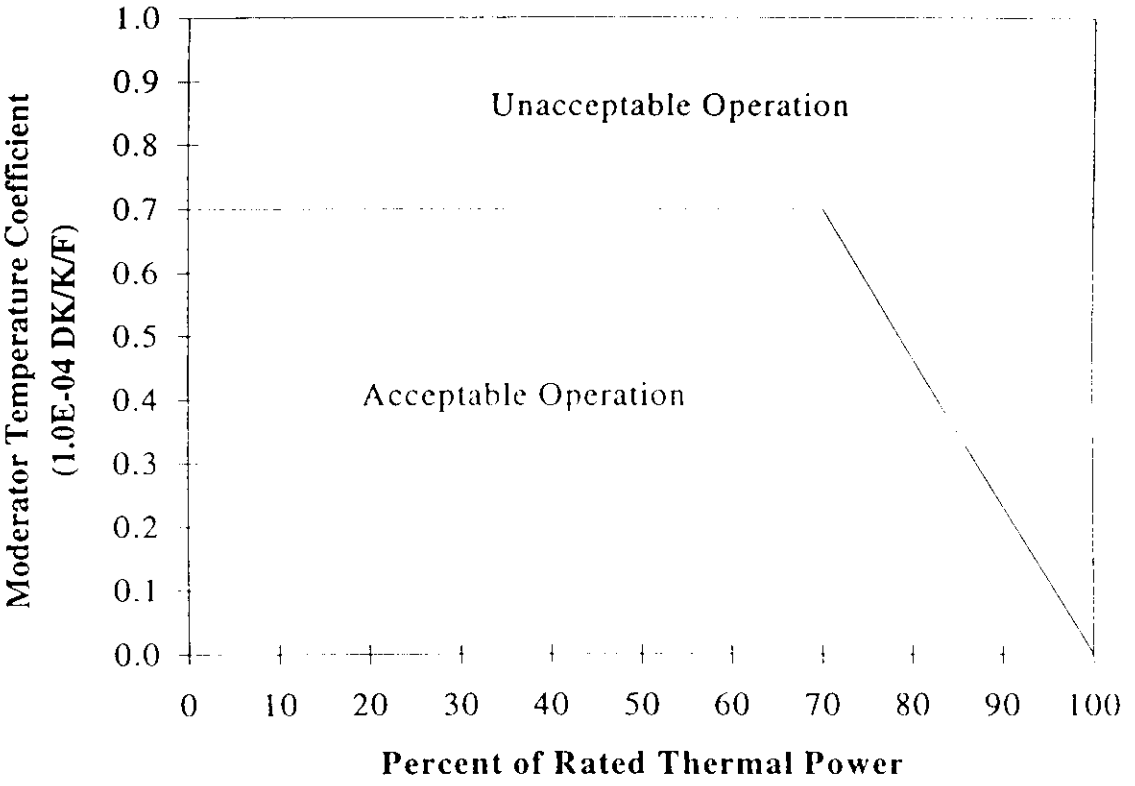
Figure 1

Moderator Temperature Coefficient Upper Limit Versus Power Level



NOTE: Compliance with Technical Specification 3.1.3 may require rod withdrawal limits. Refer to the Unit 1 ROD manual for details.

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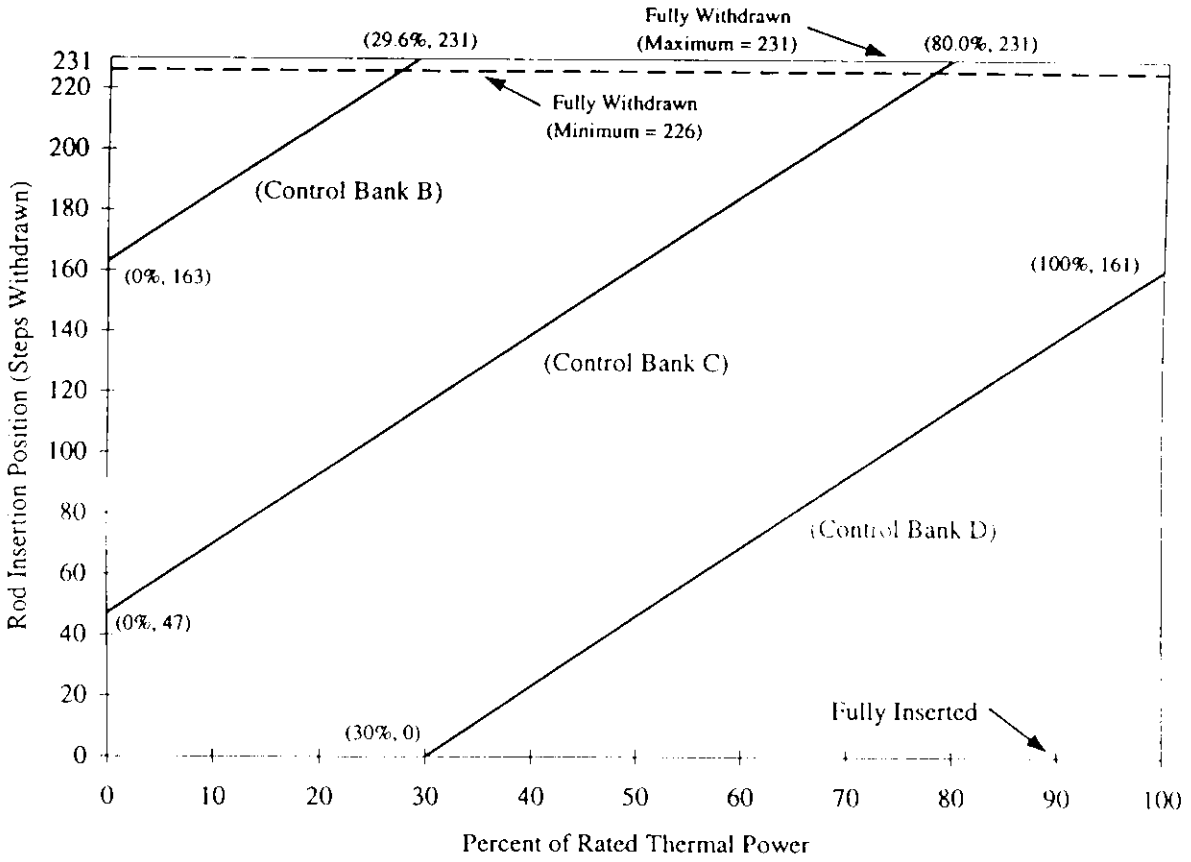
Figure 2

Control Bank Insertion Limits Versus Percent Rated Thermal Power



NOTE: Compliance with Technical Specification 3.1.3 may require rod withdrawal limits. Refer to the Unit 1 ROD manual for details.

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Table 1
Control Bank Withdrawal Steps and Sequence

Fully Withdrawn at 226 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
226 Stop	110	0	0
226	116	0 Start	0
226	226 Stop	110	0
226	226	116	0 Start
226	226	226 Stop	110

Fully Withdrawn at 227 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
227 Stop	111	0	0
227	116	0 Start	0
227	227 Stop	111	0
227	227	116	0 Start
227	227	227 Stop	111

Fully Withdrawn at 228 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
228 Stop	112	0	0
228	116	0 Start	0
228	228 Stop	112	0
228	228	116	0 Start
228	228	228 Stop	112

Fully Withdrawn at 229 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
229 Stop	113	0	0
229	116	0 Start	0
229	229 Stop	113	0
229	229	116	0 Start
229	229	229 Stop	113

Fully Withdrawn at 230 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
230 Stop	114	0	0
230	116	0 Start	0
230	230 Stop	114	0
230	230	116	0 Start
230	230	230 Stop	114

Fully Withdrawn at 231 Steps

Control Bank A	Control Bank B	Control Bank C	Control Bank D
0 Start	0	0	0
116	0 Start	0	0
231 Stop	115	0	0
231	116	0 Start	0
231	231 Stop	115	0
231	231	116	0 Start
231	231	231 Stop	115

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2.5 Heat Flux Hot Channel Factor - $F_Q(X,Y,Z)$ (TS 3.2.1)

2.5.1 $F_Q(X,Y,Z)$ steady-state limits are defined by the following relationships:

$$F_Q^{RTP} * K(Z)/P \qquad \text{for } P > 0.5$$
$$F_Q^{RTP} * K(Z)/0.5 \qquad \text{for } P \leq 0.5$$

where,

P = (Thermal Power)/(Rated Power)

Note: The measured $F_Q(X,Y,Z)$ shall be increased by 3% to account for manufacturing tolerances and 5% to account for measurement uncertainty when comparing against the limits. The manufacturing tolerance and measurement uncertainty are implicitly included in the F_Q surveillance limits as defined in COLR Sections 2.5.5 and 2.5.6.

2.5.2 $F_Q^{RTP} = 2.50 \times K(BU)$

2.5.3 K(Z) is the normalized $F_Q(X,Y,Z)$ as a function of core height. K(Z) for MkBW fuel is provided in Figure 3, and the K(Z) for Westinghouse RFA fuel is provided in Figure 4.

2.5.4 K(BU) is the normalized $F_Q(X,Y,Z)$ as a function of burnup. K(BU) for both MkBW fuel and Westinghouse RFA fuel is 1.0 at all burnups.

The following parameters are required for core monitoring per the Surveillance Requirements of Technical Specification 3.2.1:

2.5.5 $$[F_Q^L(X,Y,Z)]^{OP} = \frac{F_Q^D(X,Y,Z) * M_Q(X,Y,Z)}{UMT * MT * TILT}$$

where:

$[F_Q^L(X,Y,Z)]^{OP}$ = Cycle dependent maximum allowable design peaking factor that ensures that the $F_Q(X,Y,Z)$ LOCA limit is not exceeded for operation within the AFD, RIL, and QPTR limits. $F_Q^L(X,Y,Z)^{OP}$ includes allowances for calculational and measurement uncertainties.

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$F_Q^D(X,Y,Z)$ = Design power distribution for F_Q. $F_Q^D(X,Y,Z)$ is provided in Table 4, Appendix A, for normal operating conditions and in Table 5, Appendix A for power escalation testing during initial startup operation.

$M_Q(X,Y,Z)$ = Margin remaining in core location X,Y,Z to the LOCA limit in the transient power distribution. $M_Q(X,Y,Z)$ is provided in Table 4, Appendix A for normal operating conditions and in Table 5, Appendix A for power escalation testing during initial startup operation.

UMT = Total Peak Measurement Uncertainty. (UMT = 1.05)

MT = Engineering Hot Channel Factor. (MT = 1.03)

TILT = Peaking penalty that accounts for allowable quadrant power tilt ratio of 1.02. (TILT = 1.035)

2.5.6 $$[F_Q^L(X,Y,Z)]^{RPS} = \frac{F_Q^D(X,Y,Z) * M_C(X,Y,Z)}{UMT * MT * TILT}$$

where:

$[F_Q^L(X,Y,Z)]^{RPS}$ = Cycle dependent maximum allowable design peaking factor that ensures that the $F_Q(X,Y,Z)$ Centerline Fuel Melt (CFM) limit is not exceeded for operation within the AFD, RIL, and QPRT limits. $[F_Q^L(X,Y,Z)]^{RPS}$ includes allowances for calculational and measurement uncertainties.

$F_Q^D(X,Y,Z)$ = Design power distributions for F_Q. $F_Q^D(X,Y,Z)$ is provided in Table 4, Appendix A for normal operating conditions and in Table 5, Appendix A for power escalation testing during initial startup operations.

$M_C(X,Y,Z)$ = Margin remaining to the CFM limit in core location X,Y,Z from the transient power distribution. $M_C(X,Y,Z)$ is provided in Table 6, Appendix A for normal operating conditions and in Table 7, Appendix A for power escalation testing during initial startup operations.

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UMT = Measurement Uncertainty (UMT = 1.05)

MT = Engineering Hot Channel Factor (MT = 1.03)

TILT = Peaking penalty that accounts for allowable quadrant power tilt ratio of 1.02. (TILT = 1.035)

2.5.7 KSLOPE = 0.0725

where:

KSLOPE = the adjustment to the K_1 value from OTΔT trip setpoint required to compensate for each 1% that $F_Q^M(X,Y,Z)$ exceeds $F_Q^L(X,Y,Z)^{RPS}$.

2.5.8 $F_Q(X,Y,Z)$ Penalty Factors for Technical Specification Surveillances 3.2.1.2 and 3.2.1.3 are provided in Table 2.

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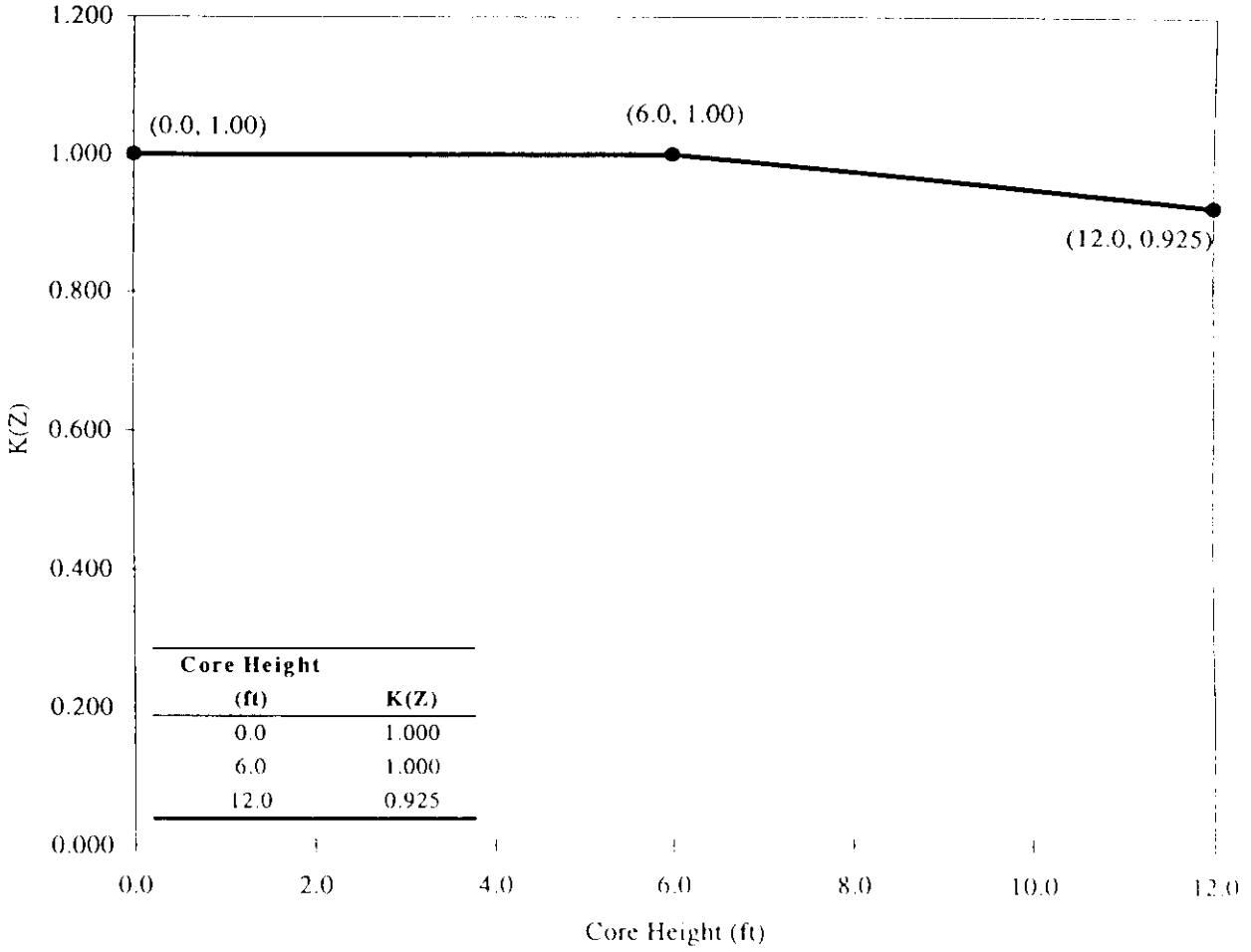
Figure 3

K(Z), Normalized $F_Q(X,Y,Z)$ as a Function of Core Height for MkBW Fuel



Core Height (ft)	K(Z)
0.0	1.000
6.0	1.000
12.0	0.925

Note: Figure 3 represents the K(Z) function analyzed for Mk-BW fuel in the C1C13 Maneuvering Analysis (CNC-1553.05-00-0337). This K(Z) function is based on Appendix K LOCA methodology and is more conservative than the current K(Z) function required by the BELOCA methodology referenced in Technical Specification 5.6.5.

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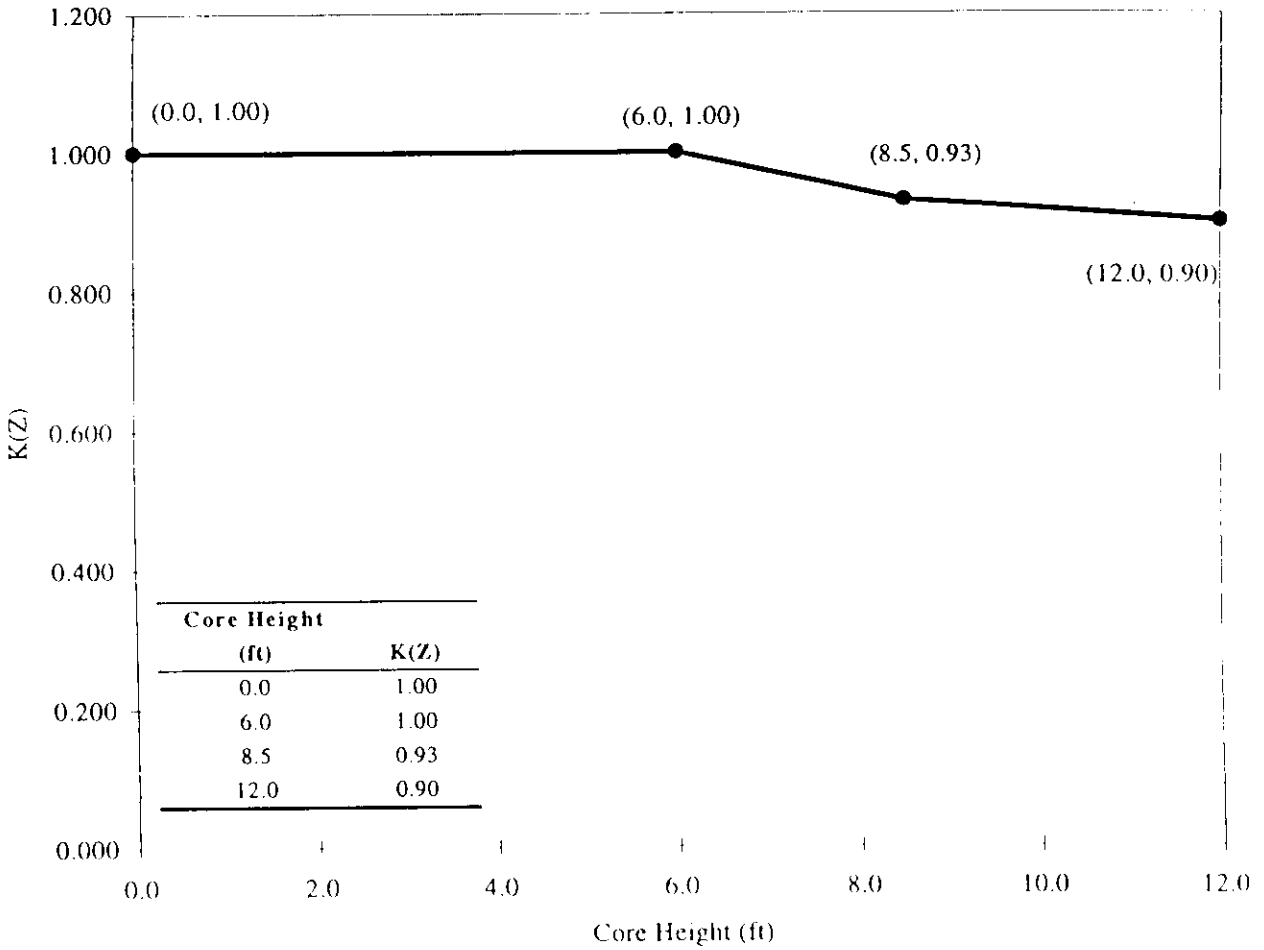
Figure 4

K(Z), Normalized $F_Q(X,Y,Z)$ as a Function of Core Height for RFA Fuel



Core Height (ft)	K(Z)
0.0	1.00
6.0	1.00
8.5	0.93
12.0	0.90

Note: Figure 4 represents the K(Z) function analyzed for RFA fuel in the C1C13 Maneuvering Analysis (CNC-1553.05-00-0337). This K(Z) function is based on Appendix K LOCA methodology and is more conservative than the current K(Z) function required by the BELOCA methodology referenced in Technical Specification 5.6.5.

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Table 2

$F_Q(X,Y,Z)$ and $F_{\Delta H}(X,Y)$ Penalty Factors For Tech Spec Surveillances 3.2.1.2, 3.2.1.3 and 3.2.2.2

Burnup (EFPD)	$F_Q(X,Y,Z)$ Penalty Factor(%)	$F_{\Delta H}(X,Y)$ Penalty Factor (%)
4	2.00	2.00
12	2.00	2.00
25	2.00	2.00
50	2.00	2.00
75	2.00	2.00
100	2.00	2.00
125	2.00	2.00
150	2.00	2.00
175	**2.06**	2.00
200	2.00	2.00
225	2.00	2.00
250	2.00	2.00
275	2.00	2.00
300	2.00	2.00
470	2.00	2.00
495	**2.44**	2.00
505	**2.46**	2.00

Note: Linear interpolation is adequate for intermediate cycle burnups.

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2.6 Nuclear Enthalpy Rise Hot Channel Factor - $F_{\Delta H}(X,Y)$ (TS 3.2.2)

The $F_{\Delta H}$ steady-state limits referred to in Technical Specification 3.2.2 is defined by the following relationship.

2.6.1 $$[F^{L}_{\Delta H}(X,Y)]^{LCO} = MARP(X,Y) * \left[1.0 + \frac{1}{RRH} * (1.0 - P)\right]$$

where:

$[F^{L}_{\Delta H}(X,Y)]^{LCO}$ is defined as the steady-state, maximum allowed radial peak. $[F^{L}_{\Delta H}(X,Y)]^{LCO}$ includes allowances for calculation/measurement uncertainty.

MARP(X,Y) = Cycle-specific operating limit Maximum Allowable Radial Peaks. MARP(X,Y) radial peaking limits are provided in Table 3.

$$P = \frac{\text{Thermal Power}}{\text{Rated Thermal Power}}$$

RRH = Thermal Power reduction required to compensate for each 1% that the measured radial peak, $F^{M}_{\Delta H}(X,Y)$, exceeds the limit.
(RRH = 3.34, $0.0 < P \leq 1.0$)

The following parameters are required for core monitoring per the Surveillance requirements of Technical Specification 3.2.2.

2.6.2 $$[F^{L}_{\Delta H}(X,Y)]^{SURV} = \frac{F^{D}_{\Delta H}(X,Y) \times M_{\Delta H}(X,Y)}{UMR \times TILT}$$

where:

$[F^{L}_{\Delta H}(X,Y)]^{SURV}$ = Cycle dependent maximum allowable design peaking factor that ensures that the $F_{\Delta H}(X,Y)$ limit is not exceeded for operation within the AFD, RIL, and QPTR limits. $F^{L}_{\Delta H}(X,Y)^{SURV}$ includes allowances for calculational and measurement uncertainty.

$F^{D}_{\Delta H}(X,Y)$ = Design power distribution for $F_{\Delta H}$. $F^{D}_{\Delta H}(X,Y)$ is provided in Table 8, Appendix A for normal operation and in Table 9,

Appendix A for power escalation testing during initial startup operation.

$M_{\Delta H}(X,Y)$ = The margin remaining in core location X,Y relative to the Operational DNB limits in the transient power distribution. $M_{\Delta H}(X,Y)$ is provided in Table 8, Appendix A for normal operation and in Table 9, Appendix A for power escalation testing during initial startup operation.

UMR = Uncertainty value for measured radial peaks. UMR is set to 1.0 since a factor of 1.04 is implicitly included in the variable $M_{\Delta H}(X,Y)$.

TILT = Peaking penalty that accounts for allowable quadrant power tilt ratio of 1.02. (TILT = 1.035)

NOTE: $[F^{L}_{\Delta H}(X,Y)]^{SURV}$ is the parameter identified as $[F_{\Delta H}(X,Y)]^{MAX}$ in DPC-NE-2011PA.

2.6.3 RRH = 3.34

where:

RRH = Thermal Power reduction required to compensate for each 1% that the measured radial peak, $F^{M}_{\Delta H}(X,Y)$ exceeds its limit. $(0 < P \leq 1.0)$

2.6.4 TRH = 0.04

where:

TRH = Reduction in OTΔT K_1 setpoint required to compensate for each 1% that the measured radial peak, $F_{\Delta H}(X,Y)$ exceeds its limit.

2.6.5 $F_{\Delta H}(X,Y)$ Penalty Factors for Technical Specification Surveillance 3.2.2.2 are provided in Table 2.

2.7 Axial Flux Difference – AFD (TS 3.2.3)

2.7.1 The Axial Flux Difference (AFD) Limits are provided in Figure 5.

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Table 3
Maximum Allowable Radial Peaks (MARPS)

MkBW and RFA Fuel MARPs

Core Height	Axial Peak												
(ft)	1.05	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.1	3.0	3.25
0.12	1.695	1.725	1.790	1.847	1.897	1.903	1.834	1.780	1.697	1.620	1.520	1.199	1.136
1.20	1.692	1.723	1.784	1.839	1.886	1.867	1.811	1.788	1.714	1.639	1.525	1.170	1.106
2.40	1.696	1.725	1.781	1.833	1.872	1.823	1.768	1.751	1.694	1.639	1.542	1.156	1.095
3.60	1.699	1.726	1.778	1.822	1.830	1.779	1.726	1.705	1.652	1.603	1.541	1.190	1.120
4.80	1.701	1.725	1.772	1.810	1.784	1.733	1.682	1.664	1.614	1.565	1.501	1.220	1.174
6.00	1.703	1.725	1.763	1.779	1.732	1.686	1.638	1.622	1.574	1.529	1.461	1.194	1.145
7.20	1.703	1.721	1.751	1.731	1.683	1.633	1.587	1.571	1.527	1.488	1.424	1.165	1.116
8.40	1.698	1.709	1.719	1.677	1.628	1.579	1.534	1.522	1.479	1.440	1.373	1.134	1.089
9.60	1.690	1.694	1.668	1.617	1.574	1.529	1.487	1.476	1.436	1.399	1.337	1.110	1.065
10.80	1.679	1.666	1.619	1.566	1.518	1.476	1.434	1.427	1.390	1.355	1.294	1.075	1.033
12.00	1.653	1.624	1.569	1.520	1.471	1.432	1.394	1.389	1.356	1.327	1.273	1.061	1.017

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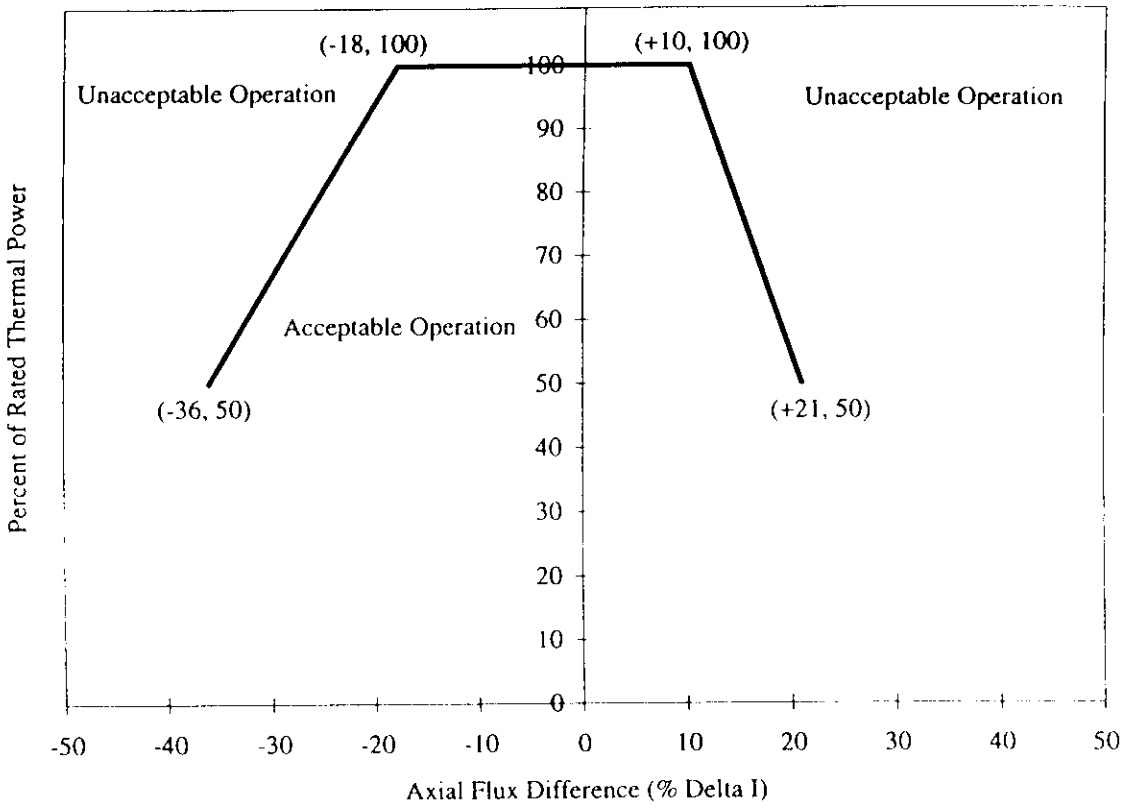
Figure 5

Percent of Rated Thermal Power Versus Percent Axial Flux Difference Limits



NOTE: Compliance with Technical Specification 3.2.1 may require more restrictive AFD limits. Refer to the Unit 1 ROD manual for operational AFD limits.

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2.8 Reactor Trip System Instrumentation Setpoints (TS 3.3.1) Table 3.3.1-1

2.8.1 Overtemperature ΔT Setpoint Parameter Values

Parameter	Nominal Value
Overtemperature ΔT reactor trip setpoint	K_1 = 1.1978
Overtemperature ΔT reactor trip heatup setpoint penalty coefficient	K_2 = 0.03340/°F
Overtemperature ΔT reactor trip depressurization setpoint penalty coefficient	K_3 = 0.001601/psi
Time constants utilized in the lead-lag compensator for ΔT	τ_1 = 8 sec. τ_2 = 3 sec.
Time constant utilized in the lag compensator for ΔT	τ_3 = 0 sec.
Time constants utilized in the lead-lag compensator for T_{avg}	τ_4 = 22 sec. τ_5 = 4 sec.
Time constant utilized in the measured T_{avg} lag compensator	τ_6 = 0 sec.
$f_1(\Delta I)$ "positive" breakpoint	= 19.0 %ΔI
$f_1(\Delta I)$ "negative" breakpoint	= N/A*
$f_1(\Delta I)$ "positive" slope	= 1.769 %ΔT_0/ %ΔI
$f_1(\Delta I)$ "negative" slope	= N/A*

* The $f_1(\Delta I)$ "negative" breakpoint and the $f_1(\Delta I)$ "negative" slope are not applicable since the $f_1(\Delta I)$ function is not required below the $f_1(\Delta I)$ "positive" breakpoint of 19.0% ΔI.

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2.8.2 Overpower ΔT Setpoint Parameter Values

Parameter	Nominal Value
Overpower ΔT reactor trip setpoint	$K_4 = 1.0864$
Overpower ΔT reactor trip heatup setpoint penalty coefficient (for T>T")	$K_6 = 0.001179/^{o}F$
Time constants utilized in the lead-lag compensator for ΔT	$\tau_1 = 8$ sec. $\tau_2 = 3$ sec.
Time constant utilized in the lag compensator for ΔT	$\tau_3 = 0$ sec.
Time constant utilized in the measured T_{avg} lag compensator	$\tau_6 = 0$ sec.
Time constant utilized in the rate-lag controller for T_{avg}	$\tau_7 = 10$ sec.
$f_2(\Delta I)$ "positive" breakpoint	= 35.0 %ΔI
$f_2(\Delta I)$ "negative" breakpoint	= -35.0 %ΔI
$f_2(\Delta I)$ "positive" slope	= 7.0 $\%\Delta T_0$/ %ΔI
$f_2(\Delta I)$ "negative" slope	= 7.0 $\%\Delta T_0$/ %ΔI

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2.9 Boron Dilution Mitigation System (TS 3.3.9)

2.9.1 Reactor Makeup Water Pump flow rate limits:

Applicable Mode	Limit
Mode 3	≤ 150 gpm
Mode 4 or 5	≤ 70 gpm

2.10 Accumulators (TS 3.5.1)

2.10.1 Boron concentration limits during modes 1 and 2, and mode 3 with RCS pressure >1000 psi:

Parameter	Limit
Cold Leg Accumulator minimum boron concentration.	2,500 ppm
Cold Leg Accumulator maximum boron concentration.	2,975 ppm

2.11 Refueling Water Storage Tank - RWST (TS 3.5.4)

2.11.1 Boron concentration limits during modes 1, 2, 3, and 4:

Parameter	Limit
Refueling Water Storage Tank minimum boron concentration.	2,700 ppm
Refueling Water Storage Tank maximum boron concentration.	2,975 ppm

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2.12 Spent Fuel Pool Boron Concentration (TS 3.7.15)

2.12.1 Minimum boron concentration limit for the spent fuel pool. Applicable when fuel assemblies are stored in the spent fuel pool.

Parameter	Limit
Spent fuel pool minimum boron concentration.	2,700 ppm

2.13 Refueling Operations - Boron Concentration (TS 3.9.1)

2.13.1 Minimum boron concentration limit for the filled portions of the Reactor Coolant System, refueling canal, and refueling cavity for mode 6 conditions. The minimum boron concentration limit and plant refueling procedures ensure that the Keff of the core will remain within the mode 6 reactivity requirement of Keff $\leq$ 0.95.

Parameter	Limit
Minimum Boron concentration of the Reactor Coolant System, the refueling canal, and the refueling cavity.	2,700 ppm

2.14 Refueling Operations - Instrumentation (TS 3.9.2)

2.14.1 Reactor Makeup Water Pump Flow rate Limit:

Applicable Mode	Limit
Mode 6	$\leq$ 70 gpm

Catawba 1 Cycle 13 Core Operating Limits Report

2.15 Standby Shutdown System - Standby Makeup Pump Water Supply - (SLC-16.7-9.3)

2.15.1 Minimum boron concentration limit for the spent fuel pool. Applicable for modes 1, 2, and 3.

Parameter	Limit
Spent fuel pool minimum boron concentration for surveillance SLC-16.7-9.3.	2,700 ppm

2.16 Borated Water Source – Shutdown (SLC 16.9-11)

2.16.1 Volume and boron concentrations for the Boric Acid Storage System and the Refueling Water Storage Tank (RWST) during mode 4 with any RCS cold leg temperature $\leq 285^{O}F$, and modes 5 and 6.

Parameter	Limit
Boric Acid Storage System minimum contained borated water volume	12,054 gallons
Boric Acid Storage System minimum boron concentration	7,000 ppm
Boric Acid Storage System minimum water volume required to maintain SDM at 7,000 ppm	639 gallons
Refueling Water Storage Tank minimum contained borated water volume	45,000 gallons
Refueling Water Storage Tank minimum boron concentration	2,700 ppm
Refueling Water Storage Tank minimum water volume required to maintain SDM at 2,700 ppm	3,500 gallons

Catawba 1 Cycle 13 Core Operating Limits Report

2.17 Borated Water Source - Operating (SLC 16.9-12)

2.17.1 Volume and boron concentrations for the Boric Acid Storage System and the Refueling Water Storage Tank (RWST) during modes 1, 2, 3, and mode 4 with all RCS cold leg temperatures > 285°F.

Parameter	Limit
Boric Acid Storage System minimum contained borated water volume	24,720 gallons
Boric Acid Storage System minimum boron concentration	7,000 ppm
Boric Acid Storage System minimum water volume required to maintain SDM at 7,000 ppm	13,020 gallons
Refueling Water Storage Tank minimum contained borated water volume	98,607 gallons
Refueling Water Storage Tank minimum boron concentration	2,700 ppm
Refueling Water Storage Tank minimum water volume required to maintain SDM at 2,700 ppm	57,107 gallons

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NOTE: Data contained in the Appendix to this document was generated in the Catawba 1 Cycle 13 Maneuvering Analysis calculation file, CNC-1553.05-00-0337. The Plant Nuclear Engineering Section will control this information via computer file(s) and should be contacted if there is a need to access this information.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-5/SIM

Ensure Proper Feedwater Isolation Following a Reactor Trip

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Ensure Proper Feedwater Isolation following a Reactor Trip per EP/1/A/5000/ES-0.1 (Reactor Trip Response).

Alternate Path:

Yes: 1CF-51 must be manually closed from the Control Room.

Facility JPM #:

OP-CN-CF-CF-001

K/A Rating(s):

059 A3.06 (3.2/3.3)

Task Standard:

Status lights for "S/G A (B) (C) (D) CF Cont Isol Vlvs Clsd" all lit and 1CF-51 manually closed from 1MC-2.

Preferred Evaluation Simulator: **Preferred Evaluation Perform**

Simulator ___X___ In-Plant _____ Perform ___X___ Simulate _____

References:

EP/1/A/5000/ES-0.1 (Reactor Trip Response) Rev. 17

Validation Time: 5 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1. Pick any "AT POWER" IC set.

3. Block manual CF isolation:

   OVR-ISE006C DIGITAL VALUE = OFF

   OVR-ISE-008C DIGITAL VALUE = OFF

4. Insert: VLV-CF012A (CF-051 Feedwtr Cont Iso Vlv Fail Auto Action)

5. Manually trip the Reactor and perform required actions of EP/E-0 and EP/ES-0.1 through step 5.

6. Acknowledge annunciators and write to a snap.

   SNAP No.: 157

SIMULATOR OPERATOR INSTRUCTIONS:

None.

Tools/Equipment/Procedures Needed:

Ensure enough copies of EP/1/A/5000/ES-0.1 for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

A Reactor Trip has occurred on Unit 1.

EP/1/A/5000/ES-0.1 (Reactor Trip Response) has been implemented.

INITIATING CUES:

The CR SRO instructs you to verify feedwater status per step 6.

START TIME: _____

'TEP 1: Verify feedwater status as follows: STANDARD: No expectation. Examinee continues. COMMENTS:	___ SAT ___ UNSAT
STEP 2: T-Avg-LESS THAN 564°F STANDARD: "NC Loop A (B) (C) (D) Lo Tavg I (II) (III) (IV)" status lights lit on 1SI-7 or NC Loop A, B, C, D Tave meters on 1MC-5 less than 564° F. 1NCP5423, 1NCP5463, 1NCP5503, 1NCP5543 OR Actioneered Hi Tavg chart recorder (MC-1) less than 564° F. ***CUE: T-Avg is 560°F.*** COMMENTS:	___ SAT ___ UNSAT
STEP 3: All Feedwater Isolation status lights (1SI-5) LIT. STANDARD: "S/G A (B) (D) CF CONT ISOL VLVS CLSD" status light lit and "S/G C CF CONT ISOL VLVS CLSD" status light DARK on 1SI-5. ***CUE: S/G A, B, D, CF CONT ISOL VLVS CLSD status lights on 1SI-5 are LIT. "S/G C CF CONT ISOL VLVS CLSD" status light on 1SI-5 is DARK.*** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 4: Manually initiate Feedwater Isolation. STANDARD: Depress CF Isolation "INITIATE" pushbuttons on 1MC-2. Examinee verifies "INITIATE" light not LIT on CF Isolation switches. ***CUE: S/G C CF CONT ISOL VLVS CLSD" status light on 1SI-5 is DARK. "INITIATE" lights on CF Isol switches Train A and Train B are DARK.*** COMMENTS:	___ SAT ___ UNSAT
STEP 5: IF proper status light indication is not obtained, THEN manually close valves. STANDARD: RED "OPEN' light LIT for 1CF-51. CLOSED pushbutton is depressed and held until GREEN "CLSD" light LIT for 1CF-51. When 1CF-51 goes closed, the status light "S/G C CF CONT ISOL VLVS CLSD" will light and should be noted. ***CUE: 1CF-51 GREEN Closed light is LIT. "S/G C CF CONT ISOL VLVS CLSD" status light on 1SI-5 is LIT.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 6: Total feed flow to S/G(s) – Greater than 450 gpm. STANDARD: Verify total feed flow to S/G(s) – Greater than 450 gpm. ***CUE: "Total feed flow to S/G(s) is 800 gpm".*** COMMENTS: Is total FW > 450 gpm even if CF-51 not closed? Yes	___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A Reactor Trip has occurred on Unit 1.

EP/1/A/5000/ES-0.1 (Reactor Trip Response) has been implemented.

INITIATING CUES:

The CR SRO instructs you to verify feedwater status per step 6.

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-6/CR

Take Power Range Drawer Out of Service

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Remove Power Range Channel N-41 from service per AP/1/A/5500/16 (Malfunction of Nuclear Instrumentation System), Case IV Power Range Malfunction.

Alternate Path:

NO

Facility JPM #:

OP-CN-IC-ENB-002

K/A Rating(s):

015 A4.03 (3.8/3.9)

Task Standard:

Power Range Detector is N-41 removed from service with Control Power fuses removed.

Preferred Evaluation Simulator:

Simulator _X_ In-Plant ____

Preferred Evaluation Perform

Perform __X__ Simulate _____

References:

AP/1/A/5500/16 (Malfunction of Nuclear Instrumentation System), Case IV Power Range Malfunction Rev. 18

Validation Time: 10 min. **Time Critical:** No

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Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1.Place simulator on Run.

2.Insert **MAL-ENB011A** (Power Range Detector N-41A Failure), Severity Value = **100%.**

3. Perform actions of AP/16 through step 5.

4. **FREEZE** simulator.

5. Write to Protected IC.

SNAP No.: 161

SIMULATOR OPERATOR INSTRUCTIONS:

None.

Tools/Equipment/Procedures Needed:

Ensure enough copies of AP/1/A/5500/16 for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 1 is operating at 100% power.

N-41, Power Range, Upper Detector has failed offscale high.

AP/1/A/5500/16, Case IV, Power Range Malfunction, has been implemented.

INITIATING CUES:

The Control Room SRO instructs you to remove N-41 from service per step 6 through 9 of Case IV of AP/1/A/5500/16.

START TIME: _____

TEP 1: Perform the following actions at the Miscellaneous Control and Indication Panel: (Step 6) • Place the appropriate "ROD STOP BYPASS" switch to the affected channel position. • Verify NUC OVER PWR ROD STOP CH BYP status light (1SI-19) for affected channel – LIT. • Place "POWER MISMATCH BYPASS" switch to the affected channel position. STANDARD: Locates Miscellaneous Control and Indication Panel and performs the following: • Places ROD STOP BYPASS switch to BYPASS PRN41. ***CUE: The ROD STOP BYPASS switch is rotated to the BYPASS PRN41 position.*** • *Locates 1SI-19 and verifies NUC OVER PWR ROD STOP CH BYP status light for N-41 – LIT. ***CUE: The NUC OVER PWR ROD STOP CH BYP status light for N41 is LIT.*** • Places POWER MISMATCH BYPASS switch to BYPASS PRN41. ***CUE: The POWER MISMATCH BYPASS switch is rotated to the BYPASS PRN41 position.*** **EXAMINER NOTE: * This step not critical.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

STEP 2: Perform the following actions at the Detector Current Comparator panel: (Step 7)

- Place "UPPER SECTION" channel defeat switch to the affected channel.
- Verify "CHANNEL DEFEAT" light for upper section-LIT.
- Place "LOWER SECTION" channel defeat switch to the affected channel.
- Verify "CHANNEL DEFEAT" light for lower section-LIT.

CRITICAL STEP

___ SAT

___ UNSAT

STANDARD: Locates Detector Current Comparator Panel and performs the following:

- Places "UPPER SECTION" channel defeat switch to PR N41.

CUE: The UPPER SECTION channel defeat switch is rotated to the PR N41 position.

- *Verify "CHANNEL DEFEAT" light for upper section lit.

CUE: The CHANNEL DEFEAT light for the upper section is LIT.

- Places "LOWER SECTION" channel defeat switch to PR N41.

CUE: The LOWER SECTION channel defeat switch is rotated to the PR N41 position.

- *Verify "CHANNEL DEFEAT" light lit for lower section.

CUE: The CHANNEL DEFEAT light for the lower section is LIT.

EXAMINER NOTE: * These steps are not critical.

COMMENTS:

STEP 3: At the Comparator and Rate panel, place the "COMPARATOR CHANNEL DEFEAT" switch to the affected channel position. (Step 8) STANDARD: Locates Comparator and Rate panel and places "COMPARATOR CHANNEL DEFEAT" switch to N41. ***CUE: The COMPARATOR CHANNEL DEFEAT switch is rotated to the N41 position.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 4: De-energize affected channel. (Step 9.a) • Remove "CONTROL POWER" fuses at Power Range A drawer. STANDARD: Locates N41 Power Range Drawers: • Remove fuses far enough to de-energize "CONTROL POWER". ***CUE: The CONTROL POWER fuse holders are rotated counter-clockwise and pulled out.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
NOTE: Replacement of the affected P/R control power fuses shall not occur without authorization of the Superintendent of Operations or his designee.	
STEP 5: Request the OSM to maintain the "CONTROL POWER" fuses under his control. (Step 9.b) STANDARD: N/A What? "Hands both Control Power fuses to ~~OSM~~ CR SRO to transfer to OSM control. **EXAMINER CUE: OSM replies that he will keep the control power fuses in his possession.** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 6: Verify the affected Power Range cabinet shows no physical signs of damage. (Step 9.c) STANDARD: (N/A) Checks outside of Power Range cabinet for signs of damage. Looking for: - - - ****CUE: The Power Range cabinet shows no sign of damage.** COMMENTS:	___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

*****Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.***

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 1 is operating at 100% power.

N-41, Power Range, Upper Detector has failed offscale high.

AP/1/A/5500/16, Case IV, Power Range Malfunction, has been implemented.

INITIATING CUES:

The Control Room SRO instructs you to remove N-41 from service per steps 6 through 9 of Case IV of AP/1/A/5500/16.

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-7/SIM

Transfer the Emergency Core Coolant System to Cold Leg Recirculation

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Transfer the Emergency Core Coolant System to Cold Leg Recirculation per EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation)

Alternate Path:

Yes: 1FW-27A does not fully close on Low FWST Level

Facility JPM #:

OP-CN-ECCS-NI-088

K/A Rating(s):

006 A3.08 (4.2/4.3)

Task Standard:

EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), steps 1 thru 6 are performed. The FWST is isolated with both NV and both NI pumps aligned and injecting from 1B ND pump. 1A ND pump is shutdown.

Preferred Evaluation Location:

Simulator ___X___ In-Plant _____

Preferred Evaluation Method:

Perform ___X___ Simulate _____

References:

EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation) Rev. 11

Validation Time: 15 min. **Time Critical:** No

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Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

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COMMENTS

_____

_____

_____

SIMULATOR SET-UP SHEET

1. Reset to any "at power" IC Set.
2. Fail 1FW-27A open by inserting **VLV-FW002F**, set Severity Value = **.03**.
3. Insert **MAL-NC013A** (Cold Leg Break LOCA), set Severity Value = **27.5**.
4. Run the simulator until the FWST 2/4 lo level alarm is received, performing all required actions of EP/E-0 and EP/E-1. Stabilize S/G levels etc. and acknowledge alarms.
5. Ensure ECCS and Sequencer are reset.
6. Ensure 1NV-202B and 1NV-203A closed.
7. **FREEZE** the simulator and write to a SNAP.

   IC Selected 155

SIMULATOR OPERATOR INSTRUCTIONS:

NONE

Tools/Equipment/Procedures Needed:

Have enough copies of EP/1/A/5000/ES-1.3 available for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

A LOCA has occurred on Unit 1.

The "FWST 2/4 LO LEVEL" annunciator is lit

INITIATING CUES:

The SRO instructs you, as the BOP, to transfer to Cold Leg Recirculation using EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), steps 1 through 6.

Time critical

START TIME: _____

TEP 1: Monitor Enclosure 1 (Step 1) STANDARD: (NONE) What is expectation? ****EXAMINER CUE: The OATC will monitor Enclosure 1.**) Normal? COMMENTS:	___ SAT ___ UNSAT
****CAUTION: S/I Recirculation flow to NC System must be maintained at all times.**	
STEP 2: Perform steps 3-8 without delay. CSF's should not be implemented prior to completion of these steps (Step 2) STANDARD: (NONE) What is expectation? How fast is "without delay"? If operator takes 30 mins to perform is it unsat? What is max acceptable time? => Time critical COMMENTS:	___ SAT ___ UNSAT
STEP 3: Verify Containment Sump Level greater than 3.5 ft. (Step 3) STANDARD: Checks sump level to be greater than 3.5 ft. (1NIP5260 or 1NIP5270 or 1MICR-5340, 5350 pen 1 on 1MC-7). *****CUE: Containment sump level is 6 feet.*** COMMENTS:	___ SAT ___ UNSAT

STEP 4: Verify KC flow to ND heat exchangers – GREATER THAN 5000 GPM. (Step 4)

STANDARD: Checks KC Outlet Flow to NDHX1A and NDHX1B to be greater than 5000 gpm (1KCP5670 and 1KCP5680 on 1MC-7).

CUE: KC outlet flow to NDHX 1A is greater than 5000 gpm. KC outlet flow to NDHX 1B is greater than 5000 gpm.

COMMENTS:

___ SAT

___ UNSAT

a & b

STEP 5: Ensure S/I reset (Step 5)

- ECCS ← missing

STANDARD: Verify ECCS TRN A YELLOW "RESET" light LIT. (1MC-11).

Verify ECCS TRN B YELLOW "RESET" light LIT. (1MC-11).

- D/G load sequencers

Verify D/G 1A LOAD SEQ YELLOW "RESET" light LIT.

Verify D/G 1B LOAD SEQ YELLOW "RESET" light LIT.

CUE: ECCS Train A and ECCS Train B YELLOW reset lights are LIT. D/G load sequencer Train A and Train B YELLOW reset lights are LIT.

COMMENTS:

___ SAT

___ UNSAT

STEP 6: If at any time a B/O occurs, then restart S/I equipment previously on. (Step 5.e)

STANDARD: Examinee should evaluate step, determine that a B/O does not exist at this time and continue.

↑ good. Do similar on steps 1 & 2

COMMENTS:

___ SAT

___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 7: Verify following valves – OPEN: (Step 6.a) • 1NI-185A (ND Pump 1A Cont Sump Suct) • 1NI-184B (ND Pump 1B Cont Sump Suct) STANDARD: 1NI-185A RED "OPEN" light LIT, GREEN "CLSD" light DARK. 1NI-184B RED "OPEN" light LIT, GREEN "CLSD" light DARK (1MC-11). ***CUE: 1NI-185A RED "OPEN" light is LIT, GREEN "CLOSED" light is DARK. 1NI-184B RED "OPEN" light is LIT. GREEN "CLOSED" light is DARK.*** COMMENTS:	___ SAT ___ UNSAT
STEP 8: Verify following valves – CLOSED: (Step 6.b) • 1FW-27A (ND Pump 1A Suct From FWST) • 1FW-55B (ND Pump 1B Suct From FWST) STANDARD: 1FW-27A GREEN "CLSD" light LIT and RED "OPEN" light LIT (1MC-11). (Valve is in intermediate position) 1FW-55B GREEN "CLSD" light LIT and RED "OPEN" light DARK (1MC-11). ***CUE: 1FW-27A GREEN "CLSD" light is LIT, Red "OPEN" light is LIT. 1FW-55B GREEN "CLSD" light is LIT, RED "OPEN" light is DARK.*** COMMENTS:	___ SAT Dark? ok if this is Alt. path ___ UNSAT =? mid-position

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

local &/or MCR ?

STEP 9: Manually close affected valve (Step 6.b.1) RNO). STANDARD: 1FW-27A GREEN "CLOSED" pushbutton is depressed. GREEN "CLOSED" light is LIT, RED "OPEN" light remains LIT. ***CUE: 1FW-27A GREEN "CLOSED" pushbutton depressed. RED "OPEN" light is LIT, GREEN "CLSD" light is LIT.*** **EXAMINER NOTE: Operator may wait for up to a minute to determine valve will not close due to long stroke time of this valve. COMMENTS: ~~What about sending an AO to locally close?~~ good	___ SAT ___ UNSAT NO
STEP 10: Stop associated ND Pump (Step 6.a.2)a)RNO). STANDARD: ND Pump 1A GREEN "OFF" pushbutton is depressed. GREEN "OFF" light is LIT, RED "ON" light is DARK. ***CUE: ND Pump 1A GREEN "OFF" light is LIT and RED "ON" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 11: Depress "DEFEAT" pushbutton for "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A". (Step 6.b.2)b)RNO) STANDARD: "DEFEAT" pushbutton for "C-LEG RECIRC FWST TO CONT SUMP SWAP TRN A" depressed. "ENABLE" light is DARK. ***CUE: "DEFEAT" pushbutton for "C-LEG RECIR FWST TO CONT SUMP SWAP TRN A" depressed. "ENABLE" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 12: Manually close 1NI-185A. (Step 6.b.2)c)RNO)

STANDARD: Observes GREEN "CLSD" light LIT and RED "OPEN" light DARK for 1NI-185A.

CUE: 1NI-185A GREEN "CLSD" light LIT, RED "OPEN" light DARK.

___ SAT

___ UNSAT

COMMENTS:

STEP 13: If both containment sump suction valves are closed, then ..... Step 6.b.2)d)RNO)

STANDARD: This step is not applicable examinee should continue in procedure.

___ SAT

___ UNSAT

COMMENTS:

STEP 14: Verify ND pumps – ON. (Step 6.c)

STANDARD: ND Pump 1B RED "ON" light LIT (1MC-11).

ND Pump 1A GREEN "OFF" light LIT (1MC-11). RNO does not address this situation. Examinee should continue in A/ER column.

CUE: ND Pump 1A RED "ON" light is DARK, the GREEN "OFF" light is LIT. ND Pump 1B RED "ON" light is LIT, the GREEN "OFF" light is DARK.

___ SAT

___ UNSAT

COMMENTS:

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 15: Isolate NI Pump miniflow as follows: (Step 6d.1) • Verify NC pressure – LESS THAN 1620 PSIG. STANDARD: NC pressure indicates less than 1620 psig. (PLASMA displays on 1MC-1 or 1NCP5120 or 1NCP5140 on 1MC-5) ***CUE: NC pressure is 3 psig.*** COMMENTS: Examinee checks PLASMA displays on 1MC-1 or 1NCP5120 or 1NCP5140 on 1MC-5 and confirms current NC pressure is less than 1620psig.	___ SAT ___ UNSAT
STEP 16: Close the following valves: (RNO 6.d.2) • 1NI-115A (NI Pump 1A Miniflow Isol) • 1NI-144A (NI Pump 1B Miniflow Isol) STANDARD: Depress 1NI-115A GREEN "CLOSE" pushbutton and verify GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-11). Depress 1NI-144A GREEN "CLOSE" pushbutton and verify GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-11). ***CUE: 1NI-115A GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK. 1NI-144A GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK.*** **EXAMINER NOTE: Only step 16 or 18 needs to be completed correctly to meet the intent of the CRITICAL STEP. (i.e. If step 16 is completed satisfactory, then step 18 is not CRITICAL).** JPM COMMENTS: Show me on print this valve H/u.	**CRITICAL STEP** ___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 17: Place "PWR DISCON FOR 1NI-147B" switch in "ENABLE". (Step 6.d.3) STANDARD: Place the "PWR DISCON FOR 1NI-147B" switch to "ENABLE". ***CUE: "PWR DISCON FOR 1NI-147B" switch is rotated to the "ENABLE" position.*** COMMENTS:	___ SAT ___ UNSAT
STEP 18: Close 1NI-147B (NI Miniflow Hdr to FWST Isol). (Step 6.d.4) STANDARD: Depress 1NI-147B "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK (1MC-11). ***CUE: Close pushbutton for 1NI-147B depressed. GREEN "CLOSED" light is LIT and RED "OPEN" light is DARK.*** JAM **EXAMINER NOTE: Only step 16 or 18 needs to be completed correctly to meet the intent of the CRITICAL STEP. (i.e. If step 16 is completed satisfactory, then step 18 is not CRITICAL).** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 19: Close the following valves: (Step 6.e) • 1ND-32A (ND Train 1A Hot Leg Inj Isol) • 1ND-65B (ND Train 1B Hot Leg Inj Isol) STANDARD: Depress 1ND-32A GREEN "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK (1MC-11). Depress 1ND-65B GREEN "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK (1MC-11). ***CUE: 1ND-32A GREEN "CLOSED" pushbutton depressed. The GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK. 1ND-65B GREEN "CLOSED" pushbutton depressed. The GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK.*** **EXAMINER NOTE: Either valve closed meets the intent of the CRITICAL STEP.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 20: Verify at least one of the following NV pumps miniflow valves – CLOSED: (Step 6.f) • 1NV-203A (NV Pumps A&B Recirc Isol) or • 1NV-202B (NV Pumps A&B Recirc Isol) STANDARD: 1NV-203A GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-10) 1NV-202B GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-10) ***CUE: 1NV-203A GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK. 1NV-202B GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

Why? Show me on print.

Missing pgs 8 & 9 of ES-1.3. Cannot validate accuracy of JPM from step 19 to end.

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 21: Align ND train discharges to NI and NV pump suctions as follows: *Open the following valves: (Step 6.g.1) • 1NI-332A (NI Pump Suct X-Over from ND) • 1NI-333B (NI Pump Suct from ND) STANDARD: Depress 1NI-332A RED "OPEN" pushbutton. Verify RED "OPEN" light LIT and GREEN "CLSD" light DARK. (1MC-11) Depress 1NI-333B RED "OPEN" pushbutton. Verify RED "OPEN" light LIT and GREEN "CLSD" light DARK. (1MC-11) ***CUE: 1NI-332A RED "OPEN" pushbutton is depressed. The RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK. 1NI-333B RED "OPEN" pushbutton is depressed. The RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 22: Ensure 1NI-334B (NI Pump Suct X-over From ND) – OPEN. (Step 6.g.2) STANDARD: Verify 1NI-334B RED "OPEN" light LIT and GREEN "CLSD" light DARK. (1MC-11). ***CUE: NI-334B RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

STEP 23: Open the following valves: (Step 6.g.3) • 1ND-28A (ND Supply To NV & 1A NI Pmps)* • 1NI-136B (ND Supply To NI Pump 1B). STANDARD: Depress 1ND-28A RED "OPEN" pushbutton. Verifies RED "OPEN" light DARK and GREEN "CLSD" light remains LIT. (1MC-11). Interlock with 1NI-185A prohibits opening this valve. Depress 1NI-136B RED "OPEN" pushbutton. Verify RED "OPEN" light LIT and GREEN "CLSD" light DARK. (1MC-11). ***CUE: The RED "OPEN" pushbutton for 1ND-28A is depressed. The RED "OPEN" light is DARK and the GREEN "CLOSED" light is LIT. The RED "OPEN" pushbutton for 1NI-136B is depressed. The RED "OPEN" light is LIT and the GREEN "CLOSED" light is DARK.*** **EXAMINER NOTE: *(Not critical due to interlock) COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 24: Isolate FWST from NV and NI pumps as follows: (Step 6.h) • Place "PWR DISCON FOR 1NI-100B" switch in "ENABLE". • Close 1NI-100B (NI PMPS SUCT FROM FWST). STANDARD: Place the "PWR DISCON FOR 1NI-100B" switch in "ENABLE". Depress 1NI-100B GREEN "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-11). ***CUE: PWR DISCON FOR 1NI-100B" is rotated to the "ENABLE" position. The GREEN "CLOSE" pushbutton is depressed. The GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 25: Close the following valves: (Step 6.h.3) • 1NV-252A (NV Pumps Suct From FWST) • 1NV-253B (NV Pumps Suct From FWST) STANDARD: Depress 1NV-252A GREEN "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-10). Depress 1NV-253B GREEN "CLOSE" pushbutton. Verify GREEN "CLSD" light LIT and RED "OPEN" light DARK. (1MC-10). ***CUE: The GREEN "CLOSED" pushbutton for 1NV-252A is depressed. The GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK. The GREEN "CLOSED" pushbutton for 1NV-253B is depressed. The GREEN "CLOSED" light is LIT and the RED "OPEN" light is DARK.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 26: Verify proper recirc flow as follows: (Step 6.i) • "NV S/I FLOW" – INDICATING FLOW • NI pumps – INDICATION FLOW • ND pumps – INDICATING FLOW STANDARD: Verify "NV S/I FLOW" (1NVP6080 on 1MC-5). Verify NI pump discharge flows (1NIP5450 and 1NIP5120 on 1MC-11) Verify ND Pump 1B indicates flow (1MC-11) Observes ND Pump 1A has no discharge flow (1MC-11). ***CUE: NV S/I flow indicates flow*** ***NI Pump A indicates flow*** ***NI Pump B indicates flow*** ***ND Pump 1A indicates no flow*** ***ND Pump 1B indicates flow*** COMMENTS:	___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A LOCA has occurred on Unit 1.

The "FWST 2/4 LO LEVEL" annunciator is lit

INITIATING CUES:

The SRO instructs you, as the BOP, to transfer to Cold Leg Recirculation using EP/1/A/5000/ES-1.3 (Transfer to Cold Leg Recirculation), steps 1 through 6.

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-8/PLANT

Transfer HVAC Control to "LOCAL" Following Control Room Evacuation

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Transfer HVAC Control to "LOCAL" following Control Room Evacuation per AP/1/A/5500/17 (Loss of Control Room), Enclosure 5.

Alternate Path:

NO

Facility JPM #:

OP-CN-CP-RSS-003

K/A Rating(s):

013 A4.02 (4.3/4.3)

Task Standard:

Both trains of VC/YC shifted to "LOCAL" and 'B' train VC/YC placed in operation, and 'A' and 'B' train VA have been verified in operation using AP/1/A/5500/17 (Loss of Control Room), Enclosure 5.

Preferred Evaluation Location:

Simulator ____ In-Plant __X__

Preferred Evaluation Method:

Perform _____ Simulate __X__

References:

AP/1/A/5500/17, (Loss of Control Room), Enclosure 5 Rev. 42

Validation Time: 27 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SET-UP SHEET

1. N/A

SIMULATOR OPERATOR INSTRUCTIONS:

NONE

Tools/Equipment/Procedures Needed:

Have enough copies of Enclosure 5 of AP/1/A/5500/17 available for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

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

INITIAL CONDITIONS:

A fire has occurred that causes a Control Room evacuation.

locally? manually?

It has been reported that "A" train VC/YC has failed to start and can't be started.

INITIATING CUES:

You are the Auxiliary Building operator and are directed by the ASP 1A operator to perform Enclosure 5 of AP/1/A/5500/17 (Loss of Control Room).

You are to ensure "B" train VC/YC equipment and "A" and "B" train VA equipment are operating.

START TIME: _____

TEP 1: Provide a copy of Enclosure 5 HVAC Actions to the candidate. STANDARD: None COMMENTS:	___ SAT ___ UNSAT
STEP 2: Verify Train A VC/YC desired to be started in "LOCAL". STANDARD: Examinee should determine from initiating cue that "B" train is to be placed in service, ~~and~~ proceeds to Step 5 of Encl. 5. COMMENTS: Per step 1, RNO	___ SAT ___ UNSAT
STEP 3: Place "VC/YC AHU TRAIN B" switch to "LOCAL". (STEP 5.a) STANDARD: VC/YC AHU TRN B switch on 2ELCP0058 (AB-594, HH-58, Rm 560) turned to the "LOCAL" position. ***CUE: VC/YC AHU TRN B switch turned to the "LOCAL" position.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 4: Place "VC/YC AHU TRAIN B" switch to "ON". (STEP 5.b) STANDARD: VC/YC AHU TRN B on/off switch positioned to the "ON" position. RED "ON" light is LIT above local control switch on 2ELCP0058. ***CUE: VC/YC AHU TRN B on/off switch is in the "ON" position. The RED "ON" light is LIT.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 5: Verify Train B VC/YC HVAC equipment in operation: (STEP 5.c) • VC/YC AHU Train B "ON" • 2CRA-AHU-1 "ON" • 2CR-AHU-1 "ON" • 1SWGR-AHU-2 "ON" • 2SWGR-AHU-2 "ON" • 1SWGR-AHU-4 "ON" • 2SWGR-AHU-4 "ON" STANDARD: Indications on 2ELCP0058. • RED "ON" status light LIT • RED "ON" status light LIT, left panel, third row • RED "ON" status light LIT, left panel, third row • RED "ON" status light LIT, left panel, first row • RED "ON" status light LIT, left panel, first row • RED "ON" status light LIT, left panel, first row • RED "ON" status light LIT, left panel, first row After substep read, give the following cue: ***CUE: RED "ON" status light is LIT for each AHU.*** COMMENTS:	___ SAT ___ UNSAT
STEP 6: After 2 minutes, verify 2CRA-P-1 – ON. STANDARD: Verify RED "ON" status light LIT, right panel, fourth row. ***CUE: 2 minutes have passed, RED "ON" light is LIT.*** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 7: Place "VC/YC AHU Train A" switch to "LOCAL". (STEP 6.a) STANDARD: VC/YC AHU TRN A switch on 1ELCP0058 (AB 594, HH-56, RM 570) turned to the "LOCAL" Position. *****CUE: VC/YC AHU TRN A switch is in the "LOCAL" position.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 8: Ensure "VC/YC AHU TRAIN A" switch – "OFF". (STEP 6.b) STANDARD: Rotate VC/YC AHU TRAIN A" switch to the "OFF" position on 1ELCP0058. COMMENTS: Critical? No	___ SAT ___ UNSAT

STEP 9: Verify VA equipment in operation: (STEP 7)

- "AUXILIARY BLDG. SUPPLY UNIT 1A" (ABSU-1A) – ON (1ELCP0111)
- "AUXILIARY BLDG. SUPPLY UNIT 1B" (ABSU-1B) – ON (1ELCP0111)
- "AUX. BLDG. UNFILTERED EXHAUST FAN 1A (ABUXF-1A) - ON (1ELCP0111)
- "AUX. BLDG. UNFILTERED EXHAUST FAN 1B (ABUXF-1B) – ON (1ELCP0111)
- "AUX. BLDG. FILTD EXH FAN 1A" (ABFXF-1A) – ON (1ELCP0112)
- AUX. BLDG. FILTD EXH FAN 1B" (ABFXF-1B) – ON (1ELCP0113)
- "AUXILIARY BLDG. SUPPLY UNIT 2A" (ABSU-2A) – ON (2ELCP0111)
- "AUXILIARY BLDG. SUPPLY UNIT 2B" (ABSU-2B) – ON (2ELCP0111)
- "AUX. BLDG. UNFILTERED EXHAUST FAN 2A" (ABUXF-2A) – ON (2ELCP0111)
- "AUX. BLDG. UNFILTERED EXHAUST FAN 2B" (ABUXF-2B) – ON (2ELCP0111)
- "AUX. BLDG. FILTD EXH FAN 2A" (ABFXF-2A) – ON (2ELCP0112)
- "AUX. BLDG. FILTD EXH FAN 2B" (ABFXF-2B) – ON (2ELCP0113)

___ SAT

___ UNSAT

STANDARD: Indication on each panel:

- ABSU-1A Red "ON" light lit on left panel on 1ELCP0111
- ABSU-1B Red "ON" light lit on left panel on 1ELCP0111
- ABUXF-1A Red "ON" light lit on right panel on 1ELCP0111
- ABUXF-1B Red "ON" light lit on right panel on 1ELCP0111
- ABFXF-1A Red "ON" light lit on right panel on 1ELCP0112
- ABFXF-1B Red "ON" light lit on 1ELCP0113
- ABSU-2A Red "ON" light lit on left panel on 2ELCP0111
- ABSU-2B Red "ON" light lit on left panel on 2ELCP0111
- ABUXF-2A Red "ON" light lit on right panel on 2ELCP0111
- ABUXF-2B Red "ON" light lit on right panel on 2ELCP0111
- ABFXF-2A Red "ON" light lit on right panel on 2ELCP0112
- ABFXF-2B Red "ON" light lit on 2ELCP0113

CUE: RED "ON" light LIT for each fan.

COMMENTS:

STEP 10: Notify ASP operator (x5549, x5548) status of VC/YC and VA equipment. STANDARD: Call ASP operator (5549 or 5548) and reports that B Train VC/YC is in service, and that A and B Train VA equipment is in operation. ***CUE: This is the ASP Operator. I understand that B Train VC/YC and A and B Train VA are operating.*** COMMENTS:	___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

A fire has occurred that causes a Control Room evacuation.

It has been reported that "A" train VC/YC has failed to start and can't be started.

INITIATING CUES:

You are the Auxiliary Building operator and are directed by the ASP 1A operator to perform Enclosure 5 of AP/1/A/5500/17 (Loss of Control Room).

You are to ensure "B" train VC/YC equipment and "A" and "B" train VA equipment are operating.

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM I-9/PLANT

Shutdown Battery Charger 1ECA

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Shutdown Charger 1ECA per OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System), Enclosure 4.5

Alternate Path:

No

Need OP/008 Encl. 4.5

Facility JPM #:

OP-CN-EL-EPL-116

K/A Rating(s):

063 K1.03 (2.9/3.5))

Task Standard:

Battery Charger 1ECA is shutdown. OP/1/A/6350/008, Encl. 4.5 is complete through step 2.12.

Preferred Evaluation Location:

Simulator ____ In-Plant ___X_

Preferred Evaluation Method:

Perform _____ Simulate ___X__

References:

OP/1/A/6350/008 (125 VDC/120 VAC Vital Instrument and Control Power System), Enclosure 4.5. Rev. 041

Validation Time: 15 min. **Time Critical:** No

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Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SET-UP SHEET

1. N/A

SIMULATOR OPERATOR INSTRUCTIONS:

NONE

Tools/Equipment/Procedures Needed:

Have enough copies of Enclosure 4.5 of OP/1/A/6350/008 and procedure limits and precautions available for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All in-plant steps, including any required communications, **shall be simulated** for this JPM. Under no circumstances are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

Unit 1 is operating at 100% power.

Battery Charger 1ECA needs to be removed from service for PMs.

Independent Verification (IV) requirements are waived during the performance of this JPM.

INITIATING CUES:

The SRO instructs you to shutdown Battery Charger 1ECA per Enclosure 4.5 of OP/1/A/6350/008 (125 VDC/120 VAC Vital Inst. And Control Power System).

START TIME: _____

STEP 1: Review Limits and Precautions. STANDARD: Limits and Precautions of OP/1/A/6350/008 are reviewed. **EVALUATOR NOTE: Candidate determines NOTE following step 1.1 does not apply and continues.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: Verify 1ECS is aligned per Encl. 4.3 or 4.4 of OP/1/A/6350/008. STANDARD: N/A ***CUE: Completed Enclosure 4.3 is filed in Control Copy of procedure.** COMMENTS:	___ SAT ___ UNSAT
STEP 3: Verify 1ECA is aligned per Encl. 4.1 of OP/1/A/6350/008. STANDARD: N/A ***CUE: Completed Enclosure 4.1 is filed in Control Copy of procedure.** COMMENTS:	___ SAT ___ UNSAT
STEP 4: Obtain Kirk-key #695 from WCC. STANDARD: N/A ***CUE: Key #695 obtained from WCC.** COMMENTS:	___ SAT ___ UNSAT

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

STEP 5: Perform T.S. assessment for battery charger 1ECA being removed from service. STANDARD: (N/A) ***CUE: SRO has logged 1ECA in TSAIL and initialed step 2.1.*** COMMENTS:	___ SAT ___ UNSAT
STEP 6: If 1ECS is aligned to 1EMXJ (trains cross-connected), perform the following: • Ensure a TSAIL entry is made requiring the completion of this Enclosure before entering Mode 6 from NO Mode. • Declare 1RNLT7400 and 0RNLT7390 inoperable. STANDARD: (N/A) ***CUE: 1ECS is not aligned to 1EMXJ and SRO has N/A'd and initialed step 2.2*** COMMENTS:	___ SAT ___ UNSAT
STEP 7: Notify IAE to support 1ECA shutdown. STANDARD: (N/A) ***CUE: WCC notified to initiate Model W/O #91003522.*** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 8: Verify 1EMS-F01B is closed. (Incoming BKR from MCC 1EMXA-F04A feeder A). STANDARD: N/A. ***CUE: Breaker 1EMS-F01B is in the "ON" position. IAE has just arrived to perform step 2.5.*** COMMENTS:	___ SAT ___ UNSAT
STEP 9: I&E adjusts 1ECS charger output voltage to a value of 0.75 volts to 1.25 volts below the terminal voltage of 1EBA. STANDARD: N/A. ***CUE: Voltage is 0.75 to 1.25 volts below the terminal voltage of battery 1EBA, and IAE has initialed step 2.5.*** COMMENTS:	___ SAT ___ UNSAT
STEP 10: Ensure 1EDS-F01B (Feeder to Dist centers 1EDA and 1EDC) is closed. STANDARD: Kirk-key inserted and turned clockwise. Breaker 1EDS-F01B rotated clockwise to the "ON" position. ***CUE: Kirk-key inserted and turned clockwise. Breaker 1EDS-F01B rotated clockwise to the "ON" position.*** **EXAMINER NOTE: Candidate should evaluate NOTES prior to step 2.6 and determine the second note is not applicable.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 11: Close 1EDA-F03B. (125 VDC Bus 1EDA TIE BKR to 125VDC Bus 1EDC). STANDARD: Breaker 1EDA-F03B rotated clockwise to the "ON" position. ***CUE: Breaker 1EDA-F03B rotated clockwise to the "ON" position.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 12: Open the "DC OUTPUT" breaker on 1ECA. STANDARD: 1ECA DC output breaker pushed down to "OFF". ***CUE: 1ECA DC output breaker is in the "OFF" position.*** COMMENTS:	**CRITICAL STEP** **___ SAT** **___ UNSAT**
STEP 13: IAE adjusts output voltage on 1ECS to 2.21 times the lowest number of connected cells. STANDARD: N/A ***CUE: Voltage is 2.21 times the lowest number of connected cells and IAE has initialed step 2.9.*** COMMENTS:	___ SAT ___ UNSAT
STEP 14: Verify 1ECS is supplying power to distribution center 1EDA. STANDARD: DC output ammeter on 1ECS reading above zero amps and Bus 1EDA voltage between 130 and 135 volts. ***CUE: 1EDA voltage is 132 volts and 1ECS output is 15 amps.*** COMMENTS: Checks	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 15: Open 1EDA-F03A (Battery charger 1ECA). STANDARD: Breaker 1EDA-F03A rotated counterclockwise to the "OFF" position. ***CUE. Breaker 1EDA-F03A rotated counterclockwise to the "OFF" position*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 16: Open "AC INPUT" breaker on 1ECA. STANDARD: 1ECA AC input breaker pushed down to "OFF" position. ***CUE: 1ECA AC input breaker in the "OFF" position.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
This JPM is complete.	

TIME STOP: _____

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

Unit 1 is operating at 100% power.

Battery Charger 1ECA needs to be removed from service for PMs.

Independent Verification (IV) requirements are waived during the performance of this JPM.

INITIATING CUES:

The SRO instructs you to shutdown Battery Charger 1ECA per Enclosure 4.5 of OP/1/A/6350/008 (125 VDC/120 VAC Vital Inst. And Control Power System).

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

1. Initial Conditions

—— 1.1 Review the Limits and Precautions.

NOTE: The only time 1ECS may be aligned per Enclosure 4.4 (Placing 1ECS in Standby Alignment From 1EMXJ (Train B)) is during No Mode. Aligning 1ECS per Enclosure 4.4 (Placing 1ECS in Standby Alignment From 1EMXJ (Train B)) will result in Train A equipment being powered from Train B.

____ 1.2 Verify 1ECS is aligned per one of the following:

☐ Enclosure 4.3 (Placing 1ECS in Standby Alignment From 1EMXA (Train A))
OR
☐ Enclosure 4.4 (Placing 1ECS in Standby Alignment From 1EMXJ (Train B)) of this procedure.

—— 1.3 Verify 1ECA is aligned per Enclosure 4.1 (Battery Charger Startup (1ECA, 1ECB, 1ECC, 1ECD)) of this procedure.

—— 1.4 Obtain kirk key #695 from WCC.

2. Procedure

NOTE: If 1ECS is aligned to 1EMXA, the TSAIL entry for 1ECA will be for tracking.

____ 2.1 SRO Perform a Tech Spec assessment for required actions due to 1ECA being removed from service.

____ 2.2 SRO **IF** 1ECS is aligned to 1EMXJ (trains cross-connected), perform the following: {PIP 96-1849}

☐ Ensure a TSAIL entry is made requiring the completion of this enclosure before entering Mode 6 from No Mode.
☐ Declare 1RNLT7400 **AND** 0RNLT7390 inoperable. Refer to Tech Spec 3.3.2 for appropriate action.

____ 2.3 Notify IAE to support 1ECA shutdown.

☐ Model W/O #91003522
☐ Other W/O **OR** W/R_____.

2.4 Verify the appropriate incoming breaker to 1ECS is closed:

——— • Enclosure 4.3
1EMS-F01B (Incoming Bkr From MCC 1EMXA-F04A) (Feeder A)

——— • Enclosure 4.4
1EMS-F01C (Incoming Bkr From MCC 1EMXJ-F04A) (Feeder B)

NOTE: Do **NOT** continue until IAE support has arrived.

——— ——— 2.5 IAE adjust the output voltage on 1ECS to a value of 0.75 volts to 1.25 volts below the terminal voltage of 1EBA.
IAE

NOTE:
1. The breaker in Step 2.6 is kirk keyed with the output breaker to 1EDB and 1EDD so only one breaker can be closed at a time.
2. If 1ECS is aligned to 1EMXJ, an alarm will be received on 1AD-11, I/6 "STBY CHARGER 1ECS INPUT/OUTPUT TRAINS X-CONNECTED" when the following step is performed.

——— ——— 2.6 Ensure 1EDS-F01B (Feeder To Dist Centers 1EDA And 1EDC) is closed.

——— ——— 2.7 Close 1EDA-F03B (125 VDC Bus 1EDA Tie Bkr To 125 VDC Bus 1EDC).

——— ——— 2.8 Open the "DC OUTPUT" breaker on 1ECA.

——— 2.9 IAE adjust output voltage on 1ECS to 2.21 times the lowest number of connected cells on:
IAE

☐ 1EBA (+2 VDC, -0 VDC)
OR
☐ 1EBC (if aligned) (+2 VDC, -0 VDC)

——— 2.10 Verify 1ECS is supplying power to DIST. CTR. DC # 1EDA:

☐ "DC OUTPUT" > 0 amps. (1ECS)
☐ "BUS 1EDA VOLTAGE" 130 - 135 volts. (1EDA)

——— ——— 2.11 Open 1EDA-F03A (Battery Charger 1ECA).

——— ——— 2.12 Open the "AC INPUT" breaker on 1ECA.

NOTE: 1. At this point, the system is aligned as follows:

- 1ECS is now in service on 1EDA.
- 1ECA is shutdown.

2. Subsequent steps are to return the system to the following alignment:

- 1ECA in service on 1EDA.
- 1ECS in standby.

2.13 Notify IAE to support returning 1ECA to service.

☐ Model W/O #91003518
☐ Other W/O **OR** W/R_____

NOTE: Do **NOT** continue until IAE support has arrived.

2.14 Close the "AC INPUT" breaker on 1ECA.

IAE 2.15 IAE adjust the output voltage on 1ECA to a level of 0.75 volts to 1.25 volts below the terminal voltage of 1EBA.

2.16 Close the "DC OUTPUT" breaker on 1ECA.

2.17 Close 1EDA-F03A (Battery Charger 1ECA).

NOTE: The following step should be N/A'd if 1ECS is aligned to Battery 1EBC.

2.18 Open 1EDS-F01B (Feeder To Dist Centers 1EDA And 1EDC).

IAE 2.19 IAE adjust the output voltage on 1ECA to 2.21 times the number of connected cells on 1EBA (+2 VDC, -0 VDC).

2.20 Verify 1ECA is supplying power to DIST. CTR. DC # 1EDA.

☐ "DC OUTPUT" > 0 amps. (1ECA)
☐ "BUS 1EDA VOLTAGE" 130 - 135 volts. (1EDA)

2.21 Verify 1EDC is being supplied from one of the following:

☐ 1ECC and 1EBC.
OR
☐ 1ECS and 1EBC.

—— —— 2.22 Open 1EDA-F03B (125 VDC Bus 1EDA Tie Bkr To 125 VDC Bus 1EDC).

NOTE: The following two steps should be N/A'd if 1ECS is aligned to Battery 1EBC.

—— 2.23 Remove the key from 1EDS-F01B (Feeder To Dist Centers 1EDA And 1EDC).

—— 2.24 Return the key to the WCC.

—— 2.25 Perform a Tech Spec assessment for required actions due to 1ECA being returned to service.
SRO

—— 2.26 **IF** 1ECS was aligned to 1EMXJ (trains cross-connected), perform the following:
SRO {PIP 96-1849}

- ☐ Ensure the TSAIL entry made per this enclosure is cleared.
- ☐ Perform a Tech Spec assessment for 1RNLT7400 **AND** 0RNLT7390 being returned to service.

NOTE: 1ECS should be left energized and in standby per this procedure at all times unless maintenance is to be performed on it.

2.27 Do **NOT** file this enclosure in the Control Copy folder of this procedure.

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM II-4 Control Room

Re-energize 2ETA From Unit 1

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Restore power to bus 2ETA from Unit 1 following a loss of normal power per AP/2/A/5500/07 (Loss of Normal Power), Enclosure 5

Alternate Path:

Yes: DG-2A output breaker failed open.

No! Not an alt. path if failure is given in I.C. Must occur during performance of JPM.

Facility JPM #:

NEW

K/A Rating(s):

062 A2.05 (2.9/3.3*)

Task Standard:

SATA is powered from Unit 1, and bus 2ETA is re-energized.

Preferred Evaluation Location:

Simulator ____ In-Plant __X___

Preferred Evaluation Method:

Perform ____ Simulate ___X___

References:

AP/2/A/5500/07, (Loss of Normal Power), Enclosure 5, Rev. 31.

Validation Time: N/A Minutes **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1. N/A

SIMULATOR OPERATOR INSTRUCTIONS:

NONE

Tools/Equipment/Procedures Needed:

Clean copy of Enclosure 5 of AP/2/A/5500/07 for each candidate.

READ TO OPERATOR

DIRECTION TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All in-plant steps, including any required communications, **shall be simulated** for this JPM. Under no circumstances are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

You are the Unit 2 OATC. Unit 2 is at full power, and Unit 1 is shutdown.

A loss of all power to bus 2ETA has occurred and AP/2/A/5500/07 has been completed through step 24 of Case II.

How get to Encl. 5 from here?

D/G 2A output breaker will not close.

Offsite power remains unavailable to 2TC.

2ETA has been load shed in accordance with AP/2/A/5500/07, Enclosure 8.

INITIATING CUES:

The SRO directs you to re-energize 2ETA from Unit 1 by completing Enclosure 5 of AP/2/A/5500/07.

START TIME: _____

TEP 1: Obtain a copy of the appropriate procedure. STANDARD: Operator obtains a copy of AP/2/A/5500/07, Enclosure 5. ****EXAMINER'S CUE: Give the candidate a copy of enclosure 5.** COMMENTS:	___ SAT ___ UNSAT
STEP 2: Verify that it is desired to power 2ETA from Unit 2. (STEP 1.a) STANDARD: ~~The~~ Operator recalls initiating cue says it is desired to power 2ETA from Unit 1. COMMENTS: Goes to RNO action	___ SAT ___ UNSAT
STEP 3: Ensure 1TC - ENERGIZED. (RNO 1.a). STANDARD: Operator ~~simulates~~ verifies 1A Busline is energized. ~~Operator simulates verifying~~ by checking "7KV 1TC FDR FRM 1T1A" RED "CLSD" light LIT and GREEN "OPEN" light DARK; or ~~simulates verifying~~ checks "7KV 1TC FDR FRM 1T2B" and "7KV 1TC TIE BKR", RED "CLSD" light LIT and GREEN "OPEN" light DARK; and proceeds to step 2. *****CUE: "~~1A Busline is energized~~". "7KV 1TC FDR FRM 1T1A" RED "CLSD" light LIT, GREEN "OPEN" light DARK.*** COMMENTS: Used Cue for 1T2B	___ SAT ___ UNSAT

*****Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.***

STEP 4: Verify 2ETA – ENERGIZED step 2) TANDARD: Operator ~~simulates verifying~~ checks 2ETA undervoltage status lights (2SI-14) – DARK. Operator determines that the undervoltage status lights are LIT and goes to RNO 2. ***CUE: ~~2ETA undervoltage status lights (2SI-14)~~ are LIT.*** COMMENTS: How many? More than one?	___ SAT ___ UNSAT
STEP 5: Do not continue until 2ETA has been load shed. (RNO 2) STANDARD: The operator determines that the initiating cue says 2ETA has been load shed and goes to Step 3. COMMENTS:	___ SAT ___ UNSAT
STEP 6: Verify Unit 1 power alignment on 1MC-11 (step 3.a) STANDARD: Operator ~~simulates verifying~~ checks (RED indicating light – LIT) "4KV XFMR 1ATC FDR" – CLOSED and "ETA NORM FDR FRM ATC" – CLOSED on 1MC-11. by verifying the RED indicating light-LIT (what about GREEN?) ***CUE: "4KV XFMR 1ATC FDR" RED indicating light-LIT, GREEN "OPEN" light is DARK and "ETA NORM FDR FRM ATC" RED indicating light-LIT, and GREEN "OPEN" light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

STEP 7: Verify "4KV XFMR SATA FDR" from Unit 1 –RACKED OUT. (Step 3.b) STANDARD: Operator ~~simulates verifying~~ checks that 4KV XFMR SATA FDR" from Unit 1 is RACKED OUT. by identifying both Red ~~OPEN~~ closed and green ~~closed~~ open lights are DARK. ***CUE: Both the RED and GREEN indicating lights for "4KV XFMR SATA FDR" from Unit 1 are DARK.*** COMMENTS:	___ SAT ___ UNSAT
STEP 8: Verify it is desired to energize SATA from Unit 1. (Step 3.c) STANDARD: Operator determines from initial conditions that it is desired to energize 2ETA from Unit 1. COMMENTS:	___ SAT ___ UNSAT
STEP 9: Verify "4KV XFMR SATA FDR" (2MC-11) is RACKED OUT. (Step 3.d.1) STANDARD: Operator ~~simulates verifying~~ checks that the GREEN and RED operating lights for "4KV XFMR SATA FDR" (2MC-11) are DARK (~~closed~~ OPEN ~~open~~ CLOSED) ***CUE: "4KV XFMR SATA FDR" (2MC-11) GREEN and RED indicating lights are DARK.*** COMMENTS:	___ SAT ___ UNSAT

STEP 10: Dispatch NLO to RACK IN breaker 1TC#4. (Step 3.d.2) TANDARD: Operator dispatches NLO to RACK IN 1TC#4. ***CUE: NLO reports that breaker 1TC#4 is RACKED IN. "4KV XFMR SATA FDR" (1MC-11) GREEN indicating light is LIT.*** COMMENTS:	___ SAT ___ UNSAT
STEP 11 Close "4KV XFMR SATA FDR" (1MC-11) when 1TC#4 is RACKED IN. (Step 3.d.3) STANDARD: Operator ~~simulates closing~~ closes "4KV XFMR SATA FDR" (1MC-11) by turn control switch clockwise until Red closed light LIT & Green open light DARK STANDARD: When operator simulates closing "4KV XFMR SATA FDR" (1MC-1), the RED indicating light is LIT, and the GREEN indicating light is DARK. ***CUE: "4KV XFMR SATA FDR" RED indicating light is LIT.*** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 12 Ensure "ETA NORM FDR FRM ATC" is OPEN and RACKED OUT (Step 5.a & b) STANDARD: Operator determines that 'ETA NORM FDR FRM ATC" is OPEN (GREEN indicating light is LIT), and its breaker is RACKED IN. ~~Open~~ Operator goes to RNO. ***CUE: "ETA NORM FDR FRM ATC" GREEN indicating light is LIT, and the RED indicating light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.

STEP 13 Dispatch NLO to RACK OUT 2ETA#3. (RNO 5.b) STANDARD: Operator dispatches NLO to RACK OUT 2ETA#3. Green indicating light goes DARK and ****EXAMINER'S CUE: NLO reports that 2ETA#3 is RACKED OUT.** COMMENTS: When 2ETA#3 is RACKED OUT its GREEN indicating light goes DARK.	___ SAT ___ UNSAT
STEP 14 Dispatch NLO to RACK IN 2ETA#4. (Step 5.c) STANDARD: Operator dispatches NLO to RACK IN 2ETA#4. ****EXAMINER'S CUE: NLO reports that 2ETA#4 is RACKED IN.** COMMENTS: When 2ETA#4 is RACKED IN its GREEN indicating light is LIT. and	___ SAT ___ UNSAT
STEP 15 Verify D/G 2A output breaker is closed. (Step 5.d). STANDARD: Operator determines that D/G 2A output breaker is OPEN and transitions to RNO 5.d. *****CUE: The GREEN indicating light for the D/G 2A output breaker is LIT, the RED indicating light is DARK.*** COMMENTS:	___ SAT ___ UNSAT

*****Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.***

STEP 16	Close "ETA ALT FDR FRM SATA", verify 2ETA - ENERGIZED, proceed to step 6 (RNO 5.d).	**CRITICAL STEP**
STANDARD:	Operator closes "ETA ALT FDR FRM SATA", verifies "ETA ALT FDR FRM SATA" RED indicating light is LIT, and verifies 2ETA - ENERGIZED. Proceeds to step 6.	___ SAT
	CUE: When the operator closes "ETA ALT FDR FRM SATA", the RED indicating light is LIT and the GREEN indicating light is DARK. The 2ETA undervoltage status lights (2SI-14) are DARK.	___ UNSAT
COMMENTS:	Separate cue: If asked, "2SI-14 status lights are DARK" (for 2ETA undervoltage)	
STEP 17	Dispatch operator to close breakers 2ELXA-4B and 2ELXC-4B (step 6).	
STANDARD:	Breakers 2 ELXA-4B and 2ELXC-4B are closed and the operator returns to step in effect (reports to SRO that 2ETA is re-energized from Unit 1). ?	___ SAT
	CUE: Breaker 2ELXA-4B and 2ELXC-4B were previously opened due to 2ETA load shed per Enclosure 8 of this procedure. ? Inconsistent	___ UNSAT
COMMENTS:		
This JPM is complete.		

TIME STOP: _____

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

You are the Unit 2 OATC. Unit 2 is at full power, and Unit 1 is shutdown.

A loss of all power to bus 2ETA has occurred and AP/2/A/5500/07 has been completed through step 24 of Case II.

D/G 2A output breaker will not close.

Offsite power remains unavailable to 2TC.

2ETA has been load shed in accordance with AP/2/A/5500/07, Enclosure 8.

INITIATING CUES:

The SRO directs you to re-energize 2ETA from Unit 1 by completing Enclosure 5 of AP/2/A/5500/07.

***Italicized Cues Are To Be Used Only If JPM Performance Is Being Simulated.**

(R06-97)

Duke Power Company (1)ID No. AP/2/A/5500/07
PROCEDURE PROCESS RECORD Revision No. 31

PREPARATION
(2) Station CATAWBA NUCLEAR STATION

(3) Procedure Title LOSS OF NORMAL POWER

(4) Prepared By M C Hutts Date 12/18/2000

(5) Requires 10CFR50.59 evaluation?
☒ Yes (New procedure or revision with major changes)
☐ No (Revision with minor changes)
☐ No (To incorporate previously approved changes)

(6) Reviewed By Larry B Lacy (QR) Date 1-10-2001

Cross-Disciplinary Review By Tim L Hutts (QR) NA ____ Date 12/21/00

Reactivity Mgmt. Review By ____ (QR) NA GRI Date ____

(7) Additional Reviews

Reviewed By Larry B Lacy (WC, TA) Date 1-10-2001

Reviewed By ____ Date ____

(8) Temporary Approval *(if necessary)*

By ____ (SRO/QR) Date ____

By ____ (QR) Date ____

Approved By J R Brim Date 1-11-2001

PERFORMANCE (Compare with control copy every 14 calendar days while work is being performed.)

(10) Compared with Control Copy ____ Date ____

Compared with Control Copy ____ Date ____

Compared with Control Copy ____ Date ____

(11) Date(s) Performed ____

Work Order Number (WO#) ____

COMPLETION
(12) Procedure Completion Verification

☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated, or filled in N/A, as appropriate?

☐ Yes ☐ N/A Listed enclosures attached?

☐ Yes ☐ N/A Data sheets attached, completed, dated, and signed?

☐ Yes ☐ N/A Charts, graphs, etc. attached, dated, identified, and marked?

☐ Yes ☐ N/A Procedure requirements met?

Verified By ____ Date ____

(13) Procedure Completion Approved ____ Date ____

(14) Remarks *(attach additional pages, if necessary)*

CONTROL COPY

Form 45077A (R9-98) | Duke Power | See Attached Documentation

10 CFR 50.59 EVALUATION SCREENING

(Refer to NSD 209.10.1)

(1) STATION(s):	(2) UNITS(s):	(3) TYPE OF ACTIVITY:	
☐ Oconee Nuclear Station	☐ Unit 1	☐ Nuclear Station Modification	☐ Operability Evaluation
☐ McGuire Nuclear Station	☒ Unit 2	☐ Minor Modification	☐ Test or Experiment
☒ Catawba Nuclear Station	☐ Unit 3	☒ Procedure	☐ UFSAR Change
☐ _____	☐ _____	☐ Other _____	☐ Temporary Modification

(4) DOCUMENT NUMBER, REV NUMBER, and DESCRIPTION: AP/2/A/5500/07 LOSS OF NORMAL POWER Revision 31

(5) SCREENING FOR INCREASED MANAGEMENT INVOLVEMENT (NSD 209.10.2 & 213)

1. Is the activity being evaluated a procedure, test, experiment, or evolution? If "No," proceed to Part (6). If "Yes," continue to the next question. ☑ Yes ☐ No

2. Does the item involve infrequently performed tests or evolutions that have the potential to significantly degrade the level of nuclear safety? If "Yes," consult with the Superintendent of Operations to determine if additional controls are necessary. ☐ Yes ☑ No

Procedure Qualified Reviewer Larry B Lang Date: 1-10-2001

Superintendent of Operations _____ Date: _____

(6) SAFETY ANALYSIS REPORT DOCUMENT REVIEW (NSD 209.10.3)

1. Will Technical Specification changes be required? *If the answer is "Yes," then the part of the activity requiring a change to the Technical Specifications cannot be performed under 10 CFR 50.59 regulation nor implemented without prior NRC approval ☐ Yes ☑ No

2. TECHNICAL SPECIFICATIONS AND ASSOCIATED BASES CONSULTED: Tech. Spec. 3.8.1 and 3.8.2

3. UFSAR SECTIONS CONSULTED: 8.2.1.3, 8.3.1, 8.4.1, 9.5.5.2.1

4. OTHER SAR DOCUMENTS CONSULTED: _____

(7) SCREENING FOR 10CFR 50.59 REGULATION APPLICABILITY (NSD 209.10.4)

1. Does the activity change the facility as described in the SAR? ☐ Yes ☑ No
2. Does the activity change procedures, methods of operation, or alter a test or experiment as described in the SAR? ☐ Yes ☑ No
3. Does the activity appear significant enough to require inclusion in the SAR? ☐ Yes ☑ No
4. Could the activity adversely affect any system, structure, or component necessary to operate the plant in accordance with the SAR? ☐ Yes ☑ No
5. Does the activity perform a test or experiment that is NOT described in the SAR? ☐ Yes ☑ No

If the answer to any of the above five (5) screening questions in Part (7) is "Yes," STOP! This form cannot be used. Form 45077B must be used to document a USQ Evaluation.

The Design and Safety Considerations in NSD 209 Table 209-2 have been considered, as appropriate. ☑ Yes

(8) DOCUMENTATION (NSD 209.10.5 & 209.12)

Activity Description, Justification of Answers to the 5 Screening Questions in Part 7, Conclusion, and References attached? ☑ Yes

(9) APPROVAL (NSD 209.10.6)

Preparer: MD Kirk Date: 12/18/2000

Qualified Reviewer: Larry B Lang Date: 1-10-2001

DESCRIPTION OF CHANGE SUMMARY:

The following changes were made for revision 31:

1. Throughout this procedure - The undervoltage status lights on SI-14 were previously used as a quick, symptomatic way of determining whether the associated bus was energized or deenergized. It has recently been learned that the status lights themselves receive power from the same source as the sequencer. The result is that a dark status light can no longer be exclusively interpreted to mean that the associated bus is energized. The bus could, in fact be deenergized, with a deenergized sequencer. Since this fact leads the status light to be seen as an ambiguous indicator, the step was rephrased, without changing scope or result, to clarify intent.

2. Case III, Step 15 and new Enclosure 17 (Switchyard Battery Conservation) - Catawba calculation CNC 1381.06-16 (230 KV Switchyard 125VDC Control Pwr Battery and Charger Sizing Calculation) (Ref 3) documents the switchyard battery capacity. The limited capacity of the batteries leads to a need to conserve battery power during an extended power loss to ensure the switchyard PCBs are available as soon as power is available from another station. Although the capacity of the switchyard batteries is not a significant issue in the Station 4-hour blackout coping rule, it is prudent to avoid any potential delay in early restoration of plant power. The change, therefore, includes provisions to ensure the batteries remain available for at least the first 4 hours.

3. Case II - Added new steps 4 and 5. Change made as a result of OPS Call-in 9186. These steps add actions to remove a D/G from service, when it is not supplied cooling water. In this case, the D/G has not loaded its bus and thus removing it from service only serves to protect it until it can be manually aligned to the bus.

Justification:

1. Does the activity change the facility as described in the SAR?

No. This is a revision to an Abnormal Operating procedure, and does not involve a physical change to the plant.

2. Does the activity change procedures, methods of operation, or alter a test or experiment as described in the SAR?

No. This is a change to a procedure that is not described in the SAR. The change includes a limitation to ensure the batteries remain energized for at least 4 hours. This limitation maintains the validity of the SAR assumption that offsite power can be restored within 4 hours of the event initiation. The change also protects the D/G from imminent damage, allowing it to be loaded onto the bus manually.

3. Does the activity appear significant enough to require inclusion in the SAR?

No. This is a change to an existing procedure and is not significant enough to require inclusion in the SAR. This procedure is not similar to any which is currently described in the SAR.

4. Could the activity adversely affect any SSC that is necessary to operate the facility in accordance with the SAR?

No. This change does not affect any design, function, or method of operation that would prevent or impair any SSC from being able to fulfill its safety function during any mode of operation. The change includes a limitation to ensure the batteries remain energized for at least 4 hours. This limitation maintains the validity of the SAR assumption that power can be restored within 4 hours of the event initiation. Change Item 1 does not change the intent or result of the existing step, changing only its form to eliminate exclusive reliance on an indicator that is not always representative of the actual condition.

5. Does the activity perform a test or experiment that is NOT described in the SAR?

No. This change and the associated procedure do not gather data for any test or experiment. The procedure does not go beyond the design/licensing basis of the station as described in the SAR.

Conclusion:

This change does not create an unresolved safety question and therefore a 10CFR50.59 USQ Evaluation is not required.

References:

1. Tech. Spec. 3.8.1 and 3.8.2
2. SLC 16.8-3 (230 KV Switchyard 125 VDC Power System.
2. UFSAR Section 8.2.1.3, 8.3.1, and 8.4.1, 9.5.5.2.1.
3. Catawba calculation CNC 1381.06-16 (230 KV Switchyard 125VDC Control Pwr Battery and Charger Sizing Calculation)
4. DBD CNS-1465.00-00-0018 (Plant Design Basis Specification for Station Blackout Rule).
5. DBD CNS-0010.01-EB-0001 (Switchyard Systems Design Basis Specification).
6. Letter H.B Tucker to NRC, April 4, 1990.

A. Purpose

- **To verify proper response in the event of a loss of normal power to an essential train.**
- **To verify proper response in the event of a loss of all power to an essential train.**
- **To verify proper response in the event of a loss of all 6.9KV busses.**

B. Symptoms

Case I. Loss of Normal Power to an Essential Train:

- D/G starting or running status lights (2SI-15) - LIT
- "BLACKOUT LOAD SEQ ACTUATED TRN A" status light (2SI-14) - LIT
- "BLACKOUT LOAD SEQ ACTUATED TRN B" status light (2SI-14) - LIT.

Case II. Loss of All Power to an Essential Train:

- 2ETA de-energized
- 2ETB de-energized
- Loss of normally operating components supplied from affected bus
- Affected D/G - OFF
- Affected D/G breaker - OPEN
- Affected sequencer not loading essential loads.

Case III. Loss Of 6.9KV Busses

- 2AD-11, F/4 "ZONE G LOCKOUT TRIP" - LIT
- Loss Of Switchyard
- Swgr Tie Bkrs Closed status lights (2SI-14) - LIT
- Emergency lighting - LIT
- Numerous transformer trouble annunciators 2AD-11 - LIT
- "RPI DISPLAY ON EMERG POWER" (2SI-3) - LIT
- DRPI indication - DARK
- 2SA-5 failed open.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Monitor Enclosure 1 (Foldout Page).**

__ 2. **Verify affected bus - ENERGIZED.**

__ **GO TO Case II (Loss of All Power to an Essential Train).**

3. **Verify proper diesel generator operation as follows:**

__ a. Dispatch operator to affected D/G room(s) to monitor D/G operation. **REFER TO** OP/2/A/6350/002 (Diesel Generator Operation).

__ b. Verify RN cooling flow to the affected D/G.

b. Notify dispatched operator to manually open RN isolation valve for the affected D/G:

__ • 2RN-232A (D/G 2A Hx Inlet) (AB-564, DD-EE, 75-76).

__ • 2RN-292B (D/G 2B Hx Inlet) (AB-564, BB-CC, 75-76).

__ 4. **Stop any dilutions in progress.**

__ 5. **Verify CA Pump #2 - ON.**

__ **IF CA Pump #2 is required to maintain S/G levels, THEN start CA Pump #2.**

6. **Verify S/I status as follows:**

__ a. S/I - HAS ACTUATED.

__ a. **GO TO** Step 7.

__ b. **GO TO** Step 8.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **Resetting sequencer will prevent further automatic loading of B/O loads.**

7. **Verify ND System status as follows:**

__ a. Verify ND on affected train(s) - ALIGNED IN RESIDUAL HEAT REMOVAL MODE.

__ a. **GO TO** Step 8.

__ b. Verify AP/2/A/5500/19 (Loss Of Residual Heat Removal System) - **NOT** IN EFFECT.

__ b. **GO TO** Step 8.

__ c. Reset affected D/G load sequencer.

__ d. Start previously running ND pump.

__ d. **REFER TO** AP/2/A/5500/19 (Loss Of Essential Heat Removal System).

8. **Verify B/O busses are energized as follows:**

__ a. 2AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.

a. Perform the following:

NOTE Both ND Hx Bypass valves fail closed on loss of 2LXI.

1) **IF** ND train A is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-173A" in "THROT".

__ b) Throttle 2NI-173A (ND Hdr 2A To Cold Legs C&D) to stabilize NC temperature.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. (Continued)

2) **IF** ND train B is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-178B" in "THROT".

__ b) Throttle 2NI-178B (ND Hdr 2B To Cold Legs A&B) to stabilize NC temperature.

__ 3) Ensure breaker "FTA B/O NORM FDR FRM ATC" - OPEN.

__ 4) Dispatch operator to open 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

__ 5) **IF** S/I has actuated, **THEN** ensure "ECCS TRN A" reset.

__ 6) Reset "D/G 2A LOAD SEQ RESET".

7) **WHEN** notified by dispatched operator that 2LXI-4B is open, **THEN** perform the following:

__ a) Close breaker "FTA B/O ALT FDR FRM ETA".

__ b) Close breaker "ETA ALT FDR TO FTA".

__ c) Notify dispatched operator to close 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
8. (Continued)	
__ b. 2AD-11, K/4 "4KV B/O BUS FTB VOLTAGE LO" - DARK.	b. Perform the following: __ 1) Ensure breaker "FTB B/O NORM FDR FRM ATD" - OPEN. __ 2) Dispatch operator to open 2LXH-4B (Load Center 2LXH Incoming Breaker) (SB-594, Q-R, 30). __ 3) **IF** S/I has actuated, **THEN** ensure "ECCS TRN B" reset. __ 4) Reset "D/G 2B LOAD SEQ RESET". 5) **WHEN** notified by dispatched operator that 2LXH-4B is open, **THEN** perform the following: __ a) Close breaker "FTB B/O ALT FDR FRM ETB". __ b) Close breaker "ETB ALT FDR TO FTB". __ c) Notify dispatched operator to close 2LXH-4B (Load Center 2LXH Incoming Breaker) (SB-594, Q-R, 30).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **Verify B/O loads in service as follows:**

__ a. Maintain D/G load less than 5750 KW.

b. Ensure proper B/O sequencer(s) loading as follows:

__ • **REFER TO** Enclosure 2 (Blackout Loads)

__ • Dispatch operator to ensure all required in plant loads are energized or on. **REFER TO** Enclosure 3 (Local Blackout Loads).

__ c. Restore spent fuel pool cooling. **REFER TO** OP/2/A/6200/005 (Spent Fuel Pool Cooling).

__ 10. **Verify 6.9KV busses - ENERGIZED.**

__ **WHEN time and manpower permit, THEN perform applicable portions of Case III. REFER TO Case III (Loss Of All 6.9KV Busses).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE There is a five minute time delay for the automatic swapover from YV to RN.

__ 11. **Verify "YV OPERABLE" light - LIT.**

Perform the following:

a. Ensure YV swap to RN as follows:

__ • "YV/RN AUTO SWAP RESET" light - DARK

__ • "YV ISOLATED" light - LIT

__ • "RN OPERABLE" light - LIT

__ • "RN ISOLATED" light - DARK.

__ b. **WHEN** YV swap to RN is complete, **THEN** ensure two RN pumps in service. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water).

__ c. **WHEN** offsite power is restored, **THEN** realign YV to normal operation. **REFER TO** OP/2/A/6450/020 (Containment Chilled Water System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 12. **Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (2SI-18) - LIT.**	**To prevent overpressurizing the condenser perform the following:** a. Dispatch operator to close the following valves: __ • 2SA-22 (Main Stm To CSAE) (TB-614, 2L-2M, 32-33) __ • 2SA-27 (Aux Stm To CSAE) (TB-614, 2L-2M, 27). __ b. **WHEN** notified by dispatched operator that the SA supplies are closed, **THEN** open "COND A-B-C VAC BKR VLVS". c. **IF** power not available to operate "COND A-B-C VAC BKR VLVS", **THEN** dispatch operator to open the following valves: __ • 2CM-368 (2A Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 26-27) __ • 2CM-369 (2B Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 24-25) __ • 2CM-370 (2C Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 22-23). __ d. **WHEN** time permits, **THEN** dispatch operator to complete breaking condenser vacuum: **REFER TO** OP/2/B/6300/006 (Main Vacuum). __ e. Shutdown steam seals. **REFER TO** OP/2/B/6300/005 (Steam Seal System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

13. **Stop unnecessary loads placed on affected bus by the sequencer as follows:**

__ a. Reset affected D/G load sequencer(s).

__ b. Establish normal control room ventilation. **REFER TO** OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System).

__ c. Stop unnecessary loads.

__ 14. **Determine and correct cause of blackout.**

__ 15. **IF spent fuel pool instumentation is failed low, THEN dispatch operator to monitor spent fuel pool conditions. REFER TO Enclosure 14 (Spent Fuel Pool Monitoring).**

16. **Ensure compliance with appropriate Tech Specs:**

__ • 3.8.1 (A.C. Sources - Operating)

__ • 3.8.2 (A.C. Sources - Shutdown)

__ • 3.8.7 (Inverters - Operating)

__ • 3.8.8 (Inverters - Shutdown)

__ • 3.8.9 (Distribution Systems - Operating)

__ • 3.8.10 (Distribution Systems - Shutdown).

17. **Determine required notifications:**

__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)

__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Restore power to affected bus as follows:**

a. Verify the following:

__ • Offsite power - AVAILABLE

• The following PCBs - CLOSED:

__ • PCB 21
__ • PCB 24.

__ • All 6.9 KV busses - ENERGIZED.

a. Perform one of the following:

• **IF** it is desired to energize the affected bus from Unit 1, **THEN**:

__ 1) To energize 2ETA **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA).

__ 2) To energize 2ETB **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

__ 3) **WHEN** Unit 2 offsite power is available, **THEN** perform Step 18.a.

__ 4) **GO TO** Step 19.

OR

__ • **IF** Unit 2 offsite power is available, **THEN GO TO** Enclosure 4 (Restoration Of Offsite Power).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. (Continued)

b. Verify affected 4160V transformer(s) - ENERGIZED:

__ • 2ATC
__ • 2ATD.

b. Perform the following:

1) **IF** Unit 2 power available, **THEN** close the appropriate breaker to energize the affected transformer:

__ • "4 KV XFMR 2ATC FDR"

OR

__ • "4 KV XFMR 2ATD FDR".

__ 2) **IF** the affected 4160V transformer is energized, **THEN GO TO** Step 18.c.

__ 3) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

4) Do not continue in this procedure until one of the following is satisfied:

__ • The affected feeder breaker is closed

OR

__ • Dispatched operator reports that the breaker cannot be closed.

5) **IF** the affected 4160V transformer is still de-energized, **THEN** align alternate power as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

__ 6) **GO TO** Step 19.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. (Continued)

c. Energize affected bus from offsite power as follows:

__ 1) Shutdown affected D/G. **REFER TO** OP/2/A/6350/002 (Diesel Generator Operation).

2) **IF** the normal incoming breaker for the affected bus cannot be closed, **THEN** align alternate power as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

19. **Ensure plant systems returned to normal as follows:**

__ a. **WHEN** normal power is available, **THEN** return plant electrical systems to normal. **REFER TO** OP/2/A/6350/001 (Normal Power Checklist).

__ b. **WHEN** CA is no longer needed to feed S/Gs, **THEN** shutdown the CA System following the automatic start and return CA System to standby readiness. **REFER TO** OP/2/A/6250/002 (Auxiliary Feedwater System).

__ c. Verify "RPI DISPLAY ON EMERG POWER" (2SI-3) - DARK.

__ c. **WHEN** power is restored to 2RPA, **THEN** realign DRPI power to normal. **REFER TO** OP/2/B/6350/009 (125 VDC 240/120 VAC Auxiliary Control Power System).

__ d. Verify NF System - IN OPERATION.

__ d. Restore proper NF System operation. **REFER TO** OP/0/A/6200/008 (Ice Condenser Refrigeration System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

19. (Continued)

e. Verify the following switches in "DISCON":

__ • "PWR DISCON FOR 2NI-173A"

__ • "PWR DISCON FOR 2NI-178B".

e. **IF** 2NI-173A (ND Hdr 2A To Cold Legs C&D) **OR** 2NI-178B (ND Hdr 2B To Cold Legs A&B) have been throttled, **THEN**:

- **WHEN** the condition requiring the affected valve(s) to be throttled is corrected **AND** the opposite ND train is available for decay heat removal, **THEN** perform the following:

__ 1) Place the opposite ND train in RHR mode. **REFER TO** OP/2/A/6200/004 (Residual Heat Removal System).

__ 2) Do not continue in this procedure until the opposite ND train is operating in RHR mode.

__ 3) Place the affected power disconnect switch in "ENABL".

4) Cycle the affected valve(s) and leave open:

__ • 2NI-173A (ND Hdr 2A To Cold Legs C&D)

__ • 2NI-178B (ND Hdr 2B To Cold Legs A&B).

__ 5) **IF** the unit is in Mode 4, **THEN** return the affected power disconnect switch(es) to "DISCON".

__ 20. **Determine long term plant status. RETURN TO procedure in effect.**

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Monitor Enclosure 1 (Foldout Page).**

2. **Verify the essential loads powered from energized train as follows:**

__ a. RN pump(s) - IN SERVICE AS NEEDED.	__ a. Manually start pump(s).
__ b. KC pump(s) - IN SERVICE AS NEEDED.	b. Perform the following: __ 1) Manually start pump(s). __ 2) Ensure KC Hx outlet mode switches - PROPERLY ALIGNED.
__ c. At least one NV pump - ON.	__ c. **REFER TO** AP/2/A/5500/12 (Loss Of Charging Or Letdown).
__ d. CA pump - ON.	__ d. **IF** CA pump is required to maintain S/G levels, **THEN** manually start pump.
__ e. VC/YC chiller - ON.	__ e. **REFER TO** OP/0/A/6450/011 (Control Room Area Ventilation/Chilled Water System).
__ 3. **Verify CA Pump #2 - ON.**	__ **IF CA Pump #2 is required to maintain S/G levels, THEN start CA Pump #2.**
__ 4. **Verify D/G on the affected bus - RUNNING.**	__ **GO TO Step 6.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify RN cooling to the affected D/G.**	**Perform the following for the affected D/G:** • D/G 2A: __ a. Depress and hold the D/G "OFF" pushbutton. __ b. Dispatch operator to open 2EDE-F01F (Diesel Generator Load Sequencer Panel 2DGLSA) (AB-577, BB-68, Rm 486). __ c. **WHEN** 2EDE-F01F (Diesel Generator Load Sequencer Panel 2DGLSA) is open, **THEN** release the D/G "OFF" pushbutton. OR • D/G 2B: __ a. Depress and hold the D/G "OFF" pushbutton. __ b. Dispatch operator to open 2EDF-F01F (Diesel Generator Load Sequencer Panel 2DGLSB) (AB-560, BB-68, Rm 362). __ c. **WHEN** 2EDF-F01F (Diesel Generator Load Sequencer Panel 2DGLSB) is open, **THEN** release the D/G "OFF" pushbutton.
6. **Dispatch operator with a screwdriver to load shed the affected essential bus as follows:** __ • **REFER TO** Enclosure 8 (Manual Load Shed Of 2ETA) OR __ • **REFER TO** Enclosure 9 (Manual Load Shed Of 2ETB).	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 7. **Verify operating RN pump(s) flow - LESS THAN 23,000 GPM.**	__ **REFER TO AP/0/A/5500/20 (Loss Of Nuclear Service Water).**
__ 8. **Stop any dilutions in progress.**	
9. **Verify S/I status as follows:**	
__ a. S/I - HAS ACTUATED.	__ a. **GO TO** Step 10.
__ b. **GO TO** Step 11.	
10. **Verify ND System status as follows:**	
__ a. ND System - ALIGNED IN RESIDUAL HEAT REMOVAL MODE.	__ a. **GO TO** Step 11.
__ b. At least one ND pump - ON.	__ b. **REFER TO** AP/2/A/5500/19 (Loss Of Residual Heat Removal System).
__ 11. **Ensure CA System - RESET.**	
12. **Control S/G levels as follows:**	
__ a. Verify CF flow - MAINTAINING STABLE S/G LEVELS.	a. Perform the following: __ 1) **REFER TO** Enclosure 16 (S/G Level Control). __ 2) **GO TO** Step 13.
__ b. **IF AT ANY TIME** CF flow control to S/Gs is lost, **THEN** perform Step 12.	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 13. **Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (2SI-18) - LIT.**

To prevent overpressurizing the condenser perform the following:

a. Dispatch operator to close the following valves:

__ • 2SA-22 (Main Stm To CSAE) (TB-614, 2L-2M, 32-33)

__ • 2SA-27 (Aux Stm To CSAE) (TB-614, 2L-2M, 27).

__ b. **WHEN** notified by dispatched operator that the SA supplies are closed, **THEN** open "COND A-B-C VAC BKR VLVS".

c. **IF** power not available to operate "COND A-B-C VAC BKR VLVS", **THEN** dispatch operator to open the following valves:

__ • 2CM-368 (2A Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 26-27)

__ • 2CM-369 (2B Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 24-25)

__ • 2CM-370 (2C Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 22-23).

__ d. **WHEN** time permits, **THEN** dispatch operator to complete breaking condenser vacuum. **REFER TO** OP/2/B/6300/006 (Main Vacuum).

__ e. Shutdown steam seals. **REFER TO** OP/2/B/6300/005 (Steam Seal System).

14. **Control charging as follows:**

__ a. Maintain charging flow less than 180 GPM.

__ b. Adjust charging flow as necessary to maintain Pzr level in program band.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

15. **Control letdown as follows:**

__ a. Verify normal letdown - IN SERVICE.

a. Perform the following:

__ 1) Attempt to restore letdown. **REFER TO** AP/2/A/5500/12 (Loss Of Charging Or Letdown).

__ 2) **WHEN** normal letdown has been established, **THEN** place additional letdown orifice in service as necessary to control Pzr level.

__ 3) **GO TO** Step 16.

__ b. Place additional letdown orifice in service as necessary to control Pzr level.

__ 16. **Determine and correct cause of blackout.**

__ 17. **IF spent fuel pool instrumentation is failed low, THEN dispatch operator to monitor spent fuel pool conditions. REFER TO Enclosure 14 (Spent Fuel Pool Monitoring).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

18. **Ensure compliance with appropriate Tech Specs:**

__ • 3.8.1 (AC Sources - Operating)

__ • 3.8.2 (AC Sources - Shutdown)

__ • 3.8.4 (DC Sources - Operating)

__ • 3.8.5 (DC Sources - Shutdown)

__ • 3.8.7 (Inverters - Operating)

__ • 3.8.8 (Inverters - Shutdown)

__ • 3.8.9 (Distribution Systems - Operating)

__ • 3.8.10 (Distribution Systems - Shutdown).

19. **Determine required notifications:**

__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)

__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

__ 20. **Verify 6.9KV busses - ENERGIZED.**

__ **WHEN time and manpower permit, THEN perform applicable portions of Case III. REFER TO Case III (Loss Of All 6.9KV Busses).**

21. **Do not continue in this procedure until the following are satisfied:**

__ • The status of all lockout targets have been determined

__ • Station management has approved power restoration to the affected bus.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. **Energize the affected bus as follows:**

__ a. Verify the desired power source for the affected bus - FROM OFFSITE POWER.

a. Perform the following:

1) Dispatch operator to energize affected bus from D/G as follows:

__ • **REFER TO** Enclosure 10 (Energizing 2ETA From D/G)

OR

__ • **REFER TO** Enclosure 11 (Energizing 2ETB From D/G).

__ 2) Do not continue in this procedure until affected bus is energized from D/G.

__ 3) **GO TO** Step 23.

b. Verify the following:

__ • Offsite power - AVAILABLE

• The following PCBs - CLOSED:

__ • PCB 21
__ • PCB 24.

__ • All 6.9KV busses - ENERGIZED.

b. Perform one of the following:

• **IF** it is desired to energize the affected bus from Unit 1, **THEN**:

__ 1) To energize 2ETA **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA).

__ 2) To energize 2ETB **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

__ 3) **WHEN** Unit 2 offsite power is available, **THEN** perform Step 22.b.

__ 4) **GO TO** Step 23.

OR

__ • **IF** Unit 2 offsite power is available, **THEN GO TO** Enclosure 4 (Restoration Of Offsite Power).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

c. Verify affected 4160V transformer - ENERGIZED:

__ • 2ATC

OR

__ • 2ATD.

c. Perform the following:

1) **IF** Unit 2 power available, **THEN** close the appropriate breaker to energize the affected transformer:

__ • "4 KV XFMR 2ATC FDR"

OR

__ • "4 KV XFMR 2ATD FDR".

__ 2) **IF** the affected 4160V transformer is energized, **THEN GO TO** Step 22.d.

__ 3) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

4) Do not continue in this procedure until one of the following is satisfied:

__ • The affected feeder breaker is closed

OR

__ • Dispatched operator reports that the breaker cannot be closed.

__ 5) **IF** the affected 4160V transformer is energized, **THEN GO TO** Step 22.d.

6) **IF** the affected 4160V transformer is still de-energized, **THEN** align alternate power as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

d. Close the feeder breaker for the affected bus:

__ • "ETA NORM FDR FRM ATC"

OR

__ • "ETB NORM FDR FRM ATD".

__ 7) **GO TO** Step 23.

d. Perform the following:

__ 1) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 7 (Manual Operation Of 4160V Bus Breakers).

2) Do not continue in this procedure until one of the following is satisfied:

__ • The affected feeder breaker is closed

OR

__ • Dispatched operator reports that the breaker cannot be closed.

__ 3) **IF** the affected feeder breaker is closed, **THEN GO TO** Step 22.e.

4) Align alternate power to the affected bus as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

__ 5) **GO TO** Step 23.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

22. (Continued)

e. **WHEN** the feeder breaker is closed, **THEN** dispatch operator to ensure the following essential load center breakers for the affected bus are closed:

- 2ETA:

__ • 2ELXA-4B (Load Center 2ELXA Normal Incoming Breaker) (AB-577, AA-67, Rm 486)

__ • 2ELXC-4B (Load Center 2ELXC Normal Incoming Breaker) (AB-577, AA-68, Rm 486).

OR

- 2ETB:

__ • 2ELXB-4B (Load Center 2ELXB Normal Incoming Breaker) (AB-560, AA-67, Rm 362)

__ • 2ELXD-4B (Load Center 2ELXD Normal Incoming Breaker) (AB-560, AA-68, Rm 362).

23. **Verify B/O busses are energized as follows:**

__ a. 2AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.

a. Perform the following:

NOTE Both ND Hx Bypass valves fail closed on loss of 2LXI.

1) **IF** ND train A is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-173A" in "THROT".

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. (Continued)

__ b) Throttle 2NI-173A (ND Hdr 2A To Cold Legs C&D) to stabilize NC temperature.

2) **IF** ND train B is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-178B" in "THROT".

__ b) Throttle 2NI-178B (ND Hdr 2B To Cold Legs A&B) to stabilize NC temperature.

__ 3) Ensure breaker "FTA B/O NORM FDR FRM ATC" - OPEN.

__ 4) Dispatch operator to open 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

__ 5) **IF** S/I has actuated, **THEN** ensure "ECCS TRN A" reset.

__ 6) **IF** sequencer control power is available, **THEN** reset "D/G 2A LOAD SEQ RESET".

7) **WHEN** notified by dispatched operator that 2LXI-4B is open, **THEN** perform the following:

__ a) Close breaker "FTA B/O ALT FDR FRM ETA".

__ b) Close breaker "ETA ALT FDR TO FTA".

__ c) Notify dispatched operator to close 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

23. (Continued)

__ b. 2AD-11, K/4 "4KV B/O BUS FTB VOLTAGE LO" - DARK.

b. Perform the following:

__ 1) Ensure breaker "FTB B/O NORM FDR FRM ATD" - OPEN.

__ 2) Dispatch operator to open 2LXH-4B (Load Center 2LXH Incoming Breaker) (SB-594, Q-R, 30).

__ 3) **IF** S/I has actuated, **THEN** ensure "ECCS TRN B" reset.

__ 4) **IF** sequencer control power is available, **THEN** reset "D/G 2B LOAD SEQ RESET".

5) **WHEN** notified by dispatched operator that 2LXH-4B is open, **THEN** perform the following:

__ a) Close breaker "FTB B/O ALT FDR FRM ETB".

__ b) Close breaker "ETB ALT FDR TO FTB".

__ c) Notify dispatched operator to close 2LXH-4B (Load Center 2LXH Incoming Breaker).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

24. **Start required loads as follows:**

a. Ensure the load on the essential bus does not exceed the capacity of the power source as follows:

__ 1) Verify D/G - SUPPLYING POWER TO ESSENTIAL BUSSES.

1) Perform the following:

__ a) While performing the following steps, do not exceed the KW load limit determined by the Transmission Control Center (TCC).

__ b) **GO TO** Step 24.b.

__ 2) While performing the following steps, do not exceed 5750 KW on the operating D/G.

b. Manually start required loads as follows:

__ • **REFER TO** Enclosure 2 (Blackout Loads)

__ • Dispatch operator to ensure all required in plant loads are energized or on. **REFER TO** Enclosure 3 (Local Blackout Loads)

__ c. Restore spent fuel pool cooling. **REFER TO** OP/2/A/6200/005 (Spent Fuel Pool Cooling).

__ 25. **Realign VC/YC to normal operation. REFER TO OP/0/A/6450/011 (Control Room Area Ventilation/ Chilled Water System).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE There is a five minute time delay for the automatic swapover from YV to RN.

__ 26. **Verify "YV OPERABLE" light - LIT.**

Perform the following:

a. Ensure YV swap to RN as follows:

__ • "YV/RN AUTO SWAP RESET" light - DARK

__ • "YV ISOLATED" light - LIT

__ • "RN OPERABLE" light - LIT

__ • "RN ISOLATED" light - DARK.

__ b. **WHEN** YV swap to RN is complete, **THEN** ensure two RN pumps in service. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water).

__ c. **WHEN** offsite power is restored, **THEN** realign YV to normal operation. **REFER TO** OP/2/A/6450/020 (Containment Chilled Water System).

__ 27. **Verify D/G output breaker for the affected bus - CLOSED.**

__ **GO TO Step 29.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. **Align offsite power to the affected bus as follows:**

a. Verify the following:

__ • Offsite power - AVAILABLE

• The following PCBs - CLOSED:

__ • PCB 21
__ • PCB 24.

__ • All 6.9KV busses - ENERGIZED.

a. Perform one of the following:

• **IF** it is desired to energize the affected bus from Unit 1, **THEN**:

__ 1) To energize 2ETA **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA).

__ 2) To energize 2ETB **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

__ 3) **WHEN** Unit 2 offsite power is available, **THEN** perform Step 28.a.

__ 4) **GO TO** Step 29.

OR

__ • **IF** Unit 2 offsite power is available, **THEN GO TO** Enclosure 4 (Restoration Of Offsite Power).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

b. Verify affected 4160V transformer - ENERGIZED:

__ • 2ATC

OR

__ • 2ATD.

b. Perform the following:

1) **IF** Unit 2 power is available, **THEN** close the appropriate breaker to energize the affected transformer:

__ • "4 KV XFMR 2ATC FDR"

OR

__ • "4 KV XFMR 2ATD FDR".

__ 2) **IF** the affected 4160V transformer is energized, **THEN GO TO** Step 28.c.

__ 3) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

4) Do not continue in this procedure until one of the following is satisfied:

__ • The affected feeder breaker is closed

OR

__ • Dispatched operator reports that the breaker cannot be closed.

__ 5) **IF** the affected 4160V transformer is energized, **THEN GO TO** Step 28.c.

6) **IF** affected 4160V transformer is still de-energized, **THEN** align alternate power as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

__ 7) **GO TO** Step 29.

__ c. Shutdown affected D/G. **REFER TO** OP/2/A/6350/002 (Diesel Generator Operation).

d. **IF** the normal incoming breaker for the affected bus cannot be closed, **THEN** align alternate power as follows:

__ • **GO TO** Enclosure 5 (Aligning Alternate Power To 2ETA)

OR

__ • **GO TO** Enclosure 6 (Aligning Alternate Power To 2ETB).

29. **Ensure plant systems returned to normal as follows:**

__ a. **WHEN** normal power is available, **THEN** return plant electrical systems to normal. **REFER TO** OP/2/A/6350/001 (Normal Power Checklist).

__ b. **WHEN** CA is no longer needed to feed S/Gs, **THEN** shutdown the CA System following the automatic start and return CA System to standby readiness. **REFER TO** OP/2/A/6250/002 (Auxiliary Feedwater System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

29. (Continued)

c. Restore control power to the affected CA pump breaker as follows:

__ 1) Depress and hold the "CA SYS VLV CTRL RESET" pushbutton for the affected CA pump.

2) Dispatch operator with a screwdriver to re-install the following control power fuses for the affected CA pump:

__ • AU
__ • AX
__ • AZ.

__ 3) **WHEN** control power fuses have been re-installed, **THEN** release the "CA SYS VLV CTRL RESET" pushbutton.

d. Notify dispatched operator to re-install the following control power fuses for the affected NS pump:

__ • AY
__ • AX.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

29. (Continued)

e. Restore power to the affected D/G load sequencer as follows:

__ 1) Verify affected essential bus - ENERGIZED.

1) Perform the following:

a) **WHEN** affected essential bus is energized, **THEN** notify dispatched operator to close the affected breaker:

__ • 2EDE-F01F (Diesel Generator Load Sequencer Panel 2DGLSA)

OR

__ • 2EDF-F01F (Diesel Generator Load Sequencer Panel 2DGLSB).

__ b) **GO TO** Step 29.f.

2) Notify dispatched operator to close the affected breaker:

__ • 2EDE-F01F (Diesel Generator Load Sequencer Panel 2DGLSA)

OR

__ • 2EDF-F01F (Diesel Generator Load Sequencer Panel 2DGLSB).

__ f. Verify "RPI DISPLAY ON EMERG POWER" (2SI-3) - DARK.

__ f. **WHEN** power is restored to 2RPA, **THEN** realign DRPI power to normal. **REFER TO** OP/2/B/6350/009 (125 VDC 240/120 VAC Auxiliary Control Power System).

__ g. Verify NF System - IN OPERATION.

__ g. Restore proper NF System operation. **REFER TO** OP/0/A/6200/008 (Ice Condenser Refrigeration System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

29. (Continued)

h. Verify the following switches in "DISCON":

__ • "PWR DISCON FOR 2NI-173A"

__ • "PWR DISCON FOR 2NI-178B".

h. **IF** 2NI-173A (ND Hdr 2A To Cold Legs C&D) **OR** 2NI-178B (ND Hdr 2B To Cold Legs A&B) have been throttled, **THEN**:

- **WHEN** the condition requiring the affected valve(s) to be throttled is corrected **AND** the opposite ND train is available for decay heat removal, **THEN** perform the following:

__ 1) Place the opposite ND train in RHR mode. **REFER TO** OP/2/A/6200/004 (Residual Heat Removal System).

__ 2) Do not continue in this procedure until the opposite ND train is operating in RHR mode.

__ 3) Place the affected power disconnect switch in "ENABL".

4) Cycle the affected valve(s) and leave open:

__ • 2NI-173A (ND Hdr 2A To Cold Legs C&D)

__ • 2NI-178B (ND Hdr 2B To Cold Legs A&B).

__ 5) **IF** the unit is in Mode 4, **THEN** return the affected power disconnect switch(es) to "DISCON".

__ 30. **Determine long term plant status. RETURN TO procedure in effect.**

END

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

C. Operator Actions

__ 1. **Verify 2ETA and 2ETB - ENERGIZED.**

Perform the following:

__ a. **IF** 2ETA **AND** 2ETB are de-energized, **THEN GO TO** EP/2/A/5000/ECA-0.0 (Loss Of All AC Power).

__ b. **GO TO** Case II (Loss of All Power to an Essential Train).

__ 2. **Monitor Enclosure 1 (Foldout Page).**

__ 3. **Stop any NC System draining in progress.**

__ 4. **Stop any dilutions in progress.**

5. **Control S/G levels as follows:**

__ a. Verify S/Gs - REQUIRED FOR HEATSINK.

__ a. **GO TO** Step 6.

__ b. **REFER TO** Enclosure 16 (S/G Level Control).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **Verify B/O busses are energized as follows:**

__ a. 2AD-11, K/3 "4KV B/O BUS FTA VOLTAGE LO" - DARK.

a. Perform the following:

NOTE Both ND Hx Bypass valves fail closed on loss of 2LXI.

1) IF ND train A is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-173A" in "THROT".

__ b) Throttle 2NI-173A (ND Hdr 2A To Cold Legs C&D) to stabilize NC temperature.

2) IF ND train B is in Residual Heat Removal Mode, **THEN** perform the following:

__ a) Place the "PWR DISCON FOR 2NI-178B" in "THROT".

__ b) Throttle 2NI-178B (ND Hdr 2B To Cold Legs A&B) to stabilize NC temperature.

__ 3) Ensure breaker "FTA B/O NORM FDR FRM ATC" - OPEN.

__ 4) Dispatch operator to open 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

__ 5) IF S/I has actuated, **THEN** ensure "ECCS TRN A" reset.

__ 6) Reset "D/G 2A LOAD SEQ RESET".

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

7) **WHEN** notified by dispatched operator that 2LXI-4B is open, **THEN** perform the following:

__ a) Close breaker "FTA B/O ALT FDR FRM ETA".

__ b) Close breaker "ETA ALT FDR TO FTA".

__ c) Notify dispatched operator to close 2LXI-4B (Load Center 2LXI Incoming Breaker) (SB-594, P-Q, 31).

__ b. 2AD-11, K/4 "4KV B/O BUS FTB VOLTAGE LO" - DARK.

b. Perform the following:

__ 1) Ensure breaker "FTB B/O NORM FDR FRM ATD" - OPEN.

__ 2) Dispatch operator to open 2LXH-4B (Load Center 2LXH Incoming Breaker) (SB-594, Q-R, 30).

__ 3) **IF** S/I has actuated, **THEN** ensure "ECCS TRN B" reset.

__ 4) Reset "D/G 2B LOAD SEQ RESET".

5) **WHEN** notified by dispatched operator that 2LXH-4B is open, **THEN** perform the following:

__ a) Close breaker "FTB B/O ALT FDR FRM ETB".

__ b) Close breaker "ETB ALT FDR TO FTB".

__ c) Notify dispatched operator to close 2LXH-4B (Load Center 2LXH Incoming Breaker) (SB-594, Q-R, 30).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

7. **Control NC pressure as follows:**

__ a. Verify - BUBBLE IN THE PZR.

__ a. **GO TO** Step 7.d.

__ b. Energize A and B Pzr heaters as necessary to maintain NC System pressure in program band.

c. **IF AT ANY TIME** Pzr spray is required, **THEN** perform the following:

1) **IF** normal letdown is in service, **THEN** establish NV aux spray as follows:

a) Ensure the following valves - CLOSED:

__ • 2NC-27 (Pzr Spray Ctrl Frm Loop A)
__ • 2NC-29 (Pzr Spray Ctrl Frm Loop B)
__ • 2NV-39A (NV Supply To Loop D Isol)
__ • 2NV-32B (NV Supply To Loop A Isol).

__ b) Maintain charging flow less than 180 GPM.

__ c) Throttle 2NV-37A (NV Supply To Pzr Aux Spray) and charging flow to maintain NC System pressure in program band.

__ 2) **GO TO** Step 8.

__ 1) **IF** ND is in service, **THEN** establish ND Aux Spray. **REFER TO** OP/2/A/6200/004 (Residual Heat Removal System).

__ d. **IF** NC System is water solid, **THEN** control charging and letdown to stabilize NC System pressure.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. **Ensure the following DC pumps - ON AS REQUIRED BY CURRENT PLANT CONDITIONS:**

__ a. "EBOP"

__ b. "CFPT 2A EBOP"

__ c. "CFPT 2B EBOP"

__ d. Emergency Seal Oil Pump (KG Graphic).

d. Perform the following:

__ 1) Dispatch operator to start "EMERG. SEAL OIL PUMP" (2ELCP0019) (TB 568, 2F-20).

NOTE A copy of the emergency generator hydrogen purge procedure is locally mounted on the wall.

__ 2) **IF** emergency Seal Oil Pump will not start **AND** generator H2 has not been purged, **THEN** perform emergency generator hydrogen purge. **REFER TO** OP/2/B/6300/003 (Generator Hydrogen System).

__ 9. **Ensure any draining to Turbine Building sump - SECURED.**

NOTE If all non-essential power is lost on Unit 2, only RL Pumps B and C will be available.

10. **Verify RL status as follows:**

__ a. Verify RL pump B or C - ON.

a. Perform the following:

__ 1) Start available RL Pump(s).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

10. (Continued)

2) **IF** no RL pump available, **THEN** perform the following:

__ a) Notify a second SRO to initiate shutdown of Unit 1. **REFER TO** AP/1/A/5500/09 (Rapid Downpower).

__ b) **GO TO** Step 11.

__ b. Verify two RL pumps - ON.

b. Perform the following:

__ 1) Start second RL pump.

2) **IF** second RL pump not available, **THEN** perform the following:

__ a) Ensure discharge valve(s) on de-energized pump(s) - CLOSED.

__ b) Notify Environnmental Chemistry to secure cooling tower blowdown on both Units.

__ c) Notify Secondary Chemistry to limit RL makeup to YF.

__ d) Place "RL PRESS CTRL" on 1MC-13 in MANUAL.

e) Throttle "RL PRESS CTRL" in the closed direction until one of the following is attained:

__ • RL header pressure of 70 PSIG

OR

__ • "RL PRESS CTRL" output demand is at 0 (closed).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE
- If all non-essential power is lost on Unit 2, only KR pumps A and C will be available.
- The KR pump breakers do not have an UV trip. Therefore B KR pump may indicate "ON" with no power available.

11. **Verify KR status as follows:**

__ a. Verify at least one KR pump - ON.

a. Perform the following:

__ 1) Start available KR Pump(s).

2) **IF** no KR pump available, **THEN** perform the following:

__ a) Notify a second SRO to initiate shutdown of Unit 1. **REFER TO** AP/1/A/5500/09 (Rapid Downpower).

__ b) **GO TO** Step 12.

__ b. Verify two KR pumps - ON.

b. Perform the following:

__ 1) Start second KR pump.

__ 2) **IF** second KR pump not available, **THEN** ensure only two KR heat exchangers in service. **REFER TO** Enclosure 15 (KR Heat Exchanger Alignment).

__ c. Depress the "OFF" pushbutton for B KR pump.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

12. **Verify RN status as follows:**

NOTE Unit 2 RN Mini Flow will fail to KC Temp mode regardless of switch position. Unit 1 Mini Flow will function normally.

__ a. Verify each operating RN pump discharge flow - GREATER THAN 8,600 GPM.

__ a. Align RN flow through NS Hx(s) to increase each operating RN pump discharge flow to greater than 8,600 gpm. **REFER TO** OP/0/A/6400/006F (Nuclear Service Water System Flush Procedure).

NOTE The following step is to comply with SLC 16.7-6. Both 2AD-12, A/1 and 2AD-12, A/4 are inoperable.

b. Open the following valves:

__ • 1RN-58B (RN Hdr B Rtn To SNSWP)
__ • 1RN-63A (RN Hdr A Rtn To SNSWP).

13. **Verify proper VP alignment as follows:**

__ a. VP previously in service

__ a. **GO TO** Step 14.

__ b. Ensure "VP EMERG STOP" switch in the "STOP" position.

__ 14. **Determine and correct cause of Loss of 6.9KV Busses.**

__ 15. **WHEN time and manpower permit, THEN perform Enclosure 17 (Switchyard Battery Conservation).**

__ 16. **Verify blackout loads energized as required. REFER TO Enclosure 2 (Blackout Loads).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 17. **Dispatch operator to ensure all required in plant loads are energized or on. REFER TO Enclosure 3 (Local Blackout Loads).**

__ 18. **Attempt to restore off-site power. REFER TO Enclosure 4 (Restoration Of Offsite Power).**

NOTE There is a five minute time delay for the automatic swapover from YV to RN.

__ 19. **Verify "YV OPERABLE" light - LIT.**

IF YV was previously operating, THEN perform the following:

a. Ensure YV swap to RN as follows:

__ • "YV/RN AUTO SWAP RESET" light - DARK

__ • "YV ISOLATED" light - LIT

__ • "RN OPERABLE" light - LIT

__ • "RN ISOLATED" light - DARK.

__ b. **WHEN** YV swap to RN is complete, **THEN** ensure two RN pumps in service. **REFER TO** OP/0/A/6400/006C (Nuclear Service Water).

__ c. **WHEN** offsite power is restored, **THEN** realign YV to normal operation. **REFER TO** OP/2/A/6450/020 (Containment Chilled Water System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 20. **Verify "C-9 COND AVAILABLE FOR STM DUMP" status light (2SI-18) - LIT.**

NOTE The following step is performed to prevent overpressurizing the condenser.

IF condenser vacuum not previously broken, THEN perform the following:

a. Dispatch operator to close the following valves:

__ • 2SA-22 (Main Stm To CSAE) (TB-614, 2L-2M, 32-33)

__ • 2SA-27 (Aux Stm To CSAE) (TB-614, 2L-2M, 27).

__ b. **WHEN** notified by dispatched operator that the SA supplies are closed, **THEN** open "COND A-B-C VAC BKR VLVS".

c. **IF** power not available to operate "COND A-B-C VAC BKR VLVS", **THEN** dispatch operator to open the following valves:

__ • 2CM-368 (2A Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 26-27)

__ • 2CM-369 (2B Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 24-25)

__ • 2CM-370 (2C Main Cond Shell Vacuum Bkr) (TB-609, 2G-2F, 22-23).

__ d. **WHEN** time permits, **THEN** dispatch operator to complete breaking condenser vacuum. **REFER TO** OP/2/B/6300/006 (Main Vacuum).

__ e. Shutdown steam seals. **REFER TO** OP/2/B/6300/005 (Steam Seal System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 21. **Dispatch operator to monitor spent fuel pool conditions. REFER TO Enclosure 14 (Spent Fuel Pool Monitoring).**

22. **Determine required notifications:**

__ • **REFER TO** RP/0/A/5000/001 (Classification Of Emergency)

__ • **REFER TO** RP/0/B/5000/013 (NRC Notification Requirements).

23. **Ensure compliance with appropriate Tech Specs:**

__ • 3.5.4 (Refueling Water Storage Tank (RWST))
__ • 3.8.1 (A.C. Sources - Operating)
__ • 3.8.2 (A.C. Sources - Shutdown)
__ • 3.8.7 (Inverters - Operating)
__ • 3.8.8 (Inverters - Shutdown)
__ • 3.8.9 (Distribution Systems - Operating)
__ • 3.8.10 (Distribution Systems - Shutdown)
__ • SLC 16.7-4 (Loose-Part Detection System)
__ • SLC 16.7-6 (RN Discharge Instrumentation)
__ • SLC 16.7-9 (Standby Shutdown System)
__ • SLC 16.8-2 (230 KV Switchyard Systems)
__ • SLC 16.9-1 (Fire Suppression Water System)
__ • SLC 16.9-3 (CO_2 Systems)
__ • SLC 16.9-6 (Fire Detection Instrumentation)
__ • SLC 16.9-11 (Boration Systems Borated Water Source - Shutdown)
__ • SLC 16.9-12 Boration Systems Borated Water Sources - Operating).

__ 24. **Dispatch operator to ensure proper computer room ventilation operation. REFER TO OP/0/B/6450/014 (Computer Room Ventilation System).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE NCDT pumps have no power available.

__ 25. **IF required to control NCDT level without NCDT pumps, THEN REFER TO OP/2/A/6500/014 (Operations Controlled Liquid Waste).**

NOTE EFA Data Gathering Panels batteries may begin to degrade in 8 hours.

26. **WHEN 8 hours has elapsed from time of loss of 6.9KV busses, THEN:**

__ • Implement fire watches on SLC fire zones. **REFER TO** SLC 16.9-6 (Fire Detection Instrumentation).

__ • **IF** outside air temp is less than 70°F, **THEN** notify IAE to monitor FWST temperature. **REFER TO** IP/2/B/3101/001 Calibration Procedure For Refueling Water System (FW)).

__ 27. **Verify offsite power - RESTORED TO 6.9KV BUSSES.**

__ **Do not continue in this procedure until power is restored to the 6.9KV busses.**

28. **Ensure plant systems returned to normal as follows:**

__ a. Return plant electrical systems to normal. **REFER TO** OP/2/A/6350/001 (Normal Power Checklist).

__ b. Ensure VA System in normal alignment. **REFER TO** OP/0/A/6450/003 (Auxiliary Building Ventilation System).

__ c. Ensure CA aligned for current conditions. **REFER TO** OP/2/A/6250/002 (Auxiliary Feedwater System).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

__ d. Verify "RPI DISPLAY ON EMERG POWER" (2SI-3) - DARK.

__ d. **WHEN** power is restored to 2RPA, **THEN** realign DRPI power to normal. **REFER TO** OP/2/B/6350/009 (125 VDC 240/120 VAC Auxiliary Control Power System).

__ e. Ensure NF aligned for current conditions. **REFER TO** OP/0/A/6200/008 (Ice Condenser Refrigeration System).

f. Verify the following switches in "DISCON":

__ • "PWR DISCON FOR 2NI-173A"

__ • "PWR DISCON FOR 2NI-178B".

f. **IF** 2NI-173A (ND Hdr 2A To Cold Legs C&D) **OR** 2NI-178B (ND Hdr 2B To Cold Legs A&B) have been throttled, **THEN**:

- **WHEN** the condition requiring the affected valve(s) to be throttled is corrected **AND** the opposite ND train is available for decay heat removal, **THEN** perform the following:

__ 1) Place the opposite ND train in RHR mode. **REFER TO** OP/2/A/6200/004 (Residual Heat Removal System).

__ 2) Do not continue in this procedure until the opposite ND train is operating in RHR mode.

__ 3) Place the affected power disconnect switch in "ENABL".

4) Cycle the affected valve(s) and leave open:

__ • 2NI-173A (ND Hdr 2A To Cold Legs C&D)

__ • 2NI-178B (ND Hdr 2B To Cold Legs A&B).

__ 5) **IF** the unit is in Mode 4, **THEN** return the affected power disconnect switch(es) to "DISCON".

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

28. (Continued)

__ g. Ensure VP aligned for current conditions. **REFER TO** OP/2/A/6450/015 (Containment Purge System).

__ h. Ensure Main Turbine Lube Oil aligned for current conditions. **REFER TO** OP/2/B/6300/007 (Main Turbine Lube Oil System).

__ i. Ensure Feedwater Pump Turbine Oil aligned for current conditions. **REFER TO** OP/2/B/6250/012 (Feedwater Pump Turbine Oil System).

__ j. Ensure Generator Seal Oil aligned for current conditions. **REFER TO** OP/2/B/6300/004 (Generator Seal Oil System).

__ 29. **Determine long term plant status. RETURN TO procedure in effect.**

END

1. **Containment air release criterion:**

   - **IF AT ANY TIME** containment pressure is greater than or equal to .25 PSIG, **THEN**:

   __ • Perform normal VQ release. **REFER TO** OP/2/A/6450/017 (Containment Air Release And Addition System).

   OR

   __ • **IF** the VQ fans cannot be started, **THEN REFER TO** Enclosure 13 (VQ Release Without Fans).

__ 2. **IF Containment entry is required, THEN coordinate with TSC to defeat 2EMF-2 input to the containment evacuation alarm per AM/0/B/5100/009 (Defeating 1EMF-17 Or 2EMF-2 Containment Evacuation Alarm Circuits(s)).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Using control room indications, verify all of the following loads - ENERGIZED OR ON:**

   - __ • All CRD vent fans
   - __ • CFPT turning gear motors
   - __ • All Pzr PORV isolation valves
   - __ • Boric acid transfer pumps
   - __ • Hydrogen igniters
   - __ • ND & NS sump pumps
   - __ • Main fire pump B
   - __ • All RF jockey pumps
   - __ • VF exhaust fans
   - __ • Pipe tunnel booster fans
   - __ • Incore instrument room AHUs
   - __ • All upper containment return air fans
   - __ • All upper containment ventilation units
   - __ • All lower containment ventilation units
   - __ • Aux shutdown panel supply units
   - __ • Aux building filtered exhaust fans
   - __ • Aux building unfiltered exhaust fans
   - __ • Aux building supply unit fans
   - __ • 1CRA-AHU-1
   - __ • 1CR-AHU-1
   - __ • 1CRA-PFT-1
   - __ • 1CRA-CHWP-1
   - __ • 2CR-AHU-1
   - __ • 2CRA-PFT-1
   - __ • Unit 2 switchgear air handling units
   - __ • YC chiller (amps indicated)
   - __ • Nuclear service water strainer backwash drive motors.

__ **IF the de-energized loads are required to be in operation AND power is available to the equipment, THEN restore power to the affected load(s).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
2. **Verify the following EMF sample pumps - ON:** __ • 2EMF-33 "CONDENSER AIR EJECTOR EXHAUST" __ • 2EMF-35,36,37 "UNIT VENT PAR/GAS/IOD" __ • 2EMF-38,39,40 "CONTAINMENT PAR/GAS/IOD" __ • 2EMF-42 "FUEL BUILDING VENTILATION" __ • 2EMF-43B "CONTROL RM AIR INTAKE LOC B".	__ **IF required to be in service, THEN start the affected EMF sample pump(s).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. **Verify the turbine oil system status as follows:**

__ a. Verify the "T-GR OIL PUMP" - ON.

a. **IF** the "T-GR OIL PUMP" is required to be on, **THEN**:

__ 1) Start "T-GR OIL PUMP" by depressing the "ON" pushbutton.

__ 2) Do not continue until "T-GR OIL PUMP" is on.

__ b. Verify all turbine bearing lift pumps - ON.

b. **IF** the lift pumps are required to be on, **THEN**:

__ 1) Start turbine bearing lift pumps by placing all lift pumps in "ON" position.

2) **IF** the lift pumps will not start, **THEN**:

__ a) Dispatch operator to arm lift pumps.

__ b) **WHEN** notified that lift pumps are armed, **THEN** ensure lift pumps are on.

__ c. Verify Turbine - TRIPPED.

__ c. **GO TO** Step 4.

__ d. **WHEN** lift pumps are on **AND** the turbine has stopped, **THEN** verify "TURB T-GR" is on.

d. Perform the following:

__ 1) Start "TURB T-GR" by depressing the "ON" pushbutton.

__ 2) **IF** the turning gear motor will not start, **THEN** notify SPOC to perform model W/O #96036068 to jumper the interlock to start the turning gear.

__ e. **IF** "EBOP" is ON and is not required, **THEN** stop the "EBOP" and place in "AUTO".

__ 4. **Return this enclosure to the Control Room SRO.**

NOTE If SMXU is de-energized, then the VI compressors must be operated manually as power is lost to the Centac Energy Master (CEM).

1. **In the Service Building, ensure proper VI System operation as follows:**

   a. Verify at least one of the following lights - LIT:

   __ • "POWER ON" light for VI Compressor Skid "E" Control Panel (SB-568, U-32)

   __ • "POWER ON" light for VI Compressor Skid "F" Control Panel (SB-568, U-32).

   __ b. Verify at least one VI compressor - ON.

   __ c. **IF** all lights are dark **OR** no VI compressor is on, **THEN REFER TO** OP/0/A/6450/005 (Instrument Air System) to ensure proper VI compressor operation.

   __ d. **IF** required, **THEN** start the Backup Temporary VI Compressor. **REFER TO** OP/0/A/6450/005 (Instrument Air System).

2. **Ensure the following control room chiller compressor oil pump breakers - CLOSED:**

   __ • 1EKPG-21 (1EMXG-F04A) (120 VAC Power Panelboard 1EKPG) (AB-594, FF-GG, 56, Rm 570)

   __ • 2EKPH-21 (2EMXH-F04A) (120 VAC Power Panelboard 2EKPH) (AB-594, GG-58, Rm 560).

3. **Verify the ECCS pump room heater-demister sections are energized as follows:**

   a. Verify the following lights - LIT:

   __ • "PILOT LIGHT "POWER ON"" PRHDS-1A (1ELCP0154) (AB-577, JJ-55, Rm 400)
   __ • "PILOT LIGHT "POWER ON"" PRHDS-1B (1ELCP0155) (AB-577, JJ-54, Rm 400)
   __ • "PILOT LIGHT "POWER ON"" PRHDS-2A (2ELCP0154) (AB-577, KK-60, Rm 400)
   __ • "PILOT LIGHT "POWER ON"" PRHDS-2B (2ELCP0155) (AB-577, JJ-60, Rm 400).

   b. **IF** any of the power disconnect "POWER ON" lights are dark, **THEN** ensure the affected supply breaker(s) is closed as follows:

   __ • 1EMXG-R03C (Pump Room Heater Demister Section PRHDS-1A) (AB-594, FF-GG, 56, Rm 570)

   __ • 1EMXG-R03D (Pump Room Heater Demister Section PRHDS-2A) (AB-594, FF-GG, 56, Rm 570)

   __ • 2EMXH-R03C (Pump Room Heater Demister Section PRHDS-1B) (AB-594, GG-58, Rm 560)

   __ • 2EMXH-R03D (Pump Room Heater Demister Section PRHDS-2B) (AB-594, GG-58, Rm 560).

4. **Verify proper operation of the auxiliary building filter room exhaust fan as follows:**

   __ a. At control panel 2AB-ECP-1 (AB-594, HH-58, Rm 500), verify "AUX. BLDG. FILTER RM. EXHAUST FAN (ABFRXF-2)" - ON.

   __ b. **IF** ABFRXF-2 fan is off, **THEN** ensure breaker 2MXX-F01A (Aux Bldg Filter Room Exhaust Fan Motor ABRXF-2) (TB-594, 2K-2L, 33-34) is closed.

5. **Ensure the following breakers - CLOSED:**

   __ • 1EMXG-F03B (Power Panelboard Transformer 1EKTG Feeder) (AB-594, FF-GG, 56,Rm 570)

   __ • 2EMXH-F03B (Power Panelboard Transformer 2EMXH Feeder) (AB-594, GG, 57-58, Rm 560

   __ • 2EMXB-F04B (Power Panelboard Transformer 2EKTB Feeder) (AB-560, FF-58, Rm 320)

   __ • 2EMXE-F04C (600/120V AC Power Transformer 2EKTE Feeder) (AB-556, EE-75, 2A D/G Rm)

   __ • 2EMXF-F04C (600/120V AC Power Transformer 2EKTF Feeder) (AB-556, CC-75, 2B D/G Rm).

__ 6. **Verify the 125VDC auxiliary control battery charger(s) for the energized bus are in service. REFER TO OP/2/B/6350/009 (125VDC 240/120 VAC Auxiliary Control Power System).**

7. **In the CA pump room, perform the following:**

   a. Verify the "ON" or "OFF" light lit on the following:

   __ • Steam Turb Driven Aux Fdwp #2 Sump Pump 2A Control Panel (2ELCP0062)
   __ • Steam Turb Driven Aux Fdwp #2 Sump Pump 2B Control Panel (2ELCP0063)
   __ • Aux Fdwp #2A Sump Pump 2A Control Panel (2ELCP0060)
   __ • Aux Fdwp #2B Sump Pump 2B Control Panel (2ELCP0061).

   b. IF all lights are dark for the sump pump(s), THEN ensure the breaker is closed for the affected pump(s):

   __ • 2EMXS-F02C (CA Pump Turbine 2 Sump Pump Motor A) (AB-577, BB-65, Rm 486)

   __ • 2EMXB-F03B (CA Pump Turbine 2 Sump Pump Motor B) (AB-560, FF-58, Rm 320)

   __ • 2EMXI-F03A (Motor Driven CA Pump 2A Sump Pump Motor) (AB-577, FF-60, Rm 469)

   __ • 2EMXB-F03A (Motor Driven CA Pump 2B Sump Pump Motor) (AB-560, FF-58, Rm 320).

8. **At the AB WZ sump pump control panels (AB-543, RR-58, Rm 200C) perform the following:**

   a. Verify the "ON" or "OFF" light lit for the following:

   __ • WZ Sump Pump C1
   __ • WZ Sump Pump C2.

   b. IF all lights are dark for the Aux Bldg WZ sump pump(s), THEN ensure the breaker is closed for the affected pump(s):

   __ • 1EMXG-F02A (AB Groundwater Drainage Interior Sump Pump Motor C1) (AB-594, FF-GG, 56, Rm 570)

   __ • 2EMXH-F07A (AB Groundwater Drainage Interior Sump Pump Motor C2) (AB-594, GG-58, Rm 560).

9. **At the Hydrogen Stator Cooling Water Panel (2ELCP0019) (TB-568, 2E-2F, 19-20), perform the following:**

   a. Verify power available to the following pumps:

   __ • Seal oil vacuum pump
   __ • Recirc pump
   __ • Main pump.

   b. **IF** power not available, **THEN** ensure the breaker closed for the affected pump(s):

   __ • 2MXX-F03D (Generator Seal Oil Vacuum Pump Motor) (TB-594, 2K-2L, 33-34)
   __ • 2MXX-F01F (Generator Recirculating Seal Oil Pump Motor) (TB-594, 2K-2L, 33-34)
   __ • 2MXW-F01F (Generator Main Seal Oil Pump Motor) (TB-568, 2L-2M, 33-34).

10. **Ensure power is available to the following boric acid tank room and filter room unit heaters by the following breakers closed:**

   __ • 2MXW-F04C (Boric Acid Tank Room Unit Heaters AB-UH-3 & AB-UH-6) (TB-568, 2L-2M, 33-34)

   __ • 2MXW-F06D (Boric Acid Filter Room Unit Heater AB-UH-8) (TB-568, 2L-2M, 33-34).

__ 11. **Ensure 2MXX-F06B (Diesel Building RF CO2 Storage Tank Refrigeration Unit) (TB-594, 2K-2L, 33-34) - CLOSED.**

__ 12. **Verify the 250VDC auxiliary control battery charger(s) for the energized bus are in service. REFER TO OP/0/B/6350/007 (250 VDC Auxiliary Power System).**

__ 13. **Return this enclosure to the Control Room SRO.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Notify Transmission Control Center (TCC), using one of the following methods, to coordinate attempts to restore offsite power:**

   • Outside line:

   __ • 704-382-9403
   __ • 704-382-9404
   __ • 704-399-9744
   __ • 704-382-4413(System Operating Center).

   __ • Two-way radio.

__ 2. **Verify switchyard - ENERGIZED.**

Perform the following:

a. Ensure the following PCBs - OPEN:

__ • PCB 20
__ • PCB 21
__ • PCB 23
__ • PCB 24.

__ b. Notify TCC to energize the yellow bus.

__ 3. **Notify TCC to verify adequate switchyard voltage and grid reliability.**

__ 4. **Ensure both main transformer's MODs - CLOSED.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 5. **Verify both turbine generator breakers - OPEN.**	**Perform the following:** a. **IF** turbine generator supplying auxiliary loads, **THEN**: 1) **WHEN** TCC has verified adequate switchyard voltage and grid reliability, **THEN**: __ a) Synchronize the turbine generator with the switchyard. b) Close the following PCBs: __ • PCB 21 __ • PCB 24. __ 2) **GO TO** Step 9.c. __ b. Open both turbine generator breakers.
6. **Place the following pump switches in "OFF":** __ • All hotwell pumps __ • All condensate booster pumps.	
7. **Dispatch operator to ensure breakers for all motor loads on all de-energized 6.9 KV busses - OPEN:** __ • 2TA __ • 2TB __ • 2TC __ • 2TD.	
__ 8. **Do not continue until notified that all affected 6.9 KV motor load breakers are open.**	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. **WHEN TCC has verified adequate switchyard voltage and grid reliability, THEN perform the following:**

__ a. Announce "Energizing Unit 2 main power. All personnel stand clear."

b. Close the following PCBs:

__ • PCB 21
__ • PCB 24.

__ c. Verify all 6.9 KV switchgear - ENERGIZED.

c. Perform the following:

1) Energize the 6.9 KV switchgear as follows:

a) **IF** "TRANSF 2A" is energized, **THEN** perform the following for each 6.9 KV bus:

• 2TA:

__ (1) Place "7KV BUS 2TA MODE SEL" switch in "MAN A & TIE".

__ (2) Close "7KV 2TA FDR FRM 2T2A".

• 2TB:

__ (1) Place "7KV BUS 2TB MODE SEL" switch in "MAN A & TIE".

__ (2) Close "7KV 2TB FDR FRM 2T2A".

• 2TC:

__ (1) Place "7KV BUS 2TC MODE SEL" switch in "MAN A & TIE".

__ (2) Close "7KV 2TC FDR FRM 2T1A".

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

- 2TD:

__ (1) Place "7KV BUS 2TD MODE SEL" switch in "MAN A & TIE".

__ (2) Close "7KV 2TD FDR FRM 2T1A".

b) **IF** "TRANSF 2B" is energized, **THEN** perform the following for each 6.9 KV bus:

- 2TA:

__ (1) Place "7KV BUS 2TA MODE SEL" switch in "MAN B & TIE".

__ (2) Close "7KV 2TA FDR FRM 2T2B".

- 2TB:

__ (1) Place "7KV BUS 2TB MODE SEL" switch in "MAN B & TIE".

__ (2) Close "7KV 2TB FDR FRM 2T1B".

- 2TC:

__ (1) Place "7KV BUS 2TC MODE SEL" switch in "MAN B & TIE".

__ (2) Close "7KV 2TC FDR FRM 2T2B".

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

9. (Continued)

- 2TD:

__ (1) Place "7KV BUS 2TD MODE SEL" switch in "MAN B & TIE".

__ (2) Close "7KV 2TD FDR FRM 2T1B".

__ c) **IF** "TRANSF 2A" **AND** "TRANSF 2B" are energized, **THEN** place the mode select switch for all 6.9KV busses in the "AUTO" position.

__ 2) **IF** the supply breaker(s) fail to close, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

__ 10. **RETURN TO step in effect.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify the following:**	
__ a. It is desired to power 2ETA from Unit 2.	a. Perform the following: __ 1) Ensure 1TC - ENERGIZED. __ 2) **GO TO** Step 2.
__ b. Ensure 2TC - ENERGIZED.	
__ 2. **Verify 2ETA - ENERGIZED.**	__ **Do not continue in this enclosure until notified by dispatched operator that 2ETA has been load shed.**
3. **Verify Unit 1 power alignment on 1MC-11 as follows:**	
a. Verify 1ETA in normal alignment as follows: __ • "4KV XFMR 1ATC FDR" - CLOSED __ • "ETA NORM FDR FRM ATC" - CLOSED.	a. **IF** 1ETA is aligned from SATA, **THEN**: __ • Do not continue in this enclosure. __ • **RETURN TO** step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

__ b. Verify "4KV XFMR SATA FDR" from Unit 1 - RACKED OUT.

b. Perform one of the following:

- **IF** it is desired to energize SATA from Unit 1, **THEN** perform the following:

__ 1) Close "4KV XFMR SATA FDR" (1MC-11).

__ 2) **GO TO** Step 5.

OR

NOTE 2TC-4 is kirk key interlocked with 1TC-4.

- **IF** it is desired to energize SATA from Unit 2, **THEN**:

__ 1) Ensure "4KV XFMR SATA FDR" from Unit 1 - OPEN.

__ 2) Dispatch operator to rack out 1TC#4 (6900/4160V Power Transformer SATA).

__ 3) **GO TO** Step 4.

__ c. Verify it is desired to energize SATA from Unit 1.

__ c. **GO TO** Step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

d. Energize SATA as follows:

__ 1) Verify "4KV XFMR SATA FDR" (2MC-11) - RACKED OUT.

1) Perform the following:

__ a) Open "4KV XFMR SATA FDR" (2MC-11).

NOTE 2TC-4 is kirk key interlocked with 1TC-4.

__ b) Dispatch operator to rack out 2TC#4 (6900/4160V Power Transformer SATA).

__ c) Do not continue in this enclosure until 2TC-4 is racked out.

NOTE 2TC-4 is kirk key interlocked with 1TC-4.

__ 2) Dispatch operator to rack in 1TC#4 (6900/4160V Power Transformer SATA).

__ 3) **WHEN** notified that 1TC#4 is racked in, **THEN** close "4KV XFMR SATA FDR" (1MC-11).

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

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Energize SATA from Unit 2 as follows:**

__ a. Ensure "4KV XFMR SATA FDR" - RACKED IN.

__ b. Close "4KV XFMR SATA FDR".

b. Perform the following:

__ 1) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

__ 2) Do not continue in this enclosure until notified that the affected breaker is closed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE 2ETA#4 is Kirk Key interlocked with 2ETA#3 and 1ETA#4 (Key #698).

5. **Align alternate power to 2ETA as follows:**

__ a. Ensure "ETA NORM FDR FRM ATC" - OPEN.

__ b. Verify "ETA NORM FDR FRM ATC" - RACKED OUT.

__ b. Dispatch operator to rack out 2ETA#3 (Normal Incoming Feeder From Transformer 2ATC).

__ c. Dispatch operator to rack in 2ETA#4 (Alt Incoming Feeder From Transformer SATA).

__ d. Verify D/G 2A output breaker - CLOSED.

d. Perform the following:

__ 1) Close "ETA ALT FDR FRM SATA".

__ 2) Verify 2ETA - ENERGIZED.

3) Perform the following:

__ a) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 7 (Manual Operation Of 4160V Bus Breakers).

__ b) Do not continue in this enclosure until notified that the affected breaker is closed.

__ 4) **GO TO** Step 6.

__ e. Notify dispatched operator to align standby power and shutdown D/G 2A. **REFER TO** OP/2/A/6350/002 (Diesel Generator Operation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **IF previously opened, THEN notify dispatched operator to close the following breakers:**

   __ • 2ELXA-4B (Load Center 2ELXA Normal Incoming Breaker) (AB-577, AA-67, Rm 486)

   __ • 2ELXC-4B (Load Center 2ELXC Normal Incoming Breaker) (AB-577, AA-68, Rm 486).

__ 7. **RETURN TO step in effect.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
1. **Verify the following:**	
__ a. It is desired to power 2ETB from Unit 2.	a. Perform the following: __ 1) Verify 1TB - ENERGIZED. __ 2) **GO TO** Step 2.
__ b. Ensure 2TB - ENERGIZED.	
__ 2. **Verify 2ETB - ENERGIZED.**	__ **Do not continue in this enclosure until notified by dispatched operator that 2ETB has been load shed.**
3. **Verify Unit 1 power alignment on 1MC-11 as follows:**	
a. Verify 1ETB in normal alignment as follows:	a. **IF** 1ETB is aligned from SATB, **THEN**:
__ • "4KV XFMR 1ATD FDR" - CLOSED	__ • Do not continue in this enclosure.
__ • "ETB NORM FDR FRM ATD" - CLOSED.	__ • **RETURN TO** step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

__ b. Verify "4KV XFMR SATB FDR" from Unit 1 - RACKED OUT.

b. Perform one of the following:

- **IF** it is desired to energize SATB from Unit 1, **THEN** perform the following:

__ 1) Close "4KV XFMR SATB FDR" (1MC-11).

__ 2) **GO TO** Step 5.

OR

NOTE 2TB-4 is kirk key interlocked with 1TB-4.

- **IF** it is desired to energize SATB from Unit 2, **THEN**:

__ 1) Ensure "4KV XFMR SATB FDR" from Unit 1 - OPEN.

__ 2) Dispatch operator to rack out 1TB#4 (6900/4160V Power Transformer SATB).

__ 3) **GO TO** Step 4.

__ c. Verify it is desired to energize SATB from Unit 1.

__ c. **GO TO** Step 4.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

3. (Continued)

d. Energize SATB as follows:

__ 1) Verify "4KV XFMR SATB FDR" (2MC-11) - RACKED OUT.

1) Perform the following:

__ a) Open "4KV XFMR SATB FDR" (2MC-11).

NOTE 2TB-4 is kirk key interlocked with 1TB-4.

__ b) Dispatch operator to rack out 2TB#4 (6900/4160V Power Transformer SATB).

__ c) Do not continue in this enclosure until 2TB-4 is racked out.

NOTE 2TB-4 is kirk key interlocked with 1TB-4.

__ 2) Dispatch operator to rack in 1TB#4 (6900/4160V Power Transformer SATB).

__ 3) **WHEN** notified that 1TB#4 is racked in, **THEN** close "4KV XFMER SATB FDR" (1MC-11).

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

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

4. **Energize SATB from Unit 2 as follows:**

__ a. Ensure "4KV XFMR SATB FDR" - RACKED IN.

__ b. Close "4KV XFMR SATB FDR."

b. Perform the following:

__ 1) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 12 (Manual Operation Of 6900V Bus Breakers).

__ 2) Do not continue in this enclosure until notified that the affected breaker is closed.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE 2ETB#4 is Kirk Key interlocked with 2ETB#3 and 1ETB#4 (Key #713).

5. **Align alternate power to 2ETB as follows:**

__ a. Ensure "ETB NORM FDR FRM ATD" - OPEN.

__ b. Verify "ETB NORM FDR FRM ATD" - RACKED OUT.

__ b. Dispatch operator to rack out 2ETB#3 (Normal Incoming Feeder From Transformer 2ATD).

__ c. Dispatch operator to rack in 2ETB#4 (Alternate Incoming Feeder From Transformer SATB).

__ d. Verify D/G 2B output breaker - CLOSED.

d. Perfrom the following:

__ 1) Close "ETB ALT FDR FRM SATB".

__ 2) Verify 2ETB - ENERGIZED.

3) Perform the following:

__ a) **IF** the affected feeder breaker is open due to a loss of control power, **THEN REFER TO** Enclosure 7 (Manual Operation Of 4160V Bus Breakers).

__ b) Do not continue in this enclosure until notified that the affected breaker is closed.

__ 4) **GO TO** Step 6.

__ e. Notify dispatched operator to align standby power and shutdown D/G 2B. **REFER TO** OP/2/A/6350/002 (Diesel Generator Operation).

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. **IF previously opened, THEN notify dispatched operator to close the following breakers:**

   __ • 2ELXB-4B (Load Center 2ELXB Normal Incoming Breaker) (AB-560, AA-67, Rm 362)

   __ • 2ELXD-4B (Load Center 2ELXD Normal Incoming Breaker) (AB-560, AA-68, Rm 362).

__ 7. **RETURN TO step in effect.**

__ 1. **Obtain breaker manual pull cord from the Operations storage room (TB-568, 1C-17) (Key #292).**

2. **Determine breaker to be manually closed:**

- 2ETA:

__ • 2ETA#3 (Normal Incoming Feeder From Transformer 2ATC)
__ • 2ETA#4 (Alt Incoming Feeder From Transformer SATA)
__ • 2ETA#18 (Diesel Generator 2A).

- 2ETB:

__ • 2ETB#3 (Normal Incoming Feeder From Transformer 2ATD)
__ • 2ETB#4 (Alternate Incoming Feeder From Transformer SATB)
__ • 2ETB#18 (Diesel Generator 2B).

3. **IF a D/G breaker is to be closed, THEN perform the following:**

a. Notify Control Room SRO to perform one of the following:

__ • Enclosure 10 (Energizing 2ETA From D/G)

OR

__ • Enclosure 11 (Energizing 2ETB From D/G).

__ b. **WHEN** the affected D/G is running, **THEN GO TO** Step 4 of this enclosure.

__ c. Do not continue with this enclosure until the affected D/G is running.

__ 4. **Attach pull cord to the "CLOSE" lever at the bottom of the breaker.**

__ 5. **Do not stand in front of the breaker cubicle.**

__ 6. **Pull cord to manually close breaker.**

__ 7. **Notify Control Room SRO that this enclosure has been completed.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Load shed 2ETA as follows:**

   a. Open the following breakers:

   __ • 2EDE-F01F (Diesel Generator Load Sequencer Panel 2DGLSA) (AB-577, BB-68, Rm 486)

   __ • 2ELXA-4B (Load Center 2ELXA Normal Incoming Breaker) (AB-577, AA-67, Rm 486)

   __ • 2ELXC-4B (Load Center 2ELXC Normal Incoming Breaker) (AB-577, AA-68, Rm 486).

   b. Open the following breakers on 2ETA:

   __ • 2ETA#2 (Alternate Feeder to 4160 Blackout Switchgear 2FTA)

   __ • 2ETA#3 (Normal Incoming Feeder From Transformer 2ATC)

   __ • 2ETA#4 (Alt Incoming Feeder From Transformer SATA)

   __ • 2ETA#6 (Component Cooling Water Pump Motor 2A1)

   __ • 2ETA#7 (Component Cooling Water Pump Motor 2A2)

   __ • 2ETA#8 (Containment Spray Pump Motor 2A)

   __ • 2ETA#9 (Residual Heat Removal Pump Motor 2A)

   __ • 2ETA#11 (Safety Injection Pump Motor 2A)

   __ • 2ETA#12 (CVCS Centrifugal Charging Pump Motor 2A)

   __ • 2ETA#13 (Auxiliary Feedwater Pump Motor 2A)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

   __ • 2ETA#14 (Nuclear Service Water Pump Motor 2A)

   __ • 2ETA#15 (Fuel Pool Cooling Pump Motor 2A)

   __ • 2ETA#17 (Control Room Area Chiller Comp A Unit 2 Supply)

   __ • 2ETA#18 (Diesel Generator 2A).

   c. Verify the following 2ETA lockout targets - DARK:

   __ • 86N (2ETA#3 Cubicle)
   __ • 86B (2ETA#3 Cubicle)
   __ • 86S (2ETA#4 Cubicle)
   __ • 86D (2ETA#19 Cubicle).

   d. Remove the following control power fuses from 2ETA#13 (Auxiliary Feedwater Pump Motor 2A):

   __ • AU
   __ • AX
   __ • AZ.

   e. Remove the following control power fuses from 2ETA#8 (Containment Spray Pump Motor 2A):

   __ • AY
   __ • AX.

__ 2. **Notify Control Room SRO that 2ETA has been load shed.**

__ c. Request Control Room SRO to notify IAE to assist in clearing essential bus lockout relays.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Load shed 2ETB as follows:**

   a. Open the following breakers:

   __ • 2EDF-F01F (Diesel Generator Load Sequencer Panel 2DGLSB) (AB-560, BB-68, Rm 362)

   __ • 2ELXB-4B (Load Center 2ELXB Normal Incoming Breaker) (AB-560, AA-67, Rm 362)

   __ • 2ELXD-4B (Load Center 2ELXD Normal Incoming Breaker) (AB-560, AA-68, Rm 362).

   b. Open the following breakers on 2ETB:

   __ • 2ETB#2 (Alternate Feeder to 4160 Blackout Switchgear 2FTB)

   __ • 2ETB#3 (Normal Incoming Feeder From Transformer 2ATD)

   __ • 2ETB#4 (Alternate Incoming Feeder From Transformer SATB)

   __ • 2ETB#6 (Component Cooling Water Pump Motor 2B1)

   __ • 2ETB#7 (Component Cooling Water Pump Motor 2B2)

   __ • 2ETB#8 (Containment Spray Pump Motor 2B)

   __ • 2ETB#9 (Residual Heat Removal Pump Motor 2B)

   __ • 2ETB#11 (Safety Injection Pump Motor 2B)

   __ • 2ETB#12 (CVCS Centrifugal Charging Pump Motor 2B)

   __ • 2ETB#13 (Auxiliary Feedwater Pump Motor 2B)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. (Continued)

   __ • 2ETB#14 (Nuclear Service Water Pump Motor 2B)

   __ • 2ETB#15 (Fuel Pool Cooling Pump Motor 2B)

   __ • 2ETB#17 (Control Room Area Chiller Comp B Unit 2 Supply)

   __ • 2ETB#18 (Diesel Generator 2B).

   c. Verify the following 2ETB lockout targets - DARK:

   __ • 86N (2ETB#3 Cubicle)
   __ • 86B (2ETB#3 Cubicle)
   __ • 86S (2ETB#4 Cubicle)
   __ • 86D (2ETB#19 Cubicle).

   __ c. Request Control Room SRO to notify IAE to assist in clearing essential bus lockout relays.

   d. Remove the following control power fuses from 2ETB#13 (Auxiliary Feedwater Pump Motor 2B):

   __ • AU
   __ • AX
   __ • AZ.

   e. Remove the following control power fuses from 2ETB#8 (Containment Spray Pump Motor 2B):

   __ • AY
   __ • AX.

__ 2. **Notify Control Room SRO that 2ETB has been manually load shed.**

1. **Obtain the following:**

   __ • Key #757 (2A/2B D/G Test Start Switch) from WCC Key Locker

   __ • Flashlight.

__ 2. **Do not continue in this procedure until notified that load shed of 2ETA is complete.**

3. **Locally start D/G 2A as follows:**

   __ a. Notify Control Room Operator to place the "D/G 2A CTRL LOCATION" switch on 2MC11 in the "LOCAL" position.

   __ b. **IF** unable to transfer diesel to Local Control, **THEN** actuate the "CONTROL ROOM OVERRIDE" at the breakglass station on 2DGCPA.

   __ c. Place the key in the "MANUAL TEST START" keyswitch and turn to the "START" position.

   __ d. Ensure "SPEED CONTROL" is adjusted to obtain frequency of between 58.8 and 61.2 Hz.

   __ e. Ensure "VOLTAGE CONTROL" is adjusted to obtain "D/G VOLTAGE" between 4160 and 4600 Volts.

__ 4. **WHEN the D/G is running, THEN close "DIESEL GENERATOR 2A" breaker.**

5. **IF the D/G breaker will not close, THEN:**

   __ a. Stop D/G 2A by depressing "STOP" on 2DECPA.

   __ b. Notify Control Room SRO to perform Enclosure 7 (Manual Operation Of 4160V Bus Breakers).

   __ c. Do not continue in this enclosure.

6. **Ensure RN flow through the KD Hx as follows:**

   __ a. Verify 2RN-232A (D/G 2A Hx Inlet) (DB-562, DD-76) - OPEN.

   b. **IF** 2RN-232A (D/G 2A Hx Inlet) does not open, **THEN** perform the following:

      __ 1) Open 2EMXE-F01A (Diesel Generator A Hx Inlet Isolation Valve 2RN232A) (DB-556, EE-75).

      __ 2) Manually open 2RN-232A (D/G 2A Hx Inlet).

7. **IF RN flow cannot be established, THEN:**

   __ a. Stop D/G 2A by depressing "STOP" on 2DECPA.

   __ b. Notify the Control Room SRO of status.

   __ c. Return this enclosure to the Control Room SRO.

__ 8. **Notify Control Room Operator to place the "D/G 2A CTRL LOCATION" switch on 2MC11 in the "CTRL-RM" position.**

__ 9. **Close 2VN-1 (2A D/G Exhaust Silencer Drain) (DB-557, DD-75).**

10. **Ensure the following:**

   __ • "LO PUMP & HEATER" indicating light - OFF

   __ • "JW PUMP & HEATER" indication light - OFF

   __ • "DIESEL BLDG GEN VENT FAN 2A1" - ON

   __ • "DIESEL BLDG GEN VENT FAN 2A2" - ON.

11. **Close the following essential load center normal incoming breakers:**

   __ • 2ELXA-4B (Load Center 2ELXA Normal Incoming Breaker) (AB-577, AA-67, Rm 486)
   __ • 2ELXC-4B (Load Center 2ELXC Normal Incoming Breaker) (AB-577, AA-68, Rm 486).

__ 12. **Monitor D/G operating parameters.**

1. **Obtain the following:**

   __ • Key #757 (2A/2B D/G Test Start Switch) from WCC Key Locker

   __ • Flashlight.

__ 2. **Do not continue in this enclosure until notified that load shed of 2ETB is complete.**

3. **Locally start D/G 2B as follows:**

   __ a. Notify Control Room Operator to place the "D/G 2B CTRL LOCATION" switch on 2MC11 in the "LOCAL" position.

   __ b. **IF** unable to transfer diesel to Local Control, **THEN** actuate the "CONTROL ROOM OVERRIDE" at the breakglass station on 2DGCPB.

   __ c. Place the key in the "MANUAL TEST START" keyswitch and turn to the "START" position.

   __ d. Ensure "SPEED CONTROL" is adjusted to obtain frequency of between 58.8 and 61.2 Hz.

   __ e. Ensure "VOLTAGE CONTROL" is adjusted to obtain "D/G VOLTAGE" between 4160 and 4600 Volts.

__ 4. **WHEN the D/G is running, THEN close "DIESEL GENERATOR 2B" breaker.**

5. **IF the D/G breaker will not close, THEN:**

   __ a. Stop D/G 2B by depressing "STOP" on 2DECPB.

   __ b. Notify Control Room SRO to perform Enclosure 7 (Manual Operation Of 4160V Bus Breakers).

   __ c. Do not continue in this enclosure.

6. **Ensure RN flow through the KD Hx as follows:**

   __ a. Verify 2RN-292B (D/G 2B Hx Inlet) (DB-562, BB-76) - OPEN.

   b. **IF** 2RN-292B (D/G 2B Hx Inlet) does not open, **THEN** perform the following:

      __ 1) Open 2EMXF-F01A (Diesel Generator B Hx Inlet Isolation Valve 2RN292B) (DB-556, CC-75).

      __ 2) Manually open 2RN-292B (D/G 2B Hx Inlet).

7. **IF RN flow cannot be established, THEN:**

   __ a. Stop D/G 2B by depressing "STOP" on 2DECPB.

   __ b. Notify the Control Room SRO of status.

   __ c. Return this enclosure to the Control Room SRO.

__ 8. **Notify Control Room Operator to place the "D/G 2B CTRL LOCATION" switch on 2MC11 in the "CTRL-RM" position.**

__ 9. **Close 2VN-2 (2B D/G Exhaust Silencer Drain) (DB-557, BB-73).**

10. **Ensure the following:**

   __ • "LO PUMP & HEATER" indicating light - OFF

   __ • "JW PUMP & HEATER" indication light - OFF

   __ • "DIESEL BLDG GEN VENT FAN 2B1" - ON

   __ • "DIESEL BLDG GEN VENT FAN 2B2" - ON.

11. **Close the following essential load center normal incoming breakers:**

   __ • 2ELXB-4B (Load Center 2ELXB Normal Incoming Breaker) (AB-560, AA-67, Rm 362)
   __ • 2ELXD-4B (Load Center 2ELXD Normal Incoming Breaker) (AB-560, AA-68, Rm 362).

__ 12. **Monitor D/G operating parameters.**

__ 1. **Obtain breaker manual pull cord from the Operations storage room (TB-568, 1C-17) (Key #292).**

2. **Determine breaker to be manually closed:**

- 2TA:

__ • 2TA#4 (6900/4160V Power Transformer 2ATC)
__ • 2TA#5 (Incoming Feeder From Aux Power Transformer 2T2A).

- 2TB:

__ • 2TB#4 (6900/4160V Power Transformer SATB)
__ • 2TB#5 (Incoming Feeder From Aux. Power Transformer 2T1B).

- 2TC:

__ • 2TC#4 (6900/4160V Power Transformer SATA)
__ • 2TC#5 (Incoming Feeder From Aux. Power Transformer 2T1A).

- 2TD:

__ • 2TD#4 (6900/4160V Power Transformer 2ATD)
__ • 2TD#5 (Incoming Feeder From Aux. Power Transformer 2T1B)

- Unit 1 breakers:

__ • 1TB#4 (6900/4160V Power Transformer SATB)
__ • 1TC#4 (6900/4160V Power Transformer SATA).

__ 3. **Attach pull cord to the "CLOSE" lever at the bottom of the breaker.**

__ 4. **Do not stand in front of the breaker cubicle.**

__ 5. **Pull cord to manually close breaker.**

__ 6. **Notify Control Room SRO that this enclosure has been completed.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

1. **Control containment pressure as follows:**

   a. Verify the following has not occurred:

   __ • LOCA

   OR

   __ • Steam line break.

   a. Perform the following:

   __ 1) Do not continue in this enclosure.

   __ 2) Return to procedure step in effect.

   b. Verify power available to the following equipment:

   __ • VQ fans

   __ • 2VQ-10 (VQ Fans Disch To Unit Vent).

   __ b. **GO TO** Step 2.

   __ c. **WHEN** containment pressure is greater than or equal to .25 PSIG, **THEN** perform a normal containment air release. **REFER TO** OP/2/A/6450/017 (Containment Air Release And Addition System).

   __ d. Return to procedure step in effect.

NOTE If power is restored to 2VQSV0100 during the release, then 2VQ-10 (VQ Fans Disch To Unit Vent) manual loader will be reverse operating.

__ 2. **Notify IAE to perform AM/2/A/5100/007 to change the Fisher positioner for 2VQ-10 (VQ Fans Disch To Unit Vent) to reverse acting.**

__ 3. **Do not continue in this enclosure until notified by IAE that 2VQ-10 (VQ Fans Disch To Unit Vent) is open.**

__ 4. **Ensure a valid GWR package is available for the release.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
5. **Set the EMF setpoints for the applicable EMF as follows:**	**IF 2EMF-39 and 2EMF-36 are inoperable, THEN:**
__ • Set 2EMF-39 setpoints to the value specified on the Release Rate Determination Form. **REFER TO** OP/0/A/6500/080 (EMF RP86A Output Modules). OR __ • Ensure 2EMF-36 setpoints set to the value specified on the Release Rate Determination Form for the applicable EMF. **REFER TO** OP/0/A/6500/080 (EMF RP86A Output Modules).	__ a. Notify Radiation Protection to perform HP/0/B/1004/005 (Containment Air Release And Addition (VQ) And Containment Purge Ventilation (VP) System Release) to take grab samples. __ b. N/A the "EMF Operable/Source Checked IV For Setpoints" on the VQ Release Record. __ c. **GO TO** Step 7.
6. **Set up EMF chart recorder as follows:** a. Ensure the paper drive is on for the applicable EMF chart recorder: __ • 2MICR-6640 (2EMF39L) __ • 2MICR-6645 (2EMF36L). __ b. Stamp and record applicable information on the chart paper.	
7. **Record the following totalizer information on the VQ Release Record:** __ a. Verify totalizer - OPERABLE.	a. Perform the following: __ 1) N/A the "Initial Integrator Reading". __ 2) **GO TO** Step 8.
__ b. Reset totalizer. __ c. Enter "0" on the "Initial Integrator Reading".	

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

8. **Open the following valves:**

   __ • 2VQ-2A (VQ Fan Suct From Cont Isol)

   __ • 2VQ-3B (VQ Fan Suct From Cont Isol).

__ 9. **Notify Radiation Protection that the VQ release has been initiated.**

__ 10. **Record the VQ start date and time on the "VQ RELEASE RECORD".**

__ 11. **Verify 2EMF-39 - OPERABLE.**

__ **GO TO Step 13.**

__ 12. **WHEN 5 minutes has elapsed from the start of the release, THEN verify 2EMF-39 reading is greater than or equal to 50% of the estimate EMF reading recorded on the Release Rate Determination Form.**

Perform the following:

a. Secure the VQ release as follows:

__ • Close 2VQ-2A (VQ Fan Suct From Cont Isol)

__ • Close 2VQ-3B (VQ Fan Suct From Cont Isol).

__ b. Notify Radiation Protection of the low EMF reading and termination of release.

__ c. **GO TO** Step 17.

NOTE Containment pressure shall be monitored to ensure the containment isolation valves are closed when containment pressure has equalized with atmospheric pressure.

__ 13. **IF AT ANY TIME the OAC or OAC point C2P1112 is out of service, THEN record containment pressure from 2VQP-5040 every 30 minutes during the release in the RO logbook.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 14. **Notify Control Room SRO of release in progress.**

15. **<u>WHEN</u> containment pressure decreases to 0 PSIG <u>OR</u> has stabilized with atmoshpheric pressure, <u>THEN</u> close the following valves:**

__ • 2VQ-2A (VQ Fan Suct From Cont Isol)

__ • 2VQ-3B (VQ Fan Suct From Cont Isol).

__ 16. **Notify Radiation Protection that the VQ release has been terminated.**

__ 17. **Stamp and record applicable information on the chart paper for termination of release.**

__ 18. **Notify IAE to complete AM/2/A/5100/007 to restore positioner for 2VQ-10 (VQ Fans Disch To Unit Vent).**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
19. **Record the following on the VQ Release Record:**	
__ a. "Date/Time Release Terminated".	
__ b. Verify totalizer - OPERABLE.	b. Perform the following: __ 1) N/A the "Final Integrator Reading". 2) Enter the volume released as follows: __ • Volume =(300 CFM) X (Release Time (in minutes)) __ • Release Time = (Date/Time Initiated) - (Date/Time Terminated). __ 3) **GO TO** Step 19.e.
__ c. Enter totalizer value in "Final Integrator Reading".	
__ d. Enter the volume released in "Volume (Final Intergrator Reading X 10)".	
__ e. Enter the "Highest EMF Reading" during the release as read on the chart recorder.	
__ f. Initial "Control Room Operator" blank.	
__ 20. **Verify 2EMF-39 - USED FOR THE RELEASE.**	**Perform the following:** __ a. **IF** 2EMF-36 was used for the release, **THEN** N/A the "EMF Setpoints Reset" on VQ Release Record. __ b. **GO TO** Step 22.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

21. **Reset 2EMF-39 setpoints as follows:**

__ a. Verify unit - IN MODE 1-4.

a. **IF** the unit is in Mode 5 or 6, **THEN**:

__ 1) Reset Trip 2 equal to 17,400 CPM or notify Radiation Protection to obtain a larger setpoint due to compensation for sample chamber area background.

__ 2) Reset Trip 1 to 70% of Trip 2 setpoint.

__ 3) Signoff "EMF Setpoints Reset" on VQ Release Record.

__ 4) **GO TO** Step 22.

__ b. Reset Trip 2 equal to 3 times containment atmosphere activity as indicated by EMF allowing approximately 15 minutes for indication to stabilize.

__ c. Reset Trip 1 equal to 70% of Trip 2 setpoint.

__ d. Signoff "EMF Setpoints Reset" on VQ Release Record.

__ 22. **Notify Control Room SRO of status.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
__ 1. **Obtain RP support.**	
__ 2. **Monitor spent fuel pool level between 2 ft below and equal to skimmer trough level.**	__ **Notify the control room to make up to the spent fuel pool. REFER TO OP/2/A/6200/005 (Spent Fuel Pool Cooling).**
3. **Monitor spent fuel pool temperature as follows:**	
__ a. Obtain thermometer with attached lanyard.	
__ b. Insert the thermometer into the spent fuel pool.	
__ c. After 5 minutes, remove the thermometer from the spent fuel pool.	
__ d. Verify spent fuel pool temperature - LESS THAN 125°F.	__ d. Notify control room to attempt to restore spent fuel cooling. **REFER TO** the annunciator response for 2AD-13, E/1 "SPENT FUEL POOL TEMP HI".
__ 4. **Repeat this enclosure once per hour.**	
__ 5. **WHEN spent fuel pool instrumentation has been restored, THEN discontinue this enclosure.**	

CAUTION **A minimum of two KR Hxs are required for one KR pump operation.**

__ 1. **Determine which KR Hxs are in service.**

__ 2. **IF less than 3 KR Hxs are in service, THEN return this enclosure to the Control Room SRO.**

3. **Remove 1 KR Hx from service as follows:**

- KR Hx A

__ a. Close 1KR-56 (A KR Hx Inlet) (SB-573, S-31).

b. Close the following valves:

__ • 1RL-83 (A KR Hx RL Inlet) (SB-570, S-33)

__ • 1RL-107 (A KR Hx RL Outlet (SB-580, S-30).

c. Open the following valves:

__ • 1RL-95 (A KR Hx Drain) (SB-572, S-33)

__ • 1RL-96 (A KR Hx Drain) (SB-572, S-31).

d. Remove pipe caps from the following valves:

__ • 1RL-69 (A KR Hx Vent) (SB-574, S-31)

__ • 1RL-91 (A KR Hx Vent) (SB-574, S-33).

e. Slowly open the following valves to vent heat exchanger:

__ • 1RL-69 (A KR Hx Vent)

__ • 1RL-91 (A KR Hx Vent).

OR

- KR Hx B

__ a. Close 1KR-61 (B KR Hx Inlet) (SB-570, S-31).

3. (Continued)

b. Close the following valves:

__ • 1RL-84 (B KR Hx RL Inlet) (SB-570, S-33)

__ • 1RL-108 (B KR Hx RL Outlet (SB-580, S-30).

c. Open the following valves:

__ • 1RL-97 (B KR Hx Drain) (SB-569, S-33)

__ • 1RL-98 (B KR Hx Drain) (SB-569, S-31).

d. Remove pipe caps from the following valves:

__ • 1RL-70 (B KR Hx Vent) (SB-572, S-31)

__ • 1RL-92 (B KR Hx Vent) (SB-572, S-33).

e. Slowly open the following valves to vent heat exchanger:

__ • 1RL-70 (B KR Hx Vent)

__ • 1RL-92 (B KR Hx Vent).

OR

• KR Hx C

__ a. Close 1KR-66 (C KR Hx Inlet) (SB-573, R-31).

b. Close the following valves:

__ • 1RL-85 (C KR Hx RL Inlet) (SB-570, R-33)

__ • 1RL-109 (C KR Hx RL Outlet (SB-580, R-30).

c. Open the following valves:

__ • 1RL-99 (C KR Hx Drain) (SB-574, R-31)

__ • 1RL-100 (C KR Hx Drain) (SB-572, R-33).

d. Remove pipe caps from the following valves:

__ • 1RL-71 (C KR Hx Vent) (SB-574, R-31)

__ • 1RL-93 (C KR Hx Vent) (SB-574, R-33).

3. (Continued)

e. Slowly open the following valves to vent heat exchanger:

__ • 1RL-71 (C KR Hx Vent)

__ • 1RL-93 (C KR Hx Vent).

OR

• KR Hx D

__ a. Close 1KR-71 (D KR Hx Inlet) (SB-570, R-31).

b. Close the following valves:

__ • 1RL-86 (D KR Hx RL Inlet) (SB-570, R-33)

__ • 1RL-110 (D KR Hx RL Outlet (SB-580, R-30).

c. Open the following valves:

__ • 1RL-101 (D KR Hx Drain) (SB-569, R-33)

__ • 1RL-102 (D KR Hx Drain) (SB-569, R-31).

d. Remove pipe caps from the following valves:

__ • 1RL-72 (D KR Hx Vent) (SB-572, R-31)

__ • 1RL-94 (D KR Hx Vent) (SB-572, R-33).

e. Slowly open the following valves to vent heat exchanger:

__ • 1RL-72 (D KR Hx Vent)

__ • 1RL-94 (D KR Hx Vent).

__ 4. **RETURN TO Step 2.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 1. **Ensure CA pumps - STARTED AS REQUIRED.**

__ 2. **Verify CA flow controllers - CAPABLE OF THROTTLING CA FLOW.**

CAUTION **If S/G N/R level is allowed to drop below 37% after CA is reset, a CA autostart will occur.**

Perform the following:

a. Maintain S/G N/R level 9% - 62% by manually operating any or all of the following:

- CA pump discharge valves:
  - 2A S/G:
    - __ 2CA-66B (CA Pmp 2 Disch To S/G 2A Isol)
    - __ 2CA-62A (CA Pmp A Disch To S/G 2A Isol).
  - 2B S/G:
    - __ 2CA-54B (CA Pmp 2 Disch To S/G 2B Isol)
    - __ 2CA-58A (CA Pmp A Disch To S/G 2B Isol).
  - 2C S/G:
    - __ 2CA-50A (CA Pmp 2 Disch To S/G 2C Isol)
    - __ 2CA-46B (CA Pmp B Disch To S/G 2C Isol).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

- 2D S/G:

__ • 2CA-38A (CA Pmp 2 Disch To S/G 2D Isol)

__ • 2CA-42B (CA Pmp B Disch To S/G 2D Isol).

- Dispatch operator(s) to throttle the CA flow control valves:

__ • 2CA-64 (CA Pump #2 Flow To S/G 2A) (AB-557, BB-64, Rm 260) (Ladder Needed)

__ • 2CA-52 (CA Pump #2 Flow To S/G 2B) (AB-550, DD-62, Rm 227)

__ • 2CA-48 (CA Pump #2 Flow To S/G 2C) (AB-552, DD-61, Rm 227)

__ • 2CA-36 (CA Pump #2 Flow To S/G 2D) (AB-554, BB-65, Rm 260) (Ladder needed).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

- Dispatch operator(s) to take local control of CA pump discharge valves:
  - 2A S/G:

__ • 2CA-66B (CA Pmp 2 Disch To S/G 2A Isol) (DH-585, DD-EE, 69-70, Rm 581)

__ • 2CA-62A (CA Pmp A Disch To S/G 2A Isol) (DH-587, DD-EE, 69-70, Rm 581).

  - 2B S/G:

__ • 2CA-54B (CA Pmp 2 Disch To S/G 2B Isol) (DH-585, DD-EE, 61-62, Rm 562)

__ • 2CA-58A (CA Pmp A Disch To S/G 2B Isol) (DH-587, DD-EE, 61-62, Rm 562).

  - 2C S/G:

__ • 2CA-50A (CA Pmp 2 Disch To S/G 2C Isol) (DH-585, EE, 60-61, Rm 562)

__ • 2CA-46B (CA Pmp B Disch To S/G 2C Isol) (DH-587, DD-EE, 60-61, Rm 562).

  - 2D S/G:

__ • 2CA-38A (CA Pmp 2 Disch To S/G 2D Isol) (DH-585, DD-EE, 70-71, Rm 581)

__ • 2CA-42B (CA Pmp B Disch To S/G 2D Isol) (DH-582, DD-EE, 70-71, Rm 581).

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

2. (Continued)

- Manually throttle steam flow to CA Pump #2 by dispatching an operator to remove the locks and throttle the following valves:

__ • 2SA-3 (S/G 2B SM To CAPT Stop Check) (AB-553, DD-EE, 60-61, Rm 227) (Breakaway lock installed) (Ladder needed)

__ • 2SA-6 (S/G 2C SM To CAPT Stop Check) (AB-553, DD-EE, 61-62, Rm 227) (Breakaway lock installed) (Ladder needed).

__ b. GO TO Step 4.

__ 3. **IF AT ANY TIME CA flow controllers are incapable of throttling CA flow, THEN perform Step 2.**

CAUTION **If S/G N/R level is allowed to drop below 37% after CA is reset, a CA autostart will occur.**

__ 4. **Maintain S/G N/R level in all intact S/Gs between 9% - 62%.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

NOTE Coordinate any actions performed in this enclosure with Unit 1.

1. **Verify switchyard 125 VDC system alignment normal as follows:**

   __ • 1TB - ENERGIZED

   __ • 2TB - ENERGIZED

   __ • OAC point C1X4182(Switchyard DC Power SYS 1) - NORMAL

   __ • OAC point C1X4183(Switchyard DC Power SYS 2) - NORMAL

   __ • OAC point C1X4188(Switchyard AC Load Center STA) - NORMAL

   __ • OAC point C1X4189(Switchyard AC Load Center STB) - NORMAL.

   __ **GO TO Step 4.**

2. **IF AT ANY TIME power is interrupted to the following 6.9KV buses, THEN RETURN TO Step 1:**

   __ • 1TB

   OR

   __ • 2TB

__ 3. **RETURN TO procedure and step in effect.**

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED
4. **Dispatch operator to perform the following:**	
a. Verify each of the following switchyard DC buses connected to a battery and energized charger: __ • SYD-1 __ • SYD-2.	a. **IF** power is available from either train, **THEN** ensure each of the following switchyard DC buses connected to a battery and energized charger. **REFER TO** OP/0/B/6350/015 (230KV Switchyard 125 VDC Power System): __ • SYD-1 __ • SYD-2.
__ b. Notify Control Room SRO of the status of switchyard DC power system.	
__ 5. **Verify 4 hours have elapsed from initiation of the event.**	**Perform the following:** __ a. **WHEN** 4 hours have elapsed from the initiation of the event, **THEN RETURN TO** Step 6. __ b. **GO TO** Step 7.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

CAUTION **The switchyard batteries must remain in service for at least 4 hours to comply with the station 4 hour blackout rule.**

NOTE The following step should be performed as soon as possible after 4 hours have elapsed.

6. **WHEN 4 hours have elapsed from the initiation of the event, THEN verify the following switchyard DC buses are connected to a battery and energized charger:**

   __ • SYD-1

   __ • SYD-2.

Perform the following:

NOTE The following step will stop depletion of one battery, protecting it from cell reversal and conserving it for later use.

a. Dispatch operator to isolate one switchyard battery as follows:

__ 1) **IF** battery SYB-1 is connected to an energized charger, Then **GO TO** Step 6 RNO a.3.

2) **IF** SYD-2-F01A (Incoming Bkr From Batt SYB-2 Or Spare Batt Charger SYBC-S) is "ON", **THEN** perform the following:

__ a) Have Control Room notify TCC that switchyard battery SYB-1 will be isolated.

__ b) Ensure SYD-1-F01A (Incoming Bkr From Batt SYB-1 Or Spare Batt Charger SYBC-S) - OFF.

__ c) Ensure SYD-2-F02C (125 VDC Distr Ctr SYD-2 Xtie Breaker To 125 VDC Distr Ctr SYD-1) - ON.

__ d) Ensure SYD-1-F02C (125 VDC Distr Ctr SYD-1 Xtie Breaker To 125 VDC Distr Ctr SYD-2) - ON.

__ e) **GO TO** Step 6 RNO b.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

3) **IF** SYD-1-F01A (Incoming Bkr From Batt SYB-1 Or Spare Batt Charger SYBC-S) is "ON", **THEN** perform the following:

__ a) Notify TCC that switchyard battery SYB-2 will be isolated.

__ b) Ensure SYD-2-F01A (Incoming Bkr From Batt SYB-2 Or Spare Batt Charger SYBC-S) - OFF.

__ c) Ensure SYD-2-F02C (125 VDC Distr Ctr SYD-2 Xtie Breaker To 125 VDC Distr Ctr SYD-1) - ON.

__ d) Ensure SYD-1-F02C (125 VDC Distr Ctr SYD-1 Xtie Breaker To 125 VDC Distr Ctr SYD-2) - ON.

(RNO continued on next page)

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

6. (Continued)

NOTE DC power is required to close switchyard PCBs.

b. **IF AT ANY TIME** switchyard activities requiring DC power are unresponsive, **THEN** dispatch operator to return battery to service as follows:

1) **IF** battery SYB-1 is isolated, **THEN** return it to service as follows:

__ a) Have Control Room notify TCC that switchyard battery SYB-1 will be returned to service.

__ b) Ensure SYD-2-F01A (Incoming Bkr from Batt SYB-2 Or Spare Batt Charger SYBC-S) - OFF.

__ c) Ensure SYD-1-F01A (Incoming Bkr from Batt SYB-1 Or Spare Batt Charger SYBC-S) - ON.

2) **IF** battery SYB-2 is isolated, **THEN** return it to service as follows:

__ a) Have Control Room notify TCC that switchyard battery SYB-2 will be returned to service.

__ b) Ensure SYD-1-F01A (Incoming Bkr from Batt SYB-1 Or Spare Batt Charger SYBC-S) - OFF.

__ c) Ensure SYD-2-F01A (Incoming Bkr from Batt SYB-2 Or Spare Batt Charger SYBC-S) - ON.

__ 7. **Verify power availability has been restored to switchyard 125 VDC system.**

Perform the following:

__ a. **WHEN** power availability is restored to switchyard 125 VDC system, **THEN RETURN TO** Step 7.

__ b. **RETURN TO** procedure and step in effect.

ACTION/EXPECTED RESPONSE	RESPONSE NOT OBTAINED

__ 8. **Coordinate with TSC and/or engineering staff as appropriate to ensure system returned to normal alignment. REFER TO OP/0/B/6350/015 (230KV Switchyard 125 VDC Power System).**

__ 9. **Return this enclosure to Control Room SRO.**

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

JPM II-8/PLANT

Start the Hydrogen Recombiner

CANDIDATE _____

EXAMINER _____

CATAWBA
INITIAL LICENSE EXAMINATION
JOB PERFORMANCE MEASURE

Task:

Start a Unit 2 Hydrogen Recombiner per OP/2/A/6450/010 (Containment Hydrogen Control Systems), Enclosure 4.10

Alternate Path:

Yes: Failed power supply to H_2 recombiner 2A.

Facility JPM #:

OP-CN-CNT-VX-020

K/A Rating(s):

028 A2.02 (3.5/3.9)

Task Standard:

Hydrogen Recombiner 2B is in service with Power Adjust "POT" set to greater than 60 KW.

Preferred Evaluation Location:

Simulator _____ In-Plant ___X___

Preferred Evaluation Method:

Perform _____ Simulate ___X___

References:

x
OP/2/A/6450/010 (Containment Hydrogen Control Systems), Enclosure 4.10. Rev. 019A
OP/2/A/6700/001 (Unit Two Revised Data Book), Figure 10. Rev. 0

Validation Time: 25 min. **Time Critical:** No

==========

Candidate: _____ Time Start : _____
NAME Time Finish: _____

Performance Rating: SAT _____ UNSAT _____ Question Grade _____ Performance Time _____

Examiner: _____ _____/_____
NAME SIGNATURE DATE

==========

COMMENTS

_____

_____

_____

SIMULATOR SETUP SHEET

1. N/A

SIMULATOR OPERATOR INSTRUCTIONS:

NONE

Tools/Equipment/Procedures Needed:

Enough copies of OP/2/A/6450/010, Enclosure 4.10 for each candidate.

READ TO OPERATOR

DIRECTIONS TO TRAINEE:

I will explain the initial conditions, and state the task to be performed. All in-plant steps, including any required communications, **shall be simulated** for this JPM. Under no circumstances are you to operate any plant equipment. I will provide initiating cues and reports on other actions when directed by you. Ensure you indicate to me when you understand your assigned task. To indicate that you have completed your assigned task return the handout sheet I provided you.

INITIAL CONDITIONS:

You are a spare Unit 2 RO.

A Unit 2 LOCA has occurred.

EP/2/A/5000/FR-C.1 (Response to Inadequate Core Cooling) has been initiated due to a Red Path on core cooling.

FR-C.1 is complete to Step 5.d.

Containment H_2 concentration is 1.5%.

INITIATING CUES:

Pick one 2A

The SRO directs you to place a Hydrogen Recombiner in service at the required power level per OP/2/A/6450/010, Encl. 4.10, Steps 2.1 through 2.3.

All initial conditions are complete.

Why? FR-C.1 only says Refer to OP/2/A/6450/010.

2> Why do this here?

Notify the SRO once the Hydrogen Recombiner is in service.

START TIME: _____

TEP 1: Obtain a copy of the appropriate procedure. STANDARD: Operator obtains a copy of OP/2/A/6450/010, Enclosure 4.10 **EXAMINER'S CUE: When the candidate locates the appropriate procedure, give him/her a copy and tell him/her that it is current and complete.** COMMENTS: Need step for completing Section 1, Initial Conditions. (What about P&L 2.9? 2.6 is also applicable)	___ SAT ___ UNSAT
STEP 2: If not already running, start the H_2 skimmer fans per Enclosure 4.13 (Emergency Manual Operation of the H_2 Skimmer Fans). (Step 2.1) STANDARD: Candidate ~~simulates verifying that~~ Checks the H_2 Skimmer Fans ~~are running~~ 2A & 2B ~~as soon~~ by confirming the red operating lights are LIT. STET **EXAMINER'S CUE: H_2 Skimmer Fans 2A and 2B are in operation.** COMMENTS:	___ SAT ___ UNSAT
STEP 3: Measure and record containment H_2 concentration for use in Step 2.3.9 of this enclosure. (Step 2.2) STANDARD: Operator determines per the initial conditions that H_2 concentration is 1.5%, and records that value in the space provided at Step 2.2. COMMENTS:	___ SAT ___ UNSAT

STEP 4: **CAUTION:**
If H_2 concentration is greater than 6%, do not energize Hydrogen Recombiners unless TSC approval has been obtained.

STANDARD: Examinee noted that Initial Condition states H_2 concentration is 1.5% and the CAUTION does not apply.

___ SAT

___ UNSAT

COMMENTS:

EXAMINER'S NOTE: Per the procedure NOTE, it is preferable to start H_2 recombiner 2A. If the candidate chooses to start 2B, cue him/her to start H_2 recombiner 2A.

STEP 5: Place Hydrogen Recombiner 2A in service; perform the following at Hydrogen Recombiner Control Pnl 2A (2ELCP0139). (Step 2.3)

1. Ensure the "POWER OUT SWITCH" is in the "OFF" position;
2. Ensure the "POWER ADJUST" potentiometer is set to zero (000); and
3. Verify that the white "POWER IN AVAILABLE" light is lit.

Critical Step ?

___ SAT

___ UNSAT

STANDARD: ~~Operator simulates verifying that~~ Confirms the "POWER OUT SWITCH" is in the "OFF" (down) position, the "POWER ADJUST" pot is set to "Zero" (000), and the WHITE "POWER IN AVAILABLE" light is lit. Operator determines that the "POWER OUT SWITCH" is in the "OFF" position and the "POWER ADJUST" pot is set to 000, but the WHITE "POWER IN AVAILABLE" light is DARK. *

EXAMINER'S CUE: The "POWER OUT SWITCH" is in the "OFF" (down) position and the "POWER ADJUST" pot is set to 000. The WHITE "POWER IN AVAILABLE" light is DARK.

COMMENTS:

* Only identifying white "Power in Available" light is DARK is critical

STEP 6: If the light is DARK, ensure that the appropriate breaker is in the "ON" position. (Step 2.3.4)	Critical Step ? ___ SAT ___ UNSAT
STANDARD: Operator locates breaker 2EMXK-F07C, and simulates verifying it is "ON" by noting the operator points to ON and the locking device is pushed in. Operator determines that the 2EMXK-F07C operator points to the "OFF" position, and simulates pushing in locking device in, and rotating the breaker clockwise to the "ON" position. **EXAMINER'S CUE: When the candidate locates 2EMXK-F07C, the 2EMXK-F07C operator points to the "OFF" position.** **When the candidate simulates pushing the breaker locking device in, and rotating the operator clockwise to the "ON" position, the 2EMXK-F07C operator moves back to the TRIP position (will not stay "ON").** COMMENTS:	good
EXAMINER'S NOTE: The candidate will either decide on his own to start H_2 recombiner 2B, or simulate contacting the control room, in which case cue him/her to start H_2 recombiner 2B.	

STEP 7: Place Hydrogen Recombiner 2B in service; perform the following at Hydrogen Recombiner Control Pnl 2B. (Step 2.3) 1. Ensure the "POWER OUT SWITCH" is in the "OFF" position; 2. Ensure the "POWER ADJUST" potentiometer is set to zero (000); and 3. Verify that the white "POWER IN AVAILABLE" light is LIT. STANDARD: Operator ~~simulates verifying~~ determines that the "POWER OUT SWITCH" is in the "OFF" position, the "POWER ADJUST" potentiometer is set to "Zero" (000), and the WHITE "POWER IN AVAILABLE" light is LIT. **EXAMINER'S CUE: The "POWER OUT SWITCH" is in the "OFF" position and the "POWER ADJUST" pot is set to 000. The WHITE "POWER IN AVAILABLE" light is LIT.** COMMENTS:	___ SAT ___ UNSAT
STEP 8: If the light is DARK, ensure that the appropriate breaker is in the "ON" position. STANDARD: Examinee determines that this step does not apply and continues. COMMENTS:	___ SAT ___ UNSAT
STEP 9: Place the "POWER OUT SWITCH" in the "ON" position and verify that the red indicating light is lit. (Step 2.3.5) STANDARD: Operator ~~simulates~~ pushes up the "POWER OUT SWITCH" to the "ON" position and ~~simulates~~ verifies the "RED" light on the switch plate is LIT. **EXAMINER'S CUE: The "POWER OUT SWITCH" is pushed up, and the "RED" light on the switch plate is LIT.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

EXAMINER'S NOTE: JPM STEPS 8 – 12 cannot be performed unless STEP 7 is properly completed.	move to before JPM step 7
STEP 10: Slowly turn the "POWER ADJUST" potentiometer clockwise until 5KW is indicated on the "POWER OUT" meter. Maintain a 5KW output for 10 minutes. (Step 2.3.6) STANDARD: Operator simulates adjusting the "POWER ADJUST" potentiometer clockwise until the "POWER OUT" meter rises to 5KW. **EXAMINER'S CUE: As the "POWER ADJUST" pot is adjusted clockwise, show that the "POWER OUT" meter rises to 5KW.** **10 minutes have elapsed.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 11: Slowly advance the "POWER ADJUST" setting until an output of 10KW is indicated on the "POWER OUT" meter. Maintain a 10KW output for 10 minutes. (Step 2.3.7) STANDARD: Operator simulates adjusting the "POWER ADJUST" pot clockwise until the "POWER OUT" meter rises to 10KW. **EXAMINER'S CUE: As the "POWER ADJUST" pot is adjusted clockwise, show that the "POWER OUT" meter rises to 10KW.** **10 minutes have elapsed.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT

STEP 12: Advance the "POWER ADJUST" setting until an output of 20KW is obtained on the "POWER OUT" meter. Maintain a 20KW output for 5 minutes. (Step 2.3.8) STANDARD: Operator simulates adjusting the "POWER ADJUST" pot clockwise until the "POWER OUT" meter rises to 20KW. **EXAMINER'S CUE: As the "POWER ADJUST" pot is adjusted clockwise, show that the "POWER OUT" meter rises to 20KW.** **5 minutes have elapsed.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 13: Request the SRO or NCO to determine the Hydrogen Recombiner power setting using Figure 10 from OP/2/A/6700/001, Unit Two Revised Data Book. (Step 2.3.9) STANDARD: Operator simulates contacting the control room to determine the power setting for Hydrogen Recombiner 2B, and determines that 60KW is the correct setting. Operator determines that due to H2 concentration in step 2.2 = 1.5%, it is not required to add 4KW to the 60KW. **EXAMINER'S CUE: This is the Unit 2 SRO (Bill). The power setting for H_2 Recombiner 2B is 60KW.** COMMENTS:	___ SAT ___ UNSAT

STEP 14: Advance the "POWER ADJUST" setting until the "POWER OUT" meter indicates the value calculated in Step 2.3.9. (Step 2.3.10) STANDARD: Operator simulates adjusting the "POWER ADJUST" pot clockwise, until the "POWER OUT" meter rises to 60KW. **EXAMINER'S CUE: As the "POWER ADJUST" pot is adjusted clockwise, show that the "POWER OUT" meter rises to 60KW.** COMMENTS:	**CRITICAL STEP** ___ SAT ___ UNSAT
STEP 15: Notify the NCO that Hydrogen Recombiner 2B is now in service. (Step 2.3.11) STANDARD: Candidate simulates calling the Control Room and reports that Hydrogen Recombiner 2B is in service. **EXAMINER'S CUE: This is the Unit 2 SRO (Bill). I understand that Hydrogen Recombiner 2B is in service.** COMMENTS:	___ SAT ___ UNSAT
This JPM is complete.	

STOP TIME: _____

CANDIDATE CUE SHEET
(TO BE RETURNED TO EXAMINER UPON COMPLETION OF TASK)

INITIAL CONDITIONS:

You are a spare Unit 2 RO.

A Unit 2 LOCA has occurred.

EP/2/A/5000/FR-C.1 (Response to Inadequate Core Cooling) has been initiated due to a Red Path on core cooling.

FR-C.1 is complete to Step 5.d.

Containment H_2 concentration is 1.5%.

INITIATING CUES:

The SRO directs you to place a Hydrogen Recombiner in service at the required power per OP/2/A/6450/010, Encl. 4.10, Steps 2.1 through 2.3.

All initial conditions are complete.

Source: TP/2/A/1200/11

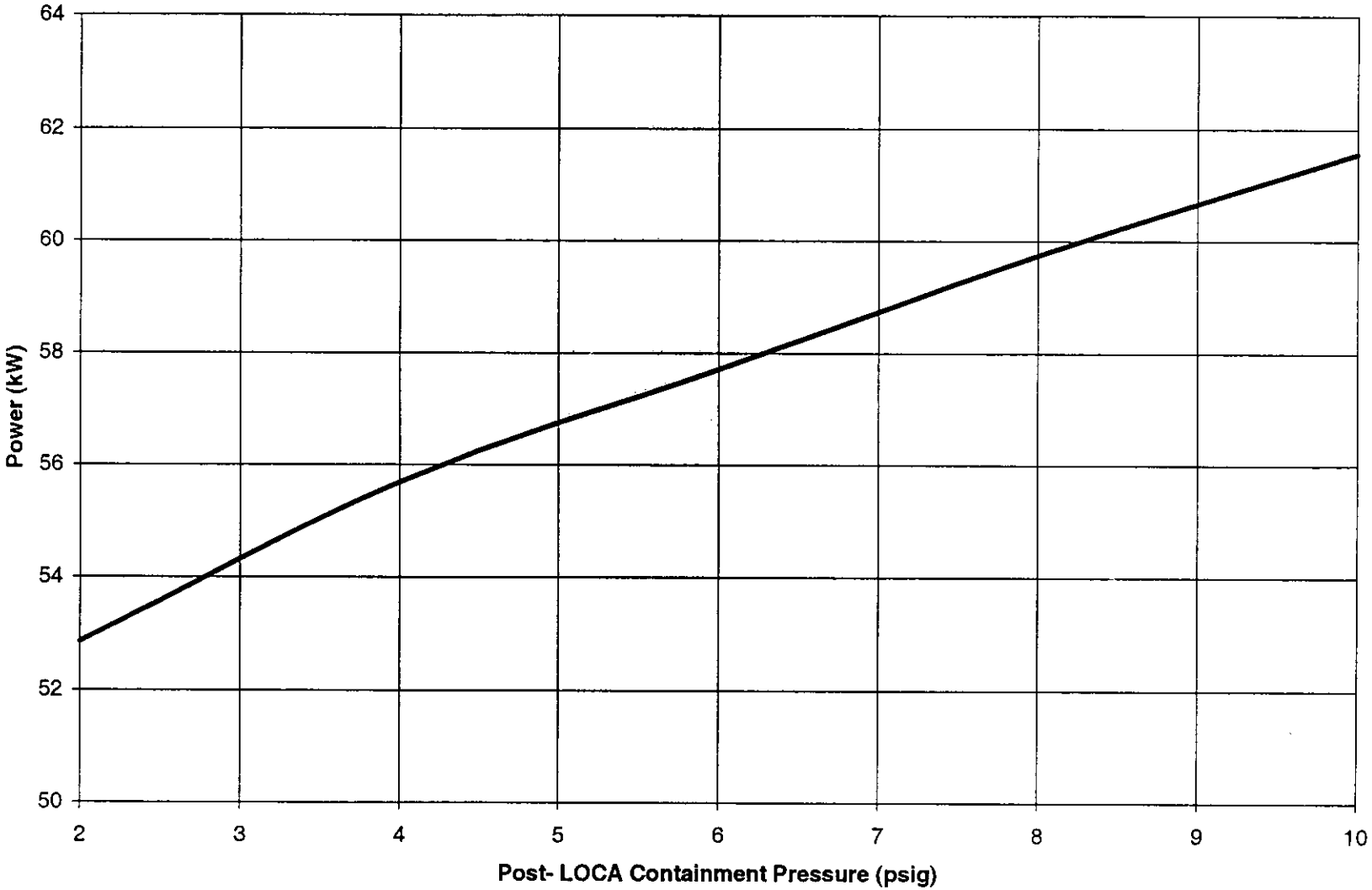

Figure 10 - Unit 2 Hydrogen Recombiners Post-LOCA Power Requirements

IR06-97I

Duke Power Company
PROCEDURE PROCESS RECORD

(1)ID No. OP/2/A/6450/010
Revision No. 019

PREPARATION

(2) Station CATAWBA NUCLEAR STATION

(3) Procedure Title CONTAINMENT HYDROGEN CONTROL SYSTEMS

(4) Prepared By Buford A Jackson Date 4-13-98

(5) Requires 10CFR50.59 evaluation?
☑ Yes (New procedure or revision with major changes)
☐ No (Revision with minor changes)
☐ No (To incorporate previously approved changes)

(6) Reviewed By Mary Wirkus (QR) Date 4-20-98

Cross-Disciplinary Review By _____ (QR) NA JHW Date _____

Reactivity Mgmt. Review By _____ (QR) NA JHW Date _____

(7) Additional Reviews

Reviewed By _____ Date _____

Reviewed By _____ Date _____

(8) Temporary Approval *(if necessary)*

By _____ (SRO/QR) Date _____

By _____ (QR) Date _____

(9) Approved By Michael J. Bradley Date 4/21/98

PERFORMANCE (Compare with control copy every 14 calendar days while work is being performed.)

(10) Compared with Control Copy _____ Date _____

Compared with Control Copy _____ Date _____

Compared with Control Copy _____ Date _____

(11) Date(s) Performed _____

Work Order Number (WO#) _____

COMPLETION

(12) Procedure Completion Verification

☐ Yes ☐ N/A Check lists and/or blanks properly initialed, signed, dated, or filled in N/A, as appropriate?

☐ Yes ☐ N/A Listed enclosures attached?

☐ Yes ☐ N/A Data sheets attached, completed, dated, and signed?

☐ Yes ☐ N/A Charts, graphs, etc. attached, dated, identified, and marked?

☐ Yes ☐ N/A Procedure requirements met?

Verified By _____ Date _____

(13) Procedure Completion Approved _____ Date _____

(14) Remarks *(attach additional pages, if necessary)*

Duke Power Company Catawba Nuclear Station	Procedure No. **OP/2/A/6450/010**
	Revision No. 019
Containment Hydrogen Control Systems	
Continuous Use	Electronic Reference No. CN005FQT

Containment Hydrogen Control Systems

1. Purpose

To define the procedure for operation of the following Containment Hydrogen Control Systems:

- Hydrogen Skimmer System
- Containment Air Return System
- Containment Hydrogen Purge System
- Emergency Hydrogen Mitigation System (Glow Plugs)
- Containment Hydrogen Analyzers
- Hydrogen Recombiners

2. Limits and Precautions

2.1 Hydrogen concentrations greater than 3.5% are combustible.

2.2 Do not use the Containment Hydrogen Purge System when H_2 concentration is below 3.0%, to prevent overloading the annulus ventilation filters.

2.3 Inadvertent operation of the Containment Air return fans may open the Ice Condenser inlet doors and cause containment pressure to fall below allowable limits.

2.4 After manual operation, maintenance or packing adjustment of any safety related valve, it shall be cycled electrically to ensure reliable automatic operation.

2.5 When manually operating any motor operated valve, minimize the torque applied to the handwheel.

2.6 At no time should the heater plate temperature of the electric hydrogen recombiners be allowed to exceed 1400°F.

2.7 To prevent suction pump damage, the Hydrogen Analyzer Control Unit should never be in the "ON" position when either of following conditions exists:

- "HYDROGEN ANALYZER CONT ISOLATION VALVES" are in the "CLOSE" position.
- "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 2".

2.8 The requirements of applicable Radiation Work Permits (RWP) or Standing Radiation Work Permits (SRWP) should be adhered to during the performance of this procedure.

2.9 Coordination with TSC and OSC is required prior to performing the following enclosures:

- Enclosure 4.9 (Operation of the Containment Hydrogen Analyzers Following a LOCA)
- Enclosure 4.10 (Operation of the Hydrogen Recombiners Following a LOCA)
- Enclosure 4.12 (Operation of the Containment Hydrogen Purge System Following a LOCA)

2.10 If hydrogen concentration reaches 6%, ensure Hydrogen Recombiners and Hydrogen Igniters are OFF and consult the TSC before actuation is attempted.

2.11 If VX Test Switches are used, (ELMC0020, ELMC0021) the switches shall be rotated through a complete rotation and back to "OFF" to return relay alignment to normal.

3. Procedures

Refer to Section 4 (Enclosures).

4. Enclosures

4.1 Alignment of the Hydrogen Skimmer System For Standby Operation

4.2 Hydrogen Skimmer Valve Checklist

4.3 Hydrogen Skimmer Separate Verification Valve Checklist

4.4 Alignment of the Containment Air Return System For Standby Operation

4.5 Alignment of the Containment Hydrogen Purge System For Standby Operation

4.6 Hydrogen Purge Valve Checklist

4.7 Hydrogen Purge Separate Verification Valve Checklist

4.8 Alignment of the Emergency Hydrogen Mitigation System (Glow Plugs) For Standby Operation

4.9 Operation of the Containment Hydrogen Analyzers Following a LOCA

4.10 Operation of the Hydrogen Recombiners Following a LOCA

4.11 Hydrogen Recombiner Heater Plate Temperature Log

4.12 Operation of the Containment Hydrogen Purge System Following a LOCA

4.13 Emergency Manual Operation of the H_2 Skimmer Fans

4.14 Shutdown of the H_2 Skimmer System After Automatic Actuation

4.15 Emergency Manual Operation of the Containment Air Return Fans

4.16 Shutdown of the Containment Air Return System After Automatic Actuation

4.17 Hydrogen Recombiner Operation For Containment Heatup

4.18 Manual Operation of the Containment Air Return Fans

4.19 Operation of the Containment Hydrogen Purge Blower for Checkout

Alignment of the Hydrogen Skimmer System For Standby Operation

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify the following PTs are not in progress:

- PT/2/A/4450/005A (Hydrogen Skimmer Fan A Performance Test)
- PT/2/A/4450/005B (Hydrogen Skimmer Fan B Performance Test)

2. Procedure

_____ 2.1 Ensure Enclosure 4.2 (Hydrogen Skimmer Valve Checklist) is complete.

_____ 2.2 Ensure Enclosure 4.3 (Hydrogen Skimmer Separate Verification Valve Checklist) is complete.

2.3 Verify the following key operated Hydrogen Skimmer test switches in the "OFF" position:

_____ • "HSF-2A TEST" (2ELMC0020, AB-594, HH-58)
_____ • "2VX-1A TEST" (2ELMC0020, AB-594, HH-58)
_____ • "HSF-2B TEST" (2ELMC0021, AB-594, LL-62)
_____ • "2VX-2B TEST" (2ELMC0021, AB-594, LL-62)

2.4 Obtain HSF 2A & 2B Key (Key #741) from WCC.

2.5 Place the following switches in "AUTO" (rear of 2MC4):

_____ _____ • "HSF-2A H2 SKIMMER FAN"
_____ _____ • "HSF-2B H2 SKIMMER FAN"

_____ 2.6 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch on Hydrogen Analyzer Control Panel Train A 2ELCP0251 (AB-579, DD-61) in the "ALL" position.

_____ 2.7 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch on Hydrogen Analyzer Control Panel Train B 2ELCP0252 (AB-559, DD-61) in the "ALL" position.

_____ 2.8 Remove HSF 2A & 2B Key and return to WCC.

2.9 File this enclosure in the Control Copy folder of this procedure.

Hydrogen Skimmer Valve Checklist

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
2VX-1A	HSF-2A Inlt Isol	659', UC 48'-263°	Closed	
2VX-2B	HSF-2B Inlt Isol	659', UC 48'-283°	Closed	
2VX-3	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2D	641', LC 41'-328°	Locked Throttled	
2VX-4	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2D	641', LC 41'-333°	Locked Throttled	
2VX-5	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2A	641', LC 41'-40°	Locked Throttled	
2VX-6	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2A	641', LC 41'-40°	Locked Throttled	
2VX-7	H_2 Skimmer Fan 2A Inlet From PZR Compartment	658', LC 41'-100°	Locked Throttled	
2VX-8	H_2 Skimmer Fan 2B Inlet From PZR Compartment	658', LC 41'-100°	Locked Throttled	
2VX-9	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2B	641', LC 41'-160°	Locked Throttled	
2VX-10	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2B	641', LC 41'-160°	Locked Throttled	
2VX-11	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2C	641', LC 41'-220°	Locked Throttled	
2VX-12	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2C	641', LC 41'-220°	Locked Throttled	
2VX-13	H_2 Skimmer Fan 2A Inlet From Rx Compartment	600', RXHD 5'-110°	Locked Throttled	
2VX-14	H_2 Skimmer Fan 2B Inlet From Rx Compartment	600', RXHD 5'-80°	Locked Throttled	
2VX-15	H_2 Skimmer Fan 2A Inlet From Accum 2C	590', CCLA 46'-230°	Locked Throttled	
2VX-16	H_2 Skimmer Fan 2B Inlet From Accum 2C	590', CCLA 46'-220°	Locked Throttled	
2VX-17	H_2 Skimmer Fan 2A Inlet From South Fan Room	585', FANR 45'-194°	Locked Throttled	
2VX-18	H_2 Skimmer Fan 2B Inlet From South Fan Room	585', FANR 45'-205°	Locked Throttled	
2VX-19	H_2 Skimmer Fan 2A Inlet From Accum 2B	590', BCLA 46'-138°	Locked Throttled	

Hydrogen Skimmer Valve Checklist

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
2VX-20	H_2 Skimmer Fan 2B Inlet From Accum 2B	590', BCLA 46'-130°	Locked Throttled	
2VX-21	H_2 Skimmer Fan 2A Inlet From Incore Inst Room	589', IIRM 45'-88°	Locked Throttled	
2VX-22	H_2 Skimmer Fan 2B Inlet From Incore Inst Room	589', IIRM 45'-82°	Locked Throttled	
2VX-23	H_2 Skimmer Fan 2B Inlet From Accum 2A	585', ACLA 45'-36°	Locked Throttled	
2VX-24	H_2 Skimmer Fan 2A Inlet From Accum 2A	585', ACLA 45'-36°	Locked Throttled	
2VX-25	H_2 Skimmer Fan 2B Inlet From North Fan Room	590', FANR 46'-340°	Locked Throttled	
2VX-26	H_2 Skimmer Fan 2A Inlet From North Fan Room	590', FANR 46'-330°	Locked Throttled	
2VX-27	H_2 Skimmer Fan 2B Inlet From Accum 2D	590', DCLA 46'-320°	Locked Throttled	
2VX-28	H_2 Skimmer Fan 2A Inlet From Accum 2D	590', DCLA 46'-315°	Locked Throttled	

Enclosure 4.3

Hydrogen Skimmer Separate Verification
Valve Checklist

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
2VX-1A	HSF-2A Inlt Isol	659', UC 48'-263°	Closed	
2VX-2B	HSF-2B Inlt Isol	659', UC 48'-283°	Closed	
2VX-3	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2D	641', LC 41'-328°	Locked Throttled	
2VX-4	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2D	641, LC 41'-333°	Locked Throttled	
2VX-5	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2A	641', LC 41'-40°	Locked Throttled	
2VX-6	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2A	641', LC 41'-40°	Locked Throttled	
2VX-7	H_2 Skimmer Fan 2A Inlet From PZR Compartment	658', LC 41'-100°	Locked Throttled	
2VX-8	H_2 Skimmer Fan 2B Inlet From PZR Compartment	658', LC 41'-100°	Locked Throttled	
2VX-9	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2B	641', LC 41'-160°	Locked Throttled	
2VX-10	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2B	641, LC 41'-160°	Locked Throttled	
2VX-11	H_2 Skimmer Fan 2A Inlet From S/G Compartment 2C	641', LC 41'-220°	Locked Throttled	
2VX-12	H_2 Skimmer Fan 2B Inlet From S/G Compartment 2C	641', LC 41'-220°	Locked Throttled	
2VX-13	H_2 Skimmer Fan 2A Inlet From Rx Compartment	600', RXHD 45'-110°	Locked Throttled	
2VX-14	H_2 Skimmer Fan 2B Inlet From Rx Compartment	600', RXHD 5'-80°	Locked Throttled	
2VX-15	H_2 Skimmer Fan 2A Inlet From Accum 2C	590', CCLA 46'-230°	Locked Throttled	
2VX-16	H_2 Skimmer Fan 2B Inlet From Accum 2C	590', CCLA 6'-220°	Locked Throttled	
2VX-17	H_2 Skimmer Fan 2A Inlet From South Fan Room	585', FANR 45'-194°	Locked Throttled	
2VX-18	H_2 Skimmer Fan 2B Inlet From South Fan Room	585', FANR 45'-205°	Locked Throttled	
2VX-19	H_2 Skimmer Fan 2A Inlet From Accum 2B	590', BCLA 46'-138°	Locked Throttled	

Hydrogen Skimmer Separate Verification Valve Checklist

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
2VX-20	H_2 Skimmer Fan 2B Inlet From Accum 2B	590',BCLA 46'-130°	Locked Throttled	
2VX-21	H_2 Skimmer Fan 2A Inlet From Incore Inst Room	589', IIRM 45'-88°	Locked Throttled	
2VX-22	H_2 Skimmer Fan 2B Inlet From Incore Inst Room	589', IIRM 45', 82°	Locked Throttled	
2VX-23	H_2 Skimmer Fan 2B Inlet From Accum 2A	585', ACLA 45'-36°	Locked Throttled	
2VX-24	H_2 Skimmer Fan 2A Inlet From Accum 2A	585', ACLA 45'-36°	Locked Throttled	
2VX-25	H_2 Skimmer Fan 2B Inlet From North Fan Room	590', FANR 46'-340°	Locked Throttled	
2VX-26	H_2 Skimmer Fan 2A Inlet From North Fan Room	590', FANR 46'-330°	Locked Throttled	
2VX-27	H_2 Skimmer Fan 2B Inlet From Accum 2D	590', DCLA 46'-320°	Locked Throttled	
2VX-28	H_2 Skimmer Fan 2A Inlet From Accum 2D	590', DCLA 46'-315°	Locked Throttled	

Alignment of the Containment Air Return System For Standby Operation

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify the following PTs are not in progress:

- PT/2/A/4450/006A (Containment Air Return Fan A Performance Test)
- PT/2/A/4450/006B (Containment Air Return Fan B Performance Test)

2. Procedure

2.1 Ensure the following breakers are in the "ON" position:

_____ _____ • 2EMXM-F01A (POWER LOCKOUT FOR CONT AIR RET 2A FED FROM 2EMXK-F11A) (AB-577, CC-61, Rm 484)

_____ _____ • 2EMXN-F01A (POWER LOCKOUT FOR CONT AIR RET 2B FED FROM 2EMXL-F11A) (AB-560, CC-61, Rm 360)

2.2 Ensure the following breakers are locked:

_____ _____ • 2EMXM-F01A (POWER LOCKOUT FOR CONT AIR RET 2A FED FROM 2EMXK-F11A) (AB-577, CC-61, Rm 484)

_____ _____ • 2EMXN-F01A (POWER LOCKOUT FOR CONT AIR RET 2B FED FROM2EMXL-F11A) (AB-560, CC-61, Rm 360)

2.3 Ensure the following dampers are closed (rear of 2MC4):

_____ _____ • "ARF-D-2 ARF 2A RET FAN DAMPER"
_____ _____ • "ARF-D-4 ARF 2B RET FAN DAMPER"

2.4 Verify the following key operated Containment Air Return test switches are in the "OFF" position:

_____ • "ARF-2A TEST" (2ELMC0020, AB-594, HH-58)
_____ • "ARF-D-2 TEST" (2ELMC0020, AB-594, HH-58)
_____ • "ARF-2B TEST" (2ELMC0021, AB-594, LL-62)
_____ • "ARF-D-4 TEST" (2ELMC0021, AB-594, LL-62)

2.5 Obtain ARF-2A & 2B Key (Key #780) from WCC.

Alignment of the Containment Air Return System For Standby Operation

2.6 Place the following switches in "AUTO" (rear of 2MC4):

_____ _____ • "ARF-2A CONT AIR RETURN FAN"
_____ _____ • "ARF-2B CONT AIR RETURN FAN"

_____ 2.7 Remove ARF 2A & 2B Key and return to WCC.

2.8 File this enclosure in the Control Copy folder of this procedure.

Alignment of the Containment Hydrogen Purge System For Standby Operation

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify Unit is shutdown and preparation for a unit startup is in progress.

2. Procedure

_____ 2.1 Ensure Enclosure 4.6 (Hydrogen Purge Valve Checklist) is complete.

_____ 2.2 Ensure Enclosure 4.7 (Hydrogen Purge Separate Verification Valve Checklist) is complete.

2.3 Ensure the following valve motor breakers are in the "OFF" position:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) (AB-560, BB-63, Rm 362)

_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B) (AB-560, BB-63, Rm 362)

_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A) (AB-577, BB-63, Rm 486)

2.4 Ensure the following valve motor breakers are locked:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B)

_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B)

_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A)

2.5 File this enclosure in the Control Copy folder of this procedure.

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
	CONTAINMENT			
2VY-29	Cont H_2 Purge Outlet Supply Isol	612', UC 34'-230°	Open	
2VY-28	Cont H_2 Purge Outlet Test Vent	610', UC 36'-230°	Closed	
2VY-30	Cont H_2 Purge Inlet Blower Outlet Isol	612', UC 34'-220°	Open	
2VY-31	Cont H_2 Purge Inlet Blower Outlet Test Vent	610', UC 36'-220°	Closed	
2VY-21	Cont H_2 Purge Inlet Blower Test Vent	588', PCHA 56'-237°	Closed	
2VY-21	Cont H_2 Purge Inlet Blower Test Vent Pipe Cap	588', PCHA 56'-237°	Installed	
	ANNULUS			
2VY-14	Cont H_2 Purge Inlet Blower Disch Test Vent	588', ANN 58'-216°	Closed	
	CONTROL ROOM			
2VY-12	VY Inlt Blwr Cont Isol	590', 427 GG-HH,62-63	Closed	
2VY-15B	VY Inlt Blwr Disch Isol	592', ANN 58'-217°	Closed*	
2VY-17A	VY Otlt Cont Isol	586', PCHA 52'-240°	Closed*	
2VY-18B	VY Otlt Cont Isol	575', ANN 60'-236°	Closed*	
2VY-19	VY Purge Otlt Flow	575', ANN 60'-234°	Closed	

* If breaker is locked, temporarily remove lock, close breaker, and verify valve position.

Hydrogen Purge Separate Verification Valve Checklist

VALVE NO.	VALVE	LOCATION	POSITION	DATE INITIAL
	CONTAINMENT			
2VY-29	Cont H_2 Purge Outlet Supply Isol	612', UC 34'-230°	Open	
2VY-30	Cont H_2 Purge Inlet Blower Outlet Isol	612', UC 34'-220°	Open	
2VY-21	Cont H_2 Purge Inlet Blower Test Vent	588', PCHA 56'-237	Closed	
2VY-21	Cont H_2 Purge Inlet Blower Test Vent Pipe Cap	588', PCHA 56'-237°	Installed	
	ANNULUS			
	CONTROL ROOM			
2VY-12	VY Inlt Blwr Cont Isol	590', 427 GG-HH,62-63	Closed	
2VY-15B	VY Inlt Blwr Disch Isol	592', ANN 58'-217°	Closed*	
2VY-17A	VY Otlt Cont Isol	586', PCHA 52'-240°	Closed*	
2VY-18B	VY Otlt Cont Isol	575', ANN 60'-236°	Closed*	

* If breaker is locked, temporarily remove lock, close breaker, and verify valve position.

Alignment of the Emergency Hydrogen Mitigation System (Glow Plugs) For Standby Operation

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify Unit Startup is in progress per OP/2/A/6100/001 (Controlling Procedure for Unit Startup).

2. Procedure

CAUTION: Do not energize the Hydrogen Igniters if the hydrogen concentration reaches 6% unless TSC approval has been obtained.

2.1 Ensure the following breakers are in the "ON" position inside Hydrogen Mitigation Group A Control Panel Unit 2 (2ELCP0278, AB-577, HH-58, Rm 400):

_____ _____ • "BKR/2"
_____ _____ • "BKR/3"
_____ _____ • "BKR/4"
_____ _____ • "BKR/5"
_____ _____ • "BKR/6"
_____ _____ • "BKR/7"
_____ _____ • "BKR/8"

_____ _____ 2.2 Ensure breaker 2EMXI-F07A (HYDROGEN IGNITER PNLBD TRANSFORMER 2XFMR0013) is in the "ON" position (AB-577, EE-60, Rm 469).

2.3 Ensure the following breakers are in the "ON" position inside Hydrogen Mitigation Group B Control Panel Unit 2 (2ELCP0279, AB-560, DD, 62, Rm 360):

_____ _____ • "BKR 2"
_____ _____ • "BKR 3"
_____ _____ • "BKR 4"
_____ _____ • "BKR 5"
_____ _____ • "BKR 6"
_____ _____ • "BKR 7"
_____ _____ • "BKR 8"

_____ _____ 2.4 Ensure breaker 2EMXB-F08A (HYDROGEN IGNITER PNLBD TRANSFORMER 2XFMR0014) is in the "ON" position (AB-560, FF-58, Rm 320).

2.5 File this enclosure in the Control Copy folder of this procedure.

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify operation of the Containment Hydrogen Analyzers is required per appropriate emergency procedures.

2. Procedure

2.1 Place Hydrogen Analyzer Train A OR Train B in service.

_____ 2.1.1 To align Hydrogen Analyzer Train A, proceed as follows:

☐ 2.1.1.1 Obtain Hydrogen Analyzer Control Panel Train A (2ELCP0251) key (Key #225) from WCC.

NOTE: Steps 2.1.1.2 - 2.1.1.5 will be performed at Hydrogen Analyzer Control Panel Train A 2ELCP0251 (AB-579, DD-61).

2.1.1.2 Select the desired sample location by positioning the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch:

☐ Position "1" (for sampling Upper Containment)
☐ Position "2" (for sampling operating level)
☐ Position "3" (for sampling Steam Generator 2B cavity)
☐ Position "ALL" (for sampling ALL 3 locations)

☐ 2.1.1.3 Verify the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 2.1.1.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" keyswitch and turn to "OPEN" position.

☐ 2.1.1.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- Sample location(s) selected in Step 2.1.1.2.

NOTE: Steps 2.1.1.6 - 2.1.1.7 will be performed inside Hydrogen Analyzer Control Unit 2MIMT5320A (AB-579, DD-61).

☐ 2.1.1.6 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

☐ 2.1.1.7 Place the "ON/OFF" switch in the "ON" position.

2.1.1.8 Monitor H_2 concentration at either of the following locations:

- "Hydrogen Analyzer Control Unit "2MIMT5320A" (AB -579, DD-61)
- "CONTAINMENT TRN A H2 ANAL" meter (2MIP5320) located on 2MC-7.

2.1.1.9 Verify Chart Recorder 2MICR5340 Position "2" "CONT. H2 ANALYSIS TRN A (%)" recording H2 concentration (2MC7).

____ 2.1.2 To align Hydrogen Analyzer Train B, proceed as follows:

☐ 2.1.2.1 Obtain Hydrogen Analyzer Control Panel Train B (2ELCP0252) key (Key #226) from WCC.

NOTE: Steps 2.1.2.2 - 2.1.2.5 will be performed at Hydrogen Analyzer Control Panel Train B 2ELCP0252 (AB-562, DD-61).

2.1.2.2 Select desired sample location by positioning the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch:

☐ Position "1" (for sampling Upper Containment)
☐ Position "2" (for sampling operating level)
☐ Position "3" (for sampling Steam Generator 2B cavity)
☐ Position "ALL" (for sampling ALL 3 locations)

☐ 2.1.2.3 Verify the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 2.1.2.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 2.1.2.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- Sample location(s) selected in Step 2.1.2.2.

NOTE: Steps 2.1.2.6 - 2.1.2.7 will be performed inside Hydrogen Analyzer Control Unit 2MIMT5330B (AB-562, DD-61).

☐ 2.1.2.6 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

☐ 2.1.2.7 Place the "ON/OFF" switch to the "ON" position.

2.1.2.8 Monitor H_2 concentration at either of the following locations:

- Hydrogen Analyzer Control Unit "2MIMT5330B" (AB-562, DD-61)
- "CONTAINMENT TRAIN B H2 ANAL" meter (2MIP5330) on 2MC-7.

2.1.2.9 Verify Chart Recorder 2MICR5350 Position "2" "CONT. H2 ANALYSIS TRN B (%)" recording H_2 concentration (2MC7).

NOTE: It is <u>not</u> necessary for the hydrogen analyzer control unit (2MIMT5320A or 2MIMT5330B) to be operable for PACS alignment.

2.2 If available and requested by Radiation Protection per HP/0/B/1009/017 (Post-Accident Containment Air Sampling System), align the available Hydrogen Analyzer Train as follows:

—— 2.2.1 To align Train A to PACS, perform the following at Hydrogen Analyzer Control Panel Train A 2ELCP0251 (AB-579, DD-61):

☐ 2.2.1.1 Obtain Hydrogen Analyzer Control Panel Train A (2ELCP0251) key (Key #225) from WCC.

☐ 2.2.1.2 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch to position "2".

☐ 2.2.1.3 Place the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch in "POS. 2".

☐ 2.2.1.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 2.2.1.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- "OPERATION LEVEL SAMPLE SELECTED"

☐ 2.2.1.6 Notify Radiation Protection that the Post Accident Containment Sampling System is operable.
Person notified _____

_____ 2.2.2 To align Train B to PACS, perform the following at Hydrogen Analyzer Control Panel Train B 2ELCP0252 (AB-562, DD-61):

☐ 2.2.2.1 Obtain Hydrogen Analyzer Control Panel Train B (2ELCP0252) key (Key #226) from WCC.

☐ 2.2.2.2 Place the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch to position.2".

☐ 2.2.2.3 Place the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch in "POS. 2".

☐ 2.2.2.4 Insert key in "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch and turn to "OPEN" position.

☐ 2.2.2.5 Verify the following indicating lights are lit:

- "H2 SAMPLE CONT. ISOLATION VALVES OPEN"
- "OPERATION LEVEL SAMPLE SELECTED"

☐ 2.2.2.6 Notify Radiation Protection that the Post Accident Containment Sampling System is operable.
Person notified _____

2.3 For containment Hydrogen Analyzer shutdown, proceed as follows:

_____ 2.3.1 If a hydrogen analyzer train is aligned to PACS, notify Radiation Protection of the intent to shutdown.
Person notified _____

_____ 2.3.2 To shutdown Hydrogen Analyzer Train A, perform the following:

NOTE: Steps 2.3.2.1 and 2.3.2.2 will be performed inside the hydrogen analyzer control unit 2MIMT5320A (AB-579, DD-61).

☐ 2.3.2.1 Ensure the "ON/OFF" switch is in the "OFF" position.

☐ 2.3.2.2 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

NOTE: Steps 2.3.2.3 - 2.3.2.5 will be performed at hydrogen analyzer control panel Train A 2ELCP0251 (AB-579, DD-61).

☐ 2.3.2.3 Place the "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch in the "CLOSE" position.

☐ 2.3.2.4 Ensure the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 2.3.2.5 Ensure the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch is in the "ALL" position.

☐ 2.3.2.6 Return Hydrogen Analyzer Control Panel Train A key to WCC.

_____ 2.3.3 To shutdown Hydrogen Analyzer Train B, perform the following:

NOTE: Steps 2.3.3.1 and 2.3.3.2 will be performed inside the hydrogen analyzer control unit 2MIMT5330B (AB-562, DD-61).

☐ 2.3.3.1 Ensure the "ON/OFF" switch is in the "OFF" position.

☐ 2.3.3.2 Verify the "STANDBY/OFF" switch is in the "STANDBY" position.

NOTE: Steps 2.3.3.3 - 2.3.3.5 will be performed at hydrogen analyzer control panel Train B 2ELCP0252 (AB-562, DD-61).

☐ 2.3.3.3 Place the "HYDROGEN ANALYZER CONT ISOLATION VALVES" key switch in the "CLOSE" position.

☐ 2.3.3.4 Ensure the "POS. 1: H2 ANALYZER POS. 2: POST ACCIDENT SAMPLE PANEL" switch is in "POS. 1".

☐ 2.3.3.5 Ensure the "HYDROGEN ANALYZER SAMPLE VALVES PORTS" switch is in the "ALL" position.

☐ 2.3.3.6 Return Hydrogen Analyzer Control Panel Train B key to WCC.

2.4 Do not file this enclosure in the Control Copy folder of this procedure.

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify operation of the Hydrogen Recombiner is required per appropriate emergency procedures.

_____ 1.3 Request RP coverage due to increasing radiation levels at Hydrogen Recombiner panels during a LOCA.
Person notified _____

2. Procedure

2.1 If not already running, start the H_2 Skimmer Fans per Enclosure 4.13 (Emergency Manual Operation of the H_2 Skimmer Fans).

_____ 2.2 Measure and record containment hydrogen concentration for use in Step 2.3.9 of this enclosure.
H_2 concentration _____%

CAUTION: If H_2 concentration is greater than 6%, do not energize Hydrogen Recombiners unless TSC approval has been obtained.

NOTE: 1. If desired to place both Hydrogen Recombiners in service, use additional Enclosure 4.10.

2. Placing Hydrogen Recombiner 2A in service is preferred for ALARA consideration.

2.3 Place one of the Hydrogen Recombiners in service:

_____ • To place Hydrogen Recombiner 2A in service, perform the following at Hydrogen Recombiner Control Pnl 2A 2ELCP0139 (AB-577, DD-62).

_____ • To place Hydrogen Recombiner 2B in service, perform the following at H ydrogen Recombiner Control Pnl 2B 2ELCP0140 (AB-560, DD-62).

_____ 2.3.1 Ensure the "POWER OUT SWITCH" is in the "OFF" position.

_____ 2.3.2 Ensure the "POWER ADJUST" potentiometer is set to zero (000).

_____ 2.3.3 Verify that the white "POWER IN AVAILABLE" light is lit.

_____ 2.3.4 If the light is DARK, ensure that the appropriate breaker is in the "ON" position:

- 2EMXK-F07C (Electric Hydrogen Recombiner Power Supply Panel 2A) (AB-577, BB-66)
- 2EMXL-F07C (Electric Hydrogen Recombiner Power Supply Panel 2B) (AB-560, BB-66)

_____ 2.3.5 Place the "POWER OUT SWITCH" in the "ON" position and verify that the red indicating light is lit.

_____ 2.3.6 Slowly turn the "POWER ADJUST" potentiometer clockwise until 5 KW is indicated on the "POWER OUT" meter. Maintain a 5 KW output for 10 minutes.

_____ 2.3.7 Slowly advance the "POWER ADJUST" setting until an output of 10 KW is obtained on the "POWER OUT" meter. Maintain a 10 KW output for 10 minutes.

_____ 2.3.8 Advance the "POWER ADJUST" setting until an output of 20 KW is obtained on the "POWER OUT" meter. Maintain a 20 KW output for 5 minutes.

_____ 2.3.9 Request SRO or NCO to determine Hydrogen Recombiner power setting as follows:
Person notified _____

- Determine KW valve from Figure 10 of the Unit Two Revised Data Book.
- If H_2 concentration is > 3.5% in Step 2.2, add 4KW.
  _____+ _____ = _____ KW

_____ 2.3.10 Advance the "POWER ADJUST" setting until the "POWER OUT" meter indicates the value calculated in 2.3.9. Adjust "POWER ADJUST" as necessary to maintain this output.

_____ 2.3.11 Notify NCO that Hydrogen Recombiner is now in service.
Person notified _____

☐ Hydrogen Recombiner 2A
☐ Hydrogen Recombiner 2B

CAUTION: Do not allow the "HYDROGEN RECOMBINER HEATER PLATE TEMP" to exceed 1400°F.

NOTE:
1. Temperature stabilization may take up to 5 hours.
2. HYDROGEN RECOMBINER HEATER PLATE TEMP is monitored from the appropriate location:
   - For Hydrogen Recombiner 2A - 2ELCO0299 (AB-577, DD-62, Rm 484)
   - For Hydrogen Recombiner 2B - 2ELCO0300 (AB-560, DD-62, Rm 360)

2.4 On Enclosure 4.11 (Hydrogen Recombiner Heater Plate Temperature Log), record (hourly until stabilized) the "HYDROGEN RECOMBINER HEATER PLATE TEMP" for each of the three thermocouples by selecting them individually with the "TEMP SELECTOR" switch.

2.5 After the heater plate temperature has stabilized per Enclosure 4.11 (Hydrogen Recombiner Heater Plate Temperature Log), perform the following:

2.5.1 If the thermocouples are inaccurate, proceed to Step 2.6.

2.5.2 Adjust "POWER ADJUST" potentiometer as necessary to maintain recombinatio temperature of 1225-1400°F as read on "HYDROGEN RECOMBINER HEATEI PLATE TEMP" meter.

2.5.3 Verify the "POWER OUT" meter indicates ≥ the value calculated in Step 2.3.9 or Step 2.5.2 as appropriate.

2.6 Every 24 hours, measure containment hydrogen concentration and adjust recombiner power for the duration of recombiner operation as follows:

2.6.1 If containment hydrogen concentration has decreased or remained constant and is ≤ 3.5%, adjust recombiner power only if containment pressure has changed as follows:

2.6.1.1 Determine new power setting per Figure 10 of the Unit Two Revised Data Book.

2.6.1.2 Slowly adjust the "POWER ADJUST" potentiometer to obtain the required output on the "POWER OUT" meter.

2.6.2 If containment hydrogen concentration has increased by .5% or is > 3.5%, adjust recombiner power as follows:

2.6.2.1 Determine power setting per Figure 10 of the Unit Two Revised Data Book.

2.6.2.2 Add 4 KW.

2.6.2.3 Slowly adjust the "POWER ADJUST" potentiometer to obtain the required output on the "POWER OUT" meter.

2.6.3 Monitor heater plate temperature per Steps 2.4 and 2.5 to prevent temperature from exceeding 1400°F.

2.7 To secure the Hydrogen Recombiner, proceed as follows:

_____ 2.7.1 Turn the "POWER ADJUST" potentiometer on the control panel to zero (000).

_____ 2.7.2 Place the "POWER OUT SWITCH" on the control panel in the "OFF" position.

2.8 Do <u>not</u> file this enclosure in the Control Copy folder of this procedure.

Enclosure 4.11

Hydrogen Recombiner Heater Plate Temperature Log

NOTE:
1. If all 3 channels are within 60°F, average all three channels.
2. If only 2 channels are within 60°F, average these two channels.
3. If no channels agree within 60°F, consider the thermocouples inaccurate.

Date/Time	Recombiner ("A" or "B")	Temp CH 1	Temp CH 2	Temp CH 3	Temp Average

Operation of the Containment Hydrogen Purge System Following a LOCA

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify VE System is in operation maintaining a negative pressure in the annulus per OP/2/A/6450/002 (Annulus Ventilation System).

_____ 1.3 Verify VY System operation is directed by the Technical Support Center (TSC).

_____ 1.4 Ensure a Gaseous Waste Release package (GWR) has been prepared, which accounts for Offsite Dose.

_____ 1.5 Verify VY System is aligned per Enclosure 4.5 (Alignment of the Containment Hydrogen Purge System For Standby Operation).

2. Procedure

2.1 Remove locks on the following breakers:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) (AB-560, BB-63, Rm 362)

_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B) (AB-560, BB-63, Rm 362)

_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A) (AB-577, BB, 63-64, Rm 486)

2.2 Place the following breakers in the "ON" position:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B)

_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B)

_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A)

_____ 2.3 If Phase A Containment Isolation is present, reset Phase A Containment Isolation.

2.4 Open the following valves (rear of 2MC5):

_____ _____ • "2VY-12 VY INLT BLWR CONT ISOL"

_____ • "2VY-15B VY INLT BLWR DISCH ISOL"

_____ • "2VY-17A VY OTLT CONT ISOL"

_____ • "2VY-18B VY OTLT CONT ISOL"

_____ 2.5 Start the "VY INLET BLWR".

_____ 2.6 Slowly open "VY PURGE OTLT FLOW" insuring annulus pressure is maintained between -1.4 and -1.8 INWC as read on 2VEP5000.

2.7 If annulus pressure cannot be maintained between -1.4 and -1.8 INWC due to high containment pressure, perform the following:

2.7.1 Close one of the following valves: (rear of 2MC5):

- "2VY-17A VY OTLT CONT ISOL"
- "2VY-18B VY OTLT CONT ISOL"

2.7.2 When containment pressure decreases and if it is desired to continue purging hydrogen, open the valve closed in Step 2.7.1.

_____ 2.8 When Containment Hydrogen concentration is reduced to the value specified by the TSC, stop the "VY INLET BLWR".

2.9 Start and stop the "VY INLET BLWR" as necessary to maintain Containment Hydrogen concentration between values specified by the TSC.

NOTE: At this point, the Hydrogen Purge System is operating for H_2 removal. Subsequent steps are to completely secure the system when further need for operation appears unlikely.

2.10 When Containment Hydrogen Purge System is no longer required, secure the system as follows (rear of 2MC5):

_____ 2.10.1 Close "YV PURGE OTLT FLOW" controller.

_____ 2.10.2 Stop the "VY INLET BLWR".

2.10.3 Close the following valves:

_____ _____ • "2VY-12 VY INLT BLWR CONT ISOL"
_____ _____ • "2VY-15B VY INLT BLWR DISCH ISOL"
_____ _____ • "2VY-17A VY OTLT CONT ISOL"
_____ _____ • "2VY-18B VY OTLT CONT ISOL"

2.10.4 Place the following valve motor breakers in the "OFF" position:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) (AB-560, BB-63, Rm 362)
_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B) (AB-560, BB-63, Rm 362)
_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A) (AB-577, BB, 63-64, Rm 486)

2.10.5 Lock the following valve motor breakers:

_____ _____ • 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B)
_____ _____ • 2EMXD-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-18B)
_____ _____ • 2EMXC-F07B (Cont H_2 Purge Outlet Cont Isol Valve 2VY-17A)

NOTE: The Containment Hydrogen Purge System is now in normal alignment per Enclosure 4.5 (Alignment of the Containment Hydrogen Purge System For Standby Operation).

2.11 Do not file this enclosure in the Control Copy folder of this procedure.

Emergency Manual Operation of the H_2 Skimmer Fans

1. Initial Conditions

——— 1.1 Review the Limits and Precautions.

——— 1.2 Verify the Hydrogen Skimmer System is aligned per Enclosure 4.1 (Alignment of the Hydrogen Skimmer System For Standby Operation).

——— 1.3 Verify necessity to operate the system manually to reduce containment H_2 concentration.

2. Procedure

2.1 Verify the following key-operated hydrogen skimmer test switches are in the "OFF" position:

——— • "HSF-2A TEST" (2ELMC0020, AB-594, HH-58)
——— • "2VX-1A TEST" (2ELMC0020, AB-594, HH-58)
——— • "HSF-2B TEST" (2ELMC0021, AB-594, LL-62)
——— • "2VX-2B TEST" (2ELMC0021, AB-594, LL-62)

2.2 Obtain the HSF 2A & 2B keys (Key #741) from WCC.

NOTE: Step 2.2.2 should be done immediately after Step 2.2.1 to avoid dead-heading the fans.

2.2.1 Place the following switches in the "ON" position (rear of 2MC4):

——— • "HSF-2A H2 SKIMMER FAN"
——— • "HSF-2B H2 SKIMMER FAN"

2.2.2 Open the following valves (rear of 2MC4):

——— • "2VX-1A HSF-2A INLT ISOL"
——— • "2VX-2B HSF-2B INLT ISOL"

NOTE: The following steps return the system to normal alignment.

2.2.3 Press the following reset switches on 2MC11:

——— • "PHASE B CONT ISOL TRAIN A RESET"
——— • "PHASE B CONT ISOL TRAIN B RESET"

2.2.4 Return the following switches to the "AUTO" position:

——— ——— • "HSF-2A H2 SKIMMER FAN"
——— ——— • "HSF-2B H2 SKIMMER FAN"

2.2.5 Close the following valves to return the Hydrogen Skimmer Fans to normal:

____ ____ • "2VX-1A HSF-2A INLT ISOL"
____ ____ • "2VX-2B HSF-2B INLT ISOL"

____ 2.2.6 Remove the keys from the Hydrogen Skimmer Fan Control switches and return them to WCC.

NOTE: The Hydrogen Skimmer System is now in normal alignment per Enclosure 4.1 (Alignment of the Hydrogen Skimmer System For Standby Operation).

2.3 Do <u>not</u> file this enclosure in the Control Copy folder of this procedure.

Shutdown of the H_2 Skimmer System After Automatic Actuation

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify the H_2 Skimmer System has been actuated automatically.

2. Procedure

NOTE: Step 2.1 resets both H_2 Skimmer System and Containment Air Return System controls simultaneously.

2.1 Press the following reset switches located on 2MC11:

_____ • "PHASE B CONT ISOL TRAIN A RESET"
_____ • "PHASE B CONT ISOL TRAIN B RESET"

2.2 To shutdown the H_2 Skimmer System, proceed as follows:

2.2.1 Obtain HSF 2A & 2B keys (Key #741) from WCC.

_____ 2.2.2 Place the following key operated switches in the "OFF" position (rear of 2MC4):

☐ "HSF-2A H2 SKIMMER FAN"
☐ "HSF-2B H2 SKIMMER FAN"

2.2.3 Close the following valves (rear of 2MC4):

_____ _____ • "2VX-1A HSF-2A INLET ISOL"
_____ _____ • "2VX-2B HSF-2B INLET ISOL"

2.2.4 Place the following switches in "AUTO":

_____ _____ • "HSF-2A H2 SKIMMER FAN"
_____ _____ • "HSF-2B H2 SKIMMER FAN"

_____ 2.2.5 Remove keys from HSF-2A and HSF-2B controls and return them to WCC.

NOTE: The H_2 Skimmer System is now aligned for standby operation.

2.3 Do not file this enclosure in the Control Copy folder of this procedure.

Emergency Manual Operation of the Containment Air Return Fans

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify the Containment Air Return Fans are aligned per Enclosure 4.4 (Alignment of the Containment Air Return System For Standby Operation).

_____ 1.3 It is desired to operate the system manually to equalize upper and lower containment pressure.

2. Procedure

_____ 2.1 Verify the following status lights on 2SI-16 are Dark:

- "VX SYS CPCS TRAIN A INHIBIT"
- "VX SYS CPCS TRAIN B INHIBIT"

2.2 Verify the following key-operated containment air return test switches are in the "OFF" position:

_____ • "ARF-2A TEST" (2ELMC0020, AB-594, HH-58)
_____ • "ARF-D-2 TEST" (2ELMC0020, AB-594, HH-58)
_____ • "ARF-2B TEST" (2ELMC0021, AB-594, LL-62)
_____ • "ARF-D-4 TEST" (2ELMC0021, AB-594, LL-62)

2.3 To operate the Containment Air Return Fans in manual, proceed as follows:

2.3.1 Obtain the ARF 2A & 2B keys (Key #780) from WCC.

NOTE: Step 2.3.3 should be done immediately after Step 2.3.2 to avoid dead-heading the fans.

2.3.2 Place the following switches in the "ON" position (rear of 2MC4):

_____ • "ARF-2A CONT AIR RETURN FAN"
_____ • "ARF-2B CONT AIR RETURN FAN"

2.3.3 Open the following dampers (rear of 2MC4):

_____ _____ • "ARF-D-2 ARF-2A RET FAN DAMPER"
_____ _____ • "ARF-D-4 ARF-2B RET FAN DAMPER"

NOTE: The following steps return the system to normal alignment.

2.4 Press the following reset switches located on 2MC11:

____ • "PHASE B CONT ISOL TRAIN A RESET"
____ • "PHASE B CONT ISOL TRAIN B RESET"

2.5 Place the following switches to the "AUTO" position (rear of 2MC4):

____ ____ • "ARF-2A CONT AIR RETURN FAN"
____ ____ • "ARF-2B CONT AIR RETURN FAN"

2.6 To return the Containment Air Return Fans to normal, close the following dampers (rear of 2MC4):

____ ____ • "ARF-D-2 ARF-2A RET FAN DAMPER"
____ ____ • "ARF-D-4 ARF-2B RET FAN DAMPER"

____ 2.7 Remove the keys from the Containment Air Return Fan control switches and return them to WCC.

NOTE: The Containment Air Return System is now in normal alignment per Enclosure 4.4 (Alignment of the Containment Air Return System For Standby Operation).

2.8 Do <u>not</u> file this enclosure in the Control Copy folder of this procedure.

Shutdown of the Containment Air Return System After Automatic Actuation

1. Initial Conditions

——— 1.1 Review the Limits and Precautions.

——— 1.2 Verify the Containment Air Return System has been actuated automatically.

2. Procedure

NOTE: Step 2.1 resets both H_2 Skimmer System and Containment Air Return System controls simultaneously.

2.1 Press the following reset switches located on 2MC11:

——— • "PHASE B CONT ISOL TRAIN A RESET"
——— • "PHASE B CONT ISOL TRAIN B RESET"

2.2 To shutdown of the Containment Air Return System, proceed as follows:

2.2.1 Obtain ARF-2A & 2B keys (Key #780) from WCC.

2.2.2 Place the following switches in the "OFF" position (rear of 2MC4):

——— • "ARF-2A CONT AIR RETURN FAN"
——— • "ARF-2B CONT AIR RETURN FAN"

2.2.3 Close the following dampers (rear of 2MC4):

——— ——— • "ARF-D-2 ARF-2A RET FAN DAMPER"
——— ——— • "ARF-D-4 ARF-2B RET FAN DAMPER"

2.2.4 Place the following switches in "AUTO":

——— ——— • "ARF-2A CONT AIR RETURN FAN"
——— ——— • "ARF-2B CONT AIR RETURN FAN"

——— 2.2.5 Remove keys for ARF-2A & 2B and return them to WCC.

NOTE: The Containment Air Return System is now aligned for standby operation.

2.3 Do <u>not</u> file this enclosure in the Control Copy folder of this procedure.

Hydrogen Recombiner Operation For Containment Heatup

1. Initial Conditions

——— 1.1 Review the Limits and Precautions.

——— 1.2 Verify Containment temperature needs to be increased.

NOTE: This operation is not for hydrogen removal. For hydrogen removal, refer to Enclosure 4.10 (Operation of the Hydrogen Recombiners Following a LOCA).

2. Procedure

——— 2.1 To place Hydrogen Recombiner 2A in service, perform the following at Hydrogen Recombiner Control Pnl 2A 2ELCP0139 (AB-577, DD-62):

☐ 2.1.1 Ensure the "POWER OUT SWITCH" is in the "OFF" position.

☐ 2.1.2 Ensure the "POWER ADJUST" potentiometer is set to zero (000).

☐ 2.1.3 Verify that the white "POWER IN AVAILABLE" light is lit.

☐ 2.1.4 If the "POWER IN AVAILABLE" light is not lit, ensure breaker 2EMXK-F07C (Electric Hydrogen Recombiner Power Supply Panel 2A) (AB-577, BB-66) is in the "ON" position.

☐ 2.1.5 Place the "POWER OUT SWITCH" in the "ON" position and verify that the red indicating light is lit.

CAUTION: Do not allow the "HYDROGEN RECOMBINER HEATER PLATE TEMP" to exceed 1400°F.

☐ 2.1.6 Slowly turn "POWER ADJUST" potentiometer clockwise until 5 KW is indicated on the "POWER OUT" meter. Maintain a 5 KW output for 20 minutes.

☐ 2.1.7 Slowly advance the "POWER ADJUST" setting until an output of 10 KW is obtained on the "POWER OUT" meter. Maintain a 10 KW output for 10 minutes.

☐ 2.1.8 Slowly advance the "POWER ADJUST" setting until an output of 20 KW is obtained on the "POWER OUT" meter. Maintain a 20 KW output for 5 minutes.

☐ 2.1.9 Slowly advance "POWER ADJUST" setting to obtain 48 KW on the "POWER OUT" meter.

2.1.10 After 10 minutes, log initial temperature and temperature readings at 30 minute intervals from the "HYDROGEN RECOMBINER HEATER PLATE TEMP" meter on 2ELCO0299 (AB-577, DD-62, Rm 484) for each of the 3 thermocouples by selecting them individually on the "TEMP SELECTOR" switch, until temperatures stabilize at less than 1400°F. Record temperatures on Enclosure 4.11 (Hydrogen Recombiner Outlet Temperature Log).

—— 2.2 To place Hydrogen Recombiner 2B in service, perform the following at Hydrogen Recombiner Control Pnl 2B 2ELCP0140 (AB-560, DD-62):

☐ 2.2.1 Ensure the "POWER OUT SWITCH" is in the "OFF" position.

☐ 2.2.2 Ensure the "POWER ADJUST" potentiometer is set to zero (000).

☐ 2.2.3 Verify that the white "POWER IN AVAILABLE" light is lit.

☐ 2.2.4 If the "POWER IN AVAILABLE" light is <u>not</u> lit, ensure breaker 2EMXL-F07C (Electric Hydrogen Recombiner Power Supply Panel 2B) (AB-560, BB-66) is in the "ON" position.

☐ 2.2.5 Place the "POWER OUT SWITCH" in the "ON" position and verify that the red indicating light is lit.

CAUTION: Do <u>not</u> allow the "HYDROGEN RECOMBINER HEATER PLATE TEMP" to exceed 1400°F.

☐ 2.2.6 Slowly turn "POWER ADJUST" potentiometer clockwise until 5 KW is indicated on the "POWER OUT" meter. Maintain a 5 KW output for 20 minutes.

☐ 2.2.7 Slowly advance the "POWER ADJUST" setting until an output of 10 KW is obtained on the "POWER OUT" meter. Maintain a 10 KW output for 10 minutes.

☐ 2.2.8 Slowly advance the "POWER ADJUST" setting until an output of 20 KW is obtained on the "POWER OUT" meter. Maintain a 20 KW output for 5 minutes.

☐ 2.2.9 Slowly advance "POWER ADJUST" setting to obtain 48 KW on the "POWER OUT" meter.

2.2.10 After 10 minutes, log initial temperature and temperature readings at 30 minute intervals from the "HYDROGEN RECOMBINER HEATER PLATE TEMP" meter on 2ELCO0300 (AB-560, DD-62, Rm 360) for each of the 3 thermocouples by selecting them individually on the "TEMP SELECTOR" switch, until temperatures stabilize at less than 1400°F. Record temperatures on Enclosure 4.11 (Hydrogen Recombiner Outlet Temperature Log).

2.3 When hydrogen recombiner operation is no longer required for containment heatup, perform the following:

_____ 2.3.1 To shutdown Hydrogen Recombiner 2A, perform the following at Hydrogen Recombiner Panel 2A 2ELCP0139 (AB-570, DD-62):

_____ 2.3.1.1 Adjust the "POWER ADJUST" potentiometer to zero (000).

_____ 2.3.1.2 Turn the "POWER OUT SWITCH" to the "OFF" position.

_____ 2.3.2 To shutdown Hydrogen Recombiner 2B, perform the following at Hydrogen Recombiner Panel 2B 2ELCP0140 (AB-560, DD-62):

_____ 2.3.2.1 Adjust the "POWER ADJUST" potentiometer to zero (000).

_____ 2.3.2.2 Turn the "POWER OUT SWITCH" to the "OFF" position.

2.4 Do not file this enclosure in the Control Copy folder of this procedure.

1. Initial Conditions

——— 1.1 Review the Limits and Precautions.

——— 1.2 Verify the Unit is in Mode 5, 6 or No Mode.

——— 1.3 Verify necessity to use the Containment Air Return Fans to recirculate the air in Upper and Lower Containment.

NOTE: If this enclosure was entered per AP/2/A/5500/026 (Loss Of Refueling Canal Or Spent Fuel Pool Level), step 1.4 may be N/Aed.

——— 1.4 Verify Radiation Protection has approved air flow from lower to upper containment.
Person notified _____

——— 1.5 Verify at least one of the following conditions exist for recirculation path:

☐ Control Rod Drive Missile Shield removed
☐ One NC Pump hatch removed.

——— 1.6 Verify ice condenser lower inlet doors have been mechanically blocked by Maintenance.

2. Procedure

2.1 If Containment Air Return Fan 2A is to be manually operated, perform the following:

2.1.1 Obtain the following keys from WCC and proceed to CPCS Control Cab 2CPCC1 (AB-577, BB-63):

- Key #776 for 2NSPT5160
- Key #781 for 2NSPT5170

——— 2.1.2 Place the following key switches on 2CPCC1 in the "TEST" position:

☐ "2NSPT5160 CONTROLS FOR AIR RETURN FAN PERMISSIVE"
☐ "2NSPT5170 CONTROLS FOR AIR RETURN FAN PERMISSIVE"

——— 2.1.3 If "VX AIR FAN2A PERMIT" is <u>not</u> lit on 2CPCC1, then have IAE adjust potentiometer "AB" in 2CPCC1 until the permit light illuminates.

——— 2.1.4 Verify the following key-operated test switches are in the "OFF" position:

☐ "ARF-2A TEST" (2ELMC0020, AB-594, HH-58)
☐ "ARF-D-2 TEST" (2ELMC0020, AB-594, HH-58)

2.1.5 Obtain Key #780 for ARF-2A from WCC.

_____ _____ 2.1.6 Place "ARF-2A CONT AIR RETURN FAN" switch in the "ON" position (rear of 2MC4).

_____ _____ 2.1.7 Open "ARF-D-2 ARF-2A RET FAN DAMPER" (rear of 2MC4).

NOTE: ARF 2A is now in manual operation, the following steps will return the system to normal alignment.

_____ _____ 2.1.8 Press "PHASE B CONT ISOL TRAIN A RESET" switch located on 2MC11.

_____ _____ 2.1.9 Place "ARF-2A CONT AIR RETURN FAN" switch in "AUTO" position (rear of 2MC4).

_____ _____ 2.1.10 Close "ARF-D-2 ARF-2A RET FAN DAMPER" (rear of 2MC4).

_____ 2.1.11 Remove ARF-2A key from control switch and return to WCC.

2.1.12 Place the following key switches at CPCS Control Cab 2CPCC1 (AB-577, BB-63) in the "NORMAL" position.

_____ _____ • "2NSPT5160 CONTROLS FOR AIR RETURN FAN PERMISSIVE"
_____ _____ • "2NSPT5170 CONTROLS FOR AIR RETURN FAN PERMISSIVE"

_____ 2.1.13 Remove the keys from switches operated in Step 2.1.12 and return them to WCC.

NOTE: ARF-2B is now in normal alignment per Enclosure 4.4 (Alignment of the Containment Air Return System For Standby Operation).

2.2 If Containment Air Return Fan 2B is to be manually operated, perform the following:

2.2.1 Obtain the following keys from WCC and proceed to CPCS Control Cab 2CPCC2 (AB-560, BB-63):

- Key #772 for 2NSPT5240
- Key #782 for 2NSPT5250

_____ 2.2.2 Place the following key switches on 2CPCC2 in the "TEST" position:

☐ "2NSPT5240 CONTROLS FOR AIR RETURN FAN PERMISSIVE"
☐ "2NSPT5250 CONTROLS FOR AIR RETURN FAN PERMISSIVE"

——— 2.2.3 If "VX AIR FAN2B PERMIT" is not lit on 2CPCC2, then have IAE adjust potentiometer "AB" in 2CPCC1 until the permit light illuminates.

——— 2.2.4 Verify the following key-operated test switches are in the "OFF" position:

☐ "ARF-2B TEST" (2ELMC0021, AB-594, LL-62)
☐ "ARF-D-4 TEST" (2ELMC0021, AB-594, LL-62)

2.2.5 Obtain Key #780 for ARF-2B from WCC.

——— ——— 2.2.6 Place "ARF-2B CONT AIR RETURN FAN" switch in the "ON" position (rear of 2MC4).

——— ——— 2.2.7 Open "ARF-D-4 ARF-2B RET FAN DAMPER" (rear of 2MC4).

NOTE: ARF 2B is now in manual operation, the following steps will return the system to normal alignment.

——— ——— 2.2.8 Press "PHASE B CONT ISOL TRAIN B RESET" switch located on 2MC11.

——— ——— 2.2.9 Place "ARF-2B CONT AIR RETURN FAN" switch in "AUTO" position (rear of 2MC4).

——— ——— 2.2.10 Close "ARF-D-4 ARF-2B RET FAN DAMPER" (rear of 2MC4).

——— 2.2.11 Remove ARF-2B key from control switch and return to WCC.

2.2.12 Place the following key switches at CPCS Control Cab 2CPCC2 (AB-560, BB-63) in the "NORMAL" position.

——— ——— • "2NSPT5240 CONTROLS FOR AIR RETURN FAN PERMISSIVE"
——— ——— • "2NSPT5250 CONTROLS FOR AIR RETURN FAN PERMISSIVE"

——— 2.2.13 Remove the keys from switches operated in Step 2.2.12 and return them to WCC.

NOTE: ARF-2B is now in normal alignment per Enclosure 4.4 (Alignment of the Containment Air Return System For Standby Operation).

2.3 Do not file this enclosure in the Control Copy folder of this procedure.

Enclosure 4.19

Operation of the Containment Hydrogen Purge Blower for Checkout

1. Initial Conditions

_____ 1.1 Review the Limits and Precautions.

_____ 1.2 Verify Unit 2 is in Mode 5, 6 or No Mode.

_____ 1.3 Verify VP is in service per OP/2/A/6450/015 (Containment Purge System).

_____ 1.4 Verify Refueling Containment Integrity is **NOT** in effect.

_____ 1.5 Verify leak rate testing of penetration M332 is **NOT** in progress per PT/2/A/4200/041D (Containment Hydrogen Sample and Purge Isolation Valve Leak Rate Test).

2. Procedure

_____ 2.1 Ensure valves are aligned per Enclosure 4.6 (Hydrogen Purge Valve Checklist).

_____ 2.2 Ensure valves are separately verified per Enclosure 4.7 (Hydrogen Purge Separate Verification Valve Checklist).

_____ _____ 2.3 Remove lock on 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) (AB-560, BB-63, Rm 362).

_____ _____ 2.4 Place 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) in the "ON" position.

_____ 2.5 **IF** Containment Closure is in effect, comply with the requirements of PT/2/A/4200/002C (Containment Closure Verification (Part 1)) and OP/0/A/6100/014 (Penetration Control for Mode 5 and 6) for opening penetration M332.

2.6 Open the following valves (rear of 2MC5):

_____ _____ • "2VY-12 VY INLT BLWR CONT ISOL"
_____ _____ • "2VY-15B VY INLT BLWR DISCH ISOL"

NOTE: The Containment Hydrogen Purge Blower will exhaust into upper Containment at a flow rate of 100 scfm; VP operates at ~ 12,500 scfm per train. If VP flow adjustment is needed per the following step, only small changes will be required.

2.7 **IF** the equipment hatch or airlock is open, adjust VP as necessary per OP/2/A/6450/015 (Containment Purge System) to ensure that air flow is inward through the hatch/ airlock while the Containment Hydrogen Purge Blower is in operation.

_____ 2.8 Start the "VY INLET BLWR".

_____ 2.9 **WHEN** operation of the Containment Hydrogen Purge Blower is no longer required, stop the "VY INLET BLWR".

2.10 Close the following valves:

_____ _____ • "2VY-12 VY INLT BLWR CONT ISOL"
_____ _____ • "2VY-15B VY INLT BLWR DISCH ISOL"

_____ _____ 2.11 Place 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B) (AB-560, BB-63, Rm 362) in the "OFF" position.

_____ _____ 2.12 Lock 2EMXD-F07C (Cont H_2 Purge Inlet Blower Disch Valve 2VY-15B).

_____ 2.13 Ensure that the following Model W/O's are scheduled to ensure that penetration M332 is tested prior to the Unit entering Mode 4:

- 98154143
- 98154147

2.14 Do **NOT** file this enclosure in the Control Copy folder of this procedure.